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The Association Between Protective Behavioral Strategies and Alcohol-related Problems: An Examination of Race and Gender Differences among College Drinkers

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Abstract

This study examined race and gender differences in use of specific types of protective behavioral strategies (PBS) and the moderating effects of race and gender on the relationship between PBS use and alcohol problems, controlling for alcohol use, among a large sample of Asian, Black, and White college drinkers. There were significant racial and gender differences in the types of PBS used. Moderation analyses indicated that PBS were more protective for women than men against experiencing alcohol-related problems. There were no significant race effects or race-by-gender interaction effects on alcohol problems. Implementing PBS may be beneficial for *all* college students.

Keywords

race; gender; PBS; alcohol-related problems; college students

Alcohol consumption among emerging adults (ages 18-25) in the United States varies by race, with White emerging adults (ages 18-25) typically drinking in greater quantities than Black and Asian emerging adults (Aud, Fox, & KewalRamani, 2010; Johnston, O'Malley, Bachman, & Schulenberg, 2013). For example, 68% of White emerging adults, compared to 50% of Black and Asian emerging adults, report past month alcohol use (Aud et al., 2010). Furthermore, rates of alcohol problems are lower for Black and Asian than White 18- to 29-year-olds; in 2001/2002 rates for past year abuse were 4% for Black and Asian 18- to 29-year-olds, compared to 8% for White 18- to 29-year-olds, and rates for past year dependence were 6% and 7% versus 11%, respectively (Grant et al., 2004). Despite the overall lower levels of consumption and drinking problems among Black and Asian 18- to 29-year-olds, rates of abuse and dependence have been increasing relatively more for Black and Asian than for White 18- to 29-year-olds. For example, between 1991/1992 and 2001/2002 rates of past year alcohol abuse increased less than 1% among White 18-29-year-olds, whereas rates increased by 75% for Black 18-29-year-olds and 115% for Asian 18-29-year-olds (Grant et

al., 2004). Thus, it is important to understand patterns of drinking and related problems among Black and Asian populations of emerging and young adults to develop prevention and intervention efforts tailored to their specific needs. College students are a particularly important subpopulation of emerging adults to target because alcohol-related problems are highly prevalent among them during this transitional time period (White & Rabiner, 2012).

One type of intervention that is easy to implement, can be taught in one session, and is linked to lower levels of alcohol use and related problems among college students is teaching/increasing the use of protective behavioral strategies (PBS) when drinking (Benton, Benton, & Downey, 2006; Martens et al., 2004). PBS are specific cognitive-behavioral strategies that can be employed to reduce risky alcohol consumption prior to and during drinking, and to limit harm from drinking (Martens et al., 2005). However, PBS use among minority groups has not been adequately explored in the literature. Specifically, studies have not examined race by gender differences in the frequency of use of specific types of PBS at the item level, and/or have not controlled for race and gender differences in drinking behavior when examining race and gender differences in the outcomes of PBS use. Accordingly, this study examined the relationship between PBS and alcohol-related problems in a large sample of White, Black, and Asian male and female students from several colleges across the United States. The current study examined (a) whether racial and gender differences exist in the types and amount of PBS used, and (b) whether the overall use of PBS protects college students from experiencing alcohol-related problems differently for White, Black, and Asian students; for male and female students; and for race by gender groups. This understanding can better inform current and future prevention and intervention programs for college students.

Race and Gender Differences in PBS Use

The few studies of college students that have examined PBS use among different racial groups have primarily explored differences in the frequency of utilizing different types of PBS. For example, studies have found that relative to White students, Asian students were more likely to utilize PBS that limited the amount they drank (e.g., alternate between alcoholic and nonalcoholic beverages; decide not to exceed a certain limit) and less likely to utilize harm reduction strategies (i.e., strategies that reduce risks of being exposed to or causing negative consequences once one has drank, such as using a designated driver or knowing where your drink is all night) (LaBrie, Lac, Kenney, & Mirza, 2011; Nguyen, Walters, Wyatt, & DeJong, 2011).

Although the results regarding utilization of specific types of PBS among Asian students are consistent across studies, findings for Black students are less consistent. Some studies reported that Black and White students did not differ in their utilization of harm reduction strategies (Madson, Arnau, & Lambert, 2013; Madson & Zeigler-Hill, 2013) or avoidance strategies (e.g., choose not to drink, avoid drinking games; Lawrence, Abel, & Hall, 2010), whereas other studies found that Black students were less likely to utilize harm reduction and limiting drinking strategies, compared to White students (Lawrence et al., 2010; Nguyen et al., 2011).

Numerous studies have found that women, relative to men, were more likely to utilize PBS, although gender differences in specific types of PBS are unclear, in part because different PBS measures have been utilized in the literature (e.g., Delva et al., 2004; Sutfin et al., 2009; Walters, Roudsari, Vader, & Harris, 2007). To our knowledge, previous studies have not examined whether racial differences in the utilization of specific types of PBS at the item level differ for men and women. An analysis of PBS at the item level across race, gender, and race by gender can inform clinicians, researchers, and school administrators about the most and least commonly used PBS items for a range of college drinkers, which can subsequently be used to better inform intervention strategies.

PBS Use and Alcohol-related Problems

Beyond examining the racial differences in frequency of specific types of PBS use, only two studies, to our knowledge, have explored whether the relationship between PBS and drinking outcomes differ across race. LaBrie and colleagues (2011) conducted a large study with White ($n = 1,224$) and Asian ($n = 368$) heavy-drinking college students. Although White and Asian students utilized different types of strategies as described above, use of PBS was similarly associated with the consumption of fewer alcoholic drinks for both groups. In contrast, Madson and Zeigler-Hill (2013) found that serious harm reduction (e.g., knowing where your drink is at all times) and limiting/stopping strategies (e.g., alternating between alcoholic and nonalcoholic beverages) were more protective for White, compared to Black, students in relation to alcohol quantity and harmful drinking patterns. In terms of alcohol-related problems across race by gender, Madson and Zeigler-Hill (2013) found that limiting/stopping strategies were protective for White men and women and Black men but not for Black women.

Overall, these studies support the buffering effect of PBS on the risks associated with drinking for White and minority groups. However, when examining alcohol-related problems in particular, Madson and Zeigler-Hill (2013) did not take into consideration that there are racial (Aud et al., 2010; Johnston et al., 2013) and gender (Johnston et al., 2013) differences in drinking, which previous studies have found to be strongly correlated with alcohol-related problems (Araas & Adams, 2008; Benton et al., 2006). Without controlling for race and gender differences in drinking, use of PBS across racial groups may be confounded with lower levels of drinking for women and Black and Asian students. Therefore, it is important to control for alcohol use when examining the relationship of PBS use to alcohol-related problems. It is possible that, after controlling for alcohol use (or among those who drink similar amounts), PBS may be more protective for minority (Black and Asian) than majority (White) college students because minorities typically perceive an increased risk of harm from drinking, while White students do not perceive the same level of risk at the same level of drinking (Paschall & Flewelling, 2002). Similarly, women perceive greater social, physical, and sexual risks from drinking, compared to men (Nolen-Hoeksema, 2004). Due to this higher level of perceived risk while drinking, minority students and women may be more inclined to effectively use PBS to protect themselves from short- (e.g., poor grades) and long-term (e.g., underemployment) consequences of heavy drinking. A better understanding of the role that race and gender play in the utilization of PBS and the effectiveness of PBS in limiting negative consequences can inform the development of

culturally-sensitive, efficacious prevention and intervention programs to prevent the development of more severe alcohol problems in the future.

Current Study

The purpose of this study was to examine the relationships among PBS, race, gender, and alcohol-related problems. This study extends the previous work of LaBrie et al. (2011) and Madson and Zeigler-Hill (2013) by controlling for alcohol use and by using a larger pooled sample of White, Asian, and Black college student drinkers from several colleges across the United States. We limited our analysis to White, Asian, and Black students because, across the pooled data set, there were inconsistencies in the assessment of ethnicity (which precluded Hispanic students) and because very small samples existed for some groups (which precluded Native American students).

The first aim was to examine race and gender differences in the types of PBS used by examining the frequency of PBS use at the item level. In addition, we explored whether race differences in the frequency of specific types of PBS differed for men and women. We hypothesized that Black and Asian, compared to White, students, and women, compared to men, would more often utilize different types of PBS. For the second aim, we examined whether race and gender moderated the association between overall PBS use and alcohol-related problems while taking into consideration different levels of alcohol use. We hypothesized that, controlling for the average typical number of drinks per drinking occasion, PBS use would be more protective for Black and Asian than White students and more protective for women than men in terms of experiencing alcohol-related problems. Finally, we explored the effects of the three-way interaction among PBS use, race, and gender on alcohol problems, while controlling for alcohol use.

Methods

Participants

Data came from Project INTEGRATE (Mun et al., 2015; Ray et al., 2014), an integrative data analysis (IDA) study evaluating the efficacy of brief motivational interventions (BMIs) and other individual-focused interventions designed for reducing heavy drinking and related problems among college students. IDA (Curran & Hussong, 2009) refers to a newly emerging approach that involves combining individual-level data from multiple studies that were independently conducted and analyzing the combined data as a single data set in an integrated analysis. Project INTEGRATE combined data from 24 independent studies conducted at public and private colleges in the United States. All studies included in Project INTEGRATE evaluated at least one type of alcohol-focused BMI. Researchers provided de-identified, original data to Project INTEGRATE. The studies included in Project INTEGRATE are a fairly representative sample of BMIs conducted during the past three decades in the United States. These studies are diverse in terms of college campuses from which participants were recruited, demographic characteristics of students, and original investigators (see Mun et al., 2015 for greater detail on study selection).

The present study was initially limited to a subset of 13 studies that included measures of PBS assessed at baseline. We further removed one study in which the baseline assessment was conducted prior to students' matriculation to college, for a total of 12 studies. We also restricted our sample to include only White ($n = 10,534$), Black ($n = 185$), and Asian ($n = 1,292$) undergraduates who were current drinkers (defined as having at least one drink in the past 1 to 3 months, depending on the study). The proportion of Black students is lower than that found nationally due to our selection of only current drinkers for the present study. Furthermore, some studies screened for heavy drinkers and others included only mandated students; these selection criteria would lead to an over-representation of White students and an under-representation of Black students, given the heavier drinking rates of White emerging adults documented above. The majority of participants in the sample were women (61%); approximately 8% belonged to a fraternity or sorority; 44% lived on campus; and 39% were freshmen, 19% sophomores, 20% juniors, and 22% seniors.

Measures

Protective Behavioral Strategies (PBS)—Across all 12 studies, four similarly worded scales were used to assess PBS: the 15-item Protective Behavioral Strategies Scale (Martens et al., 2005), a 10-item Protective Behavioral Strategies assessment from the National College Health Assessment survey (American College Health Association, 2001), 37 items from the Self-Control Questionnaire (Werch & Gorman, 1988), and a 7-item Drinking Restraint Strategies scale (created and used by Wood, Capone, Laforge, Erickson, & Brand, 2007). Response options varied across studies and were recoded to 0 (*never*), 1 (*rarely, seldom, occasionally, or sometimes*; labeled as *rarely* for the rest of the paper), 2 (*usually or often*; labeled as *often* for the rest of the paper), and 3 (*always*) to indicate how frequently participants used each strategy when drinking. From the original four scales, there were eight items that were common across at least five studies and had a sufficiently large sample of participants to test multiple comparisons across race and gender. These eight PBS items were used to analyze the first aim of the paper examining the frequency of specific types of PBS use at the item level. For this analysis, each of the eight items was assessed using a categorical (ordinal) scale reflecting frequency as described above.

For the second aim examining the moderating effects of race and gender on the association of overall PBS use to alcohol problems, we used a PBS latent trait score, which was derived from a separate item response theory analysis (IRT) conducted for Project INTEGRATE (see Mun et al., 2015). This analysis took into account the overall frequency of endorsing PBS as well as the overall pattern of endorsing frequently used vs. less frequently used PBS items across all PBS items. More specifically, a single continuous PBS latent trait score that reflected the overall propensity for participants to use PBS while drinking was estimated using a Generalized Partial Credit Model (GCPM; Muraki, 1992). This IRT analysis, based on the 43 unique items from the scales described above, estimated a PBS trait score for each participant that was normally distributed. Therefore, the PBS latent trait score reflected the overall amount or level of PBS use. The correlations between the latent trait scores and original study scale scores exceeded 0.96 (see Mun et al., 2015 for details on the IRT model).

Alcohol-related problems—Similar to PBS, alcohol-related problems were assessed with several scales including the Rutgers Alcohol Problem Index (White & Labouvie, 1989), the Young Adult Alcohol Problems Screening Test (Hurlbut & Sher, 1992), the Brief Young Adult Alcohol Consequences Questionnaire (Kahler, Strong, & Read, 2005), the Alcohol Use Disorders Identification Test (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993), and the Alcohol Dependence Scale (Skinner & Horn, 1984). These measures assessed the experience of problems within the past 1 month to 1 year, depending on the study. (Note that sensitivity analyses indicated that timeframe did not affect the IRT results; see Mun et al., 2015) Initial responses were dichotomized (0 = *did not occur* and 1 = *did occur*) due to the use of different response options across studies. A total of 68 unique items were then analyzed using a hierarchical, unidimensional two-parameter logistic (2-PL) IRT model extended for multiple groups to create the unidimensional trait score, which reflected the severity of alcohol problems experienced. Note also that through the IRT analysis, the measurement perspective was changed from the number of alcohol-related problems that occurred within a given time frame (i.e., a count variable) to the severity of alcohol-related problems (i.e., a trait score in a normal distribution) (see Huo et al., 2015 for greater technical detail on the overall model, simulation results, and application of the model to the Project INTEGRATE data). The latent trait score correlated on average .83 with the count scores for the separate alcohol problem scales (Mun et al., 2015).

Alcohol use—The average number of drinks per drinking occasion was measured using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) or a single open-ended item depending on the study. The DDQ is a self-report measure that assesses the number of drinks consumed each day during a typical week in the past 1 or 3 months (depending on the study). In order to derive the average typical number of drinks per typical drinking occasion from the DDQ variables, we divided the number of drinks per typical week by the total number of drinking days per typical week. For the single open-ended question, participants were asked to estimate their quantity of alcohol consumption during a typical drinking occasion.

Demographic and control variables—In all analyses, race was dummy coded (i.e., two dummy variables, one for Asian [coded 1] and the other for Black [coded 1]), such that, White participants served as the referent group. Gender was dummy coded 1 = men and 0 = women. Greek affiliation was dummy coded 1 = yes, a fraternity/sorority member or pledged and 0 = no. We also included 11 dummy variables for the 12 studies to account for mean level differences in alcohol problems between studies. The alcohol use variable described above (i.e., average typical number of drinks per occasion) was also included as a covariate.

Analytic Plan

Descriptive analyses include t-tests for gender differences and ANOVAs (with Tukey post-hoc comparisons) for race differences in overall PBS use (i.e., latent trait scores from the IRT analysis discussed previously), alcohol use, and alcohol-related problems. For the first aim, we examined frequencies and proportions of PBS item endorsement across race, gender, and race separately for men and women. A chi-square independence test for each

contingency table was conducted to determine whether the proportion of endorsement in each PBS item was different across the three racial groups, across men and women, and across the three racial groups separately for men and women. Since we examined eight PBS items across many group comparisons, we protected the family-wise α rate of 5% by using the Holm's sequential multiple comparison procedure (Holm, 1979). To understand the nature of the associations found in the chi-square independence tests, multinomial logistic regressions were performed with the significant PBS items as dependent variables and race dummy variables as predictors for the total sample and separately for men and women.

For the second aim, regressions with alcohol-related problems as the outcome variable were conducted to test its associations with race, gender, and the overall PBS measure (i.e., the latent trait PBS scores from the IRT analysis discussed previously), while controlling for number of drinks on a typical drinking occasion, Greek status, and between-study differences in alcohol-related problems. Two-way and three-way centered interaction terms were then examined to determine whether the relationship between PBS and alcohol problems differed by race, gender, and race by gender.

Because all the participants were nested within studies, standard errors for all estimates were adjusted using complex samples analysis (i.e., sandwich-type estimation; Froot, 1989; Huber, 1967; White, 1980), which compensates for the interdependence between participants within studies during the estimation procedure. We also weighted the data to adjust for the disproportionate sample sizes across studies by using an inverse of the square root of each study's sample size. By using this weighting method, we slightly increased the influence of participants from smaller studies and slightly decreased the influence of participants from larger studies on our estimates, although larger studies overall maintained relatively greater influence. This type of weighting system has been used in previous studies (e.g., Clarke, Kim, White, Jiao, & Mun, 2013).¹ Note that the weighting in the current study adjusts for disproportionate sample sizes across studies but not for disproportional racial sample sizes within studies.²

Results

Descriptive Statistics

Means and standard deviations for the latent PBS scores, latent alcohol-related problems scores, and number of typical drinks per occasion across races and genders are presented in Table 1 along with the ANOVA and *t*-test results. All of the six mean difference tests were found to be statistically significant at the $p < .001$. The means for overall PBS use were highest among Asian students, whereas the means for alcohol problems and drinks per

¹The weighting by an inverse of the square root of each sample is a classical strategy in statistics. For example, the standard error of a mean is inversely proportional to the square root of sample size, and is accordingly estimated by inversely weighting the estimated standard deviation using the square root of the sample size. In addition, a square root transformation is often used to minimize the influence of extreme values and thus to normalize non-normal distributions.

²The weighting in the current study slightly adjusts for disproportionate sample sizes across studies but not for disproportional racial sample sizes within studies. However, the largest studies had the smallest percentages of Black students. Thus, the adjustment for discrepant sample sizes in the current study may indirectly and slightly increase the influence of data from Black students on our estimates within the analysis.

typical occasion were highest for White students. Women reported more overall PBS use, whereas men reported higher drinks per typical occasion and alcohol problems.

Race and Gender Differences in the Type of PBS Used

Table 2 shows the results from the chi-square independence tests for race differences in frequency of use of each specific type of PBS. Significant racial differences in PBS use were found in six (in bold) out of eight PBS items. These significant differences reflect race differences in frequency of PBS use. However, by subtracting the percentage for the *never* category from 100%, one can also see the percentage who ever use a specific type of PBS. For example, 84.2% of Asian students set limits, compared to 78.1% of Black students and 80.8% of White students. Similarly, one can see the percentage of students who always use a specific strategy. For example 58.7% of White students always used a designated driver, compared to 57.9% of Asian students and 52.7% of Black students.

Multinomial logistic regression analyses were conducted for the overall sample (men and women combined within each race group; not shown) in which the *always* response was the reference category, yielding three possible contrasts, for each PBS item: *never* vs. *always*, *rarely* vs. *always*, and *often* vs. *always*. All the results reported at the PBS item level were statistically significant for all three contrasts listed above, unless noted otherwise. Black and Asian, compared to White, drinkers were more likely to set drinking limits, avoid drinking games, and use friends to moderate their drinking. Also, Asians were more likely to pace drinks to one or fewer per hour relative to Whites. This pacing behavior was not significantly different between Black and White students. Finally, Black and Asian, compared to White, students were more likely to endorse *never* (vs. *always*) using a designated driver and eating before and during drinking.

The analyses of PBS items by gender (all three race groups combined within men and women; not shown) revealed significant gender differences in four of eight PBS items. As hypothesized, women, relative to men, were more likely to endorse specific types of PBS, including setting limits, switching between alcoholic and non-alcoholic beverages, avoiding drinking games, and using social support to moderate their drinking.

Table 3 shows the results of independence tests between each PBS item endorsement and racial groups analyzed separately for men and women. For men, five of the eight items differed significantly by race and, for women seven of the eight items differed significantly by race. As noted above, with the chi-square analysis, it is not possible to distinguish exactly where race differences in the PBS utilization lie. These results are analogous to ANOVA results without post hoc comparisons. Thus, we conducted multinomial logistic regression analyses (Table 4) for the significant PBS items from Table 3 separately by gender. As before, we used the *always* response as the reference category, yielding three possible contrasts: *never* vs. *always*, *rarely* vs. *always*, and *often* vs. *always*. Because we can contrast only one category at a time to a reference category in a multinomial logistic regression, we report three binary logistic regression coefficients in Table 4 for each PBS item.

We provide a couple of detailed examples of how these coefficients can be interpreted for some of the more salient coefficients in Table 4. For the first line under Asian men in Table

4, the three significant negative coefficients, respectively, for *never* vs. *always*, *rarely* vs. *always*, and *often* vs. *always* indicate that, relative to White male students, Asian male students who drank were less likely to never (-1.23), rarely (-1.12), or often (-0.80), compared to always, set limits. Since these coefficients are symmetrical in sign, to avoid double negatives, we can say instead that Asian male students were more likely to *always* set drinking limits, compared to White male students. Black male students were also more likely to endorse setting drinking limits in advance, compared with White male students. For using a designated driver, Asian and Black male students were more likely to *never* (versus *always*) use a designated driver (0.69 and 1.37, respectively), compared to White male students. Among those students who used a designated driver rarely or often, relative to those who always used a designated driver, there were no significant differences by race (regardless of gender). Asian men were more likely to report pacing drinks to one or fewer per hour and using social support to moderate their drinking relative to White men.

Black and Asian women were more likely to use social support to moderate their drinking relative to White women. Black, compared to White, women were also more likely to avoid drinking games and eating before and during drinking. Similar to Asian men, Asian women were more likely than White women to pace their drinks to one or fewer per hour. Finally, both Black and Asian women were more likely than White women to endorse *never* (vs. *always*) using a designated driver.

Gender, Race, and PBS Effects on Alcohol Problems

The second aim examined the effects of overall PBS use on alcohol problems while controlling for alcohol use (i.e., number of typical drinks per occasion) and the other covariates. Regression analyses (see the second column in Table 5) indicated that participants who consumed more alcohol experienced more problems. After controlling for alcohol use, alcohol problems were lower for drinkers with greater tendencies to utilize PBS and men experienced fewer problems than women. In addition, with alcohol use included in the model, there were no racial differences in alcohol-related problems. Members of Greek organizations had an elevated level of problems.

Across all two- and three-way interactions between PBS, gender, and race that were tested, we found one significant interaction effect, which was for PBS $\times$ gender ($B = 0.09$, $t = 2.31$, $p < .05$; see Table 5, the third column). To investigate the significant interaction effect, the relationship between PBS and alcohol problems was plotted for men and women (see Figure 1). Given that PBS was a continuous variable, three points were chosen to illustrate each slope: at the mean and one *SD* above and below the mean PBS score. The negative relationship between PBS and alcohol problems was stronger for women relative to men.

Discussion

This study examined race and gender differences in the utilization of specific PBS items and the moderating effects of race and gender on the relationship between PBS and alcohol problems, while controlling for alcohol use. We found significant race and gender differences in overall PBS use and the frequency of utilization of specific types of PBS. We also found a significant gender by PBS interaction on alcohol problems, indicating that the

relationship between overall PBS use and alcohol problems was stronger for women than men. We did not find significant race $\times$ PBS or race $\times$ gender $\times$ PBS interactions on alcohol-related problems, which suggested that greater use of PBS was similarly associated with fewer problems for Black, Asian, and White college drinkers, when taking into account their different levels of alcohol use.

With regards to racial differences in the use of specific PBS items, item-level results suggested that Asian and Black, compared to White, students were overall more likely to use strategies that lower alcohol consumption. When we examined these racial differences within gender, we found that Black and Asian, compared to White, men were more likely to set limits, while Black and Asian, compared to White, women were more likely to avoid drinking games. Similarly, Asian men and women, and Black women, were more likely to pace their drinks to one or fewer per hour when drinking, compared to their White same-gender peers. Overall, our findings are consistent with previous studies, which found that Black and Asian, compared to White, students were more likely to use strategies that lower alcohol consumption (LaBrie et al., 2011; Madson et al., 2013; Nguyen et al., 2011). Future research should examine whether differences in cultural beliefs can explain these racial differences.

Consistent with previous research, we found that Black and Asian college students, compared to White students, were less likely to use a designated driver (LaBrie et al., 2011; Nguyen et al., 2011). While more than a half of the students reported always using a designated driver for all three race groups, relatively more Black and Asian students reported never using a designated driver, even though these students drank. It is possible that Black and Asian students, regardless of gender, drink less than White students and, therefore, may not reach the legal limit of driving while intoxicated (BAC .08% in the U.S.). For example, Siebert, Wilke, Delva, Smith, and Howell (2003) found that the average BAC for White college students after drinking was .10%, compared to .04% for Black students, suggesting that the latter may feel less impaired to drive, compared to former, and therefore, may not utilize a designated driver. Nevertheless, efforts need to be made to emphasize the utilization of a designated driver strategy for all college students, including minorities.

With regards to the relationship among race, overall PBS use, and alcohol-related problems, our findings revealed that, controlling for average number of drinks per typical drinking occasion, PBS use appears to be similarly associated with less severe alcohol-related problems among Black, Asian, and White college drinkers. Previous studies have also found similar results, when comparing Asian and White students (LaBrie et al., 2011) and Black and White male students (Madson & Zeigler-Hill, 2013). Although more studies are needed to explore race as a moderator of the relationship between PBS and alcohol outcomes, the current findings provide promising evidence that, when controlling for differences in drinking, PBS work equally well among racially diverse college drinkers. We found that after controlling for alcohol use, the magnitude of the association between PBS and alcohol-related problems was stronger for women than men, although the effect size was quite small (difference in $R^2 = 0.002$ or 0.2% variance), which is not unusual for moderation effects. Previous studies found similar results among freshmen (Sutfin et al., 2009) and

undergraduates (Delva et al., 2004; Sutfin et al., 2009) sampled from a single university. Our study extends the current literature by increasing the generalizability of these findings because undergraduate students from different academic years were sampled from several colleges across the United States. Overall, these consistent findings can be interpreted in light of previous studies that suggested that women experience more alcohol-related problems than men at the same levels of alcohol use (Clarke et al., 2013; Skidmore, Murphy, Martens, & Dennhardt, 2012; Sugarman, DeMartini, & Carey, 2009). This difference could be attributed to women, compared to men, typically having less body water and fewer enzymes that metabolize alcohol, leading to greater levels of intoxication (Kay, Taylor, Barthwell, Wichelecki, & Leopold, 2010). Also, college women are more vulnerable to specific types of consequences while intoxicated (e.g., sexual assault; Abbey, Zawacki, Buck, & Clinton, 2001). Therefore, college women may be more aware of their need to be vigilant in protecting themselves from harm by implementing multiple protective strategies that buffer against sexual and other negative consequences while drinking.

These results should be interpreted with caution given the limitations inherent within our study. Although the individual study samples are representative of the racial demographics of their college drinking populations (i.e., predominantly White), there was only a small sample of Black students (60 men, 125 women), which may have attenuated power. Therefore, the results pertaining to Black students, and especially Black men, should be interpreted with some caution. Future research should replicate this study with a larger sample of Black college drinkers.

Another important limitation is that Black students and Asian students were treated as homogenous within-race groups. Treating these racial groups as homogenous may have masked nuanced differences among potential subgroups within Asian and Black college student populations. For example, the rates of alcohol use vary considerably between Caribbean Americans and African Americans and between Japanese and other Asian ethnic groups (Dawson, 1998; Iwamoto et al., 2012; Lum et al., 2009). Unfortunately, the original studies did not collect information on specific subcategories within racial categories to permit such analysis. Furthermore, we excluded Hispanic students because of lack of consistent assessment of Hispanic ethnicity across the original studies and Native Americans due to their small representation in this study (<1% of the sample). Therefore, future research should examine more racial/ethnic groups and subcategory variations within groups.

Despite these limitations, the current study adds to the literature on PBS and alcohol-related problems among diverse college student drinkers because it utilized a large sample of students from several colleges across the United States. Also, the polytomous item-level PBS responses provided a breadth of information that would have otherwise been lost if response options were dichotomized. Examining racial and gender differences in the utilization of PBS at the item level can provide clinicians information that can be used to create preventative messages that incorporate specific protective strategies that each racial/gender group is more likely, as well as less likely, to use because they may reflect different beliefs and values that are salient for each group. At the same time, overall PBS use works similarly for students from different racial and gender backgrounds when the amount of

drinking is accounted for. Thus, this combined knowledge may be helpful when developing a stepped-care approach to alcohol interventions for college students. Overall, this study provides important insight into the association of PBS use with lower rates of alcohol-related problems among diverse college student drinkers, and highlights the importance of promoting PBS use among *all* students.

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Figure 1.
Gender as a moderator of the relationship between Protective Behavioral Strategies (PBS) and alcohol-related problems.

Table 1
Means and Standard Deviations for Protective Behavioral Strategies (PBS) Use, Alcohol Problems and Alcohol Use by Race and Gender

Variable	Race			<i>F</i>	Gender		<i>t</i>
	White <i>M (SD)</i>	Black <i>M (SD)</i>	Asian <i>M (SD)</i>		Men <i>M (SD)</i>	Women <i>M (SD)</i>	
PBS latent trait scores	0.46 _a (0.89)	0.54 _a (1.07)	0.74 _b (0.92)	46.17***	0.28 (0.89)	0.62 (0.88)	-18.85***
Alcohol-related problems latent trait scores	0.40 _a (0.86)	0.16 _b (0.95)	0.32 _b (0.90)	11.73***	0.46 (0.88)	0.34 (0.86)	7.34***
Average drinks per typical drinking occasion	3.49 _a (2.74)	2.81 _b (2.32)	2.97 _b (2.18)	38.90***	4.22 (3.21)	2.89 (2.16)	24.84***

Notes:

M = Mean; *SD* = Standard Deviation; PBS and alcohol problem scores can be interpreted as standard *z* scores, with greater scores indicating greater propensity for PBS use and more severe alcohol-related problems. Means with different subscripts within rows are significantly different at the $p < .05$ based on Tukey's post hoc paired comparisons. The *t*-test for 'average drinks per drinking occasion' was carried out with the Welch-Aspin's adjustment because it failed to meet the Levene's test for homogeneity of variances. *Df*s for *F* tests were 2, 10163; 2, 12001; and 2, 11885 (from top to bottom). *Df*s for *t*-tests were 10163, 12000, and 11884 (7350). The degrees of freedom in the parenthesis for the last *t*-test is the number under the Welch-Aspin's adjustment.

 $p < .001$.

Table 2

Frequency of Protective Behavioral Strategies (PBS) Use by Race

PBS Items	Asian (%)				Black (%)				White (%)			
	N	R	O	A	N	R	O	A	N	R	O	A
1. Determined, in advance, not to exceed a set number of drinks	15.8	42.1	24.0	18.2	21.9	39.1	18.5	20.5	19.2	51.0	20.0	9.9
2. Switched between alcohol and non alcoholic beverages	13.0	53.2	22.7	11.2	24.4	48.4	12.7	14.5	16.8	55.7	18.9	8.7
3. Used a designated driver	7.8	14.2	20.1	57.9	16.6	13.2	17.4	52.7	3.8	13.1	24.4	58.7
4. Avoided drinking games	15.0	49.8	17.5	17.7	20.9	37.9	12.9	28.4	20.9	48.1	18.6	12.4
5. Had a friend let me know when I had enough	20.7	37.4	19.7	22.2	26.2	33.4	13.8	26.7	28.1	44.5	15.6	11.8
6. Ate before and/or during drinking	3.2	23.6	41.5	31.6	7.5	23.4	32.4	36.7	1.2	27.3	46.5	25.0
7. Kept track of how many drinks I was having	4.2	22.0	34.0	39.8	6.2	30.0	28.3	35.6	5.3	29.0	33.1	32.7
8. Paced my drinks to one or fewer per hour	22.8	51.1	14.1	12.0	25.6	48.7	16.1	9.6	24.4	56.3	13.6	5.7

Notes: Items in bold are statistically significant at alpha = 0.05 using the Holm's multiple comparison method. N = *Never*, R = *Rarely*, O = *Often*, A = *Always*.

Table 3

Frequency of Protective Behavioral Strategies (PBS) Use by Race for Men and Women

PBS Items	Men											
	Asian (%)				Black (%)				White (%)			
	N	R	O	A	N	R	O	A	N	R	O	A
1. Determined, in advance, not to exceed a set number of drinks	17.5	43.1	20.4	19.0	21.0	43.3	11.1	24.6	23.3	51.6	17.7	7.4
2. Switched between alcohol and non alcoholic beverages	17.7	54.1	17.7	10.5	30.8	46.9	11.1	11.2	20.4	56.3	16.4	6.9
3. Used a designated driver	9.8	13.4	20.5	56.3	17.7	13.3	17.8	51.3	4.7	15.6	25.8	53.8
4. Avoided drinking games	17.3	51.1	15.9	15.6	16.6	46.0	13.1	24.2	25.7	47.0	17.6	9.8
5. Had a friend let me know when I had enough	23.3	39.4	18.2	19.1	33.6	35.9	12.1	18.4	35.6	44.9	12.0	7.5
6. Ate before and/or during drinking	3.5	23.8	42.0	30.7	16.6	19.5	34.4	29.5	1.3	26.2	47.9	24.7
7. Kept track of how many drinks I was having	3.9	25.1	32.1	39.0	1.5	26.4	38.8	33.3	7.4	32.0	31.5	29.1
8. Paced my drinks to one or fewer per hour	24.2	51.8	13.3	10.6	18.6	56.1	22.1	3.1	30.4	54.6	10.8	4.1

PBS Items	Women											
	Asian (%)				Black (%)				White (%)			
	N	R	O	A	N	R	O	A	N	R	O	A
1. Determined, in advance, not to exceed a set number of drinks	14.3	41.2	26.9	17.5	22.5	36.1	23.7	17.7	16.3	50.5	21.7	11.6
2. Switched between alcohol and non alcoholic beverages	9.0	52.4	27.0	11.7	19.9	49.4	13.8	16.8	14.2	55.2	20.7	9.9
3. Used a designated driver	6.1	14.9	19.7	59.3	15.9	13.2	17.2	53.7	3.2	11.3	23.5	62.1
4. Avoided drinking games	13.2	48.7	18.7	19.3	23.3	33.1	12.8	30.8	17.5	49.0	19.4	14.1
5. Had a friend let me know when I had enough	18.6	35.7	20.9	24.8	22.3	32.0	14.6	31.0	23.0	44.1	18.1	14.8
6. Ate before and/or during drinking	3.0	23.5	41.2	32.3	0.9	26.2	30.9	41.9	1.2	28.0	45.6	25.1
7. Kept track of how many drinks I was having	4.5	19.5	35.6	40.4	9.6	32.6	20.6	37.2	3.8	26.8	34.2	35.2
8. Paced my drinks to one or fewer per hour	21.6	50.5	14.8	13.1	30.3	43.7	12.0	14.0	20.3	57.4	15.5	6.8

Notes: Items in bold are significant using Holm's multiple comparison method. N = *Never*, R = *Rarely*, O = *Often*, A = *Always*.

Table 4
Multinomial Logistic Regression Analysis Results for Significant Protective Behavioral Strategies (PBS) Items by Race and Gender

Significant Chi-Square PBS Items	Never		Rarely		Often	
	B	SE	B	SE	B	SE
Asian Men						
1. Set drinking limits	-1.23***	0.13	-1.12***	0.18	-0.80***	0.17
3. Used a designated driver	0.69***	0.14	-0.20	0.18	-0.27	0.14
5. Had a friend tell me when I had enough	-1.36***	0.19	-1.07***	0.19	-0.52***	0.18
6. Ate before/during drinking	0.77***	0.15	-0.31***	0.07	-0.35*	0.16
8. Pace my drinks to one or fewer per hour	-1.18***	0.21	-1.00***	0.14	-0.75*	0.32
Black Men						
1. Set drinking limits	-1.30**	0.41	-1.37**	0.46	-1.67**	0.64
3. Used a designated driver	1.37**	0.40	-0.12	0.53	-0.32	0.33
5. Had a friend tell me when I had enough	-0.95*	0.41	-1.12	0.61	-0.89	0.73
6. Ate before/during drinking	2.37***	0.49	-0.47	0.45	-0.51*	0.22
8. Pace my drinks to one or fewer per hour	-0.22	0.65	0.30	0.82	0.99	1.02
Asian Women						
1. Set drinking limits	-0.54	0.32	-0.61**	0.21	-0.20	0.17
3. Used a designated driver	0.69**	0.24	0.33	0.25	-0.13	0.15
4. Avoided drinking games	-0.60*	0.26	-0.32	0.20	-0.35	0.20
5. Had a friend tell me when I had enough	-0.73***	0.14	-0.73***	0.16	-0.37***	0.12
6. Ate before/during drinking	0.65	0.59	-0.43*	0.18	-0.36*	0.17
7. Kept track of my drinks	0.03	0.18	-0.45***	0.09	-0.10***	0.02
8. Pace my drinks to one or fewer per hour	-0.60***	0.13	-0.79***	0.12	-0.70***	0.14
Black Women						
1. Set drinking limits	-0.10	0.30	-0.76	0.39	-0.34	0.49

3. Used a designated driver	1.75***	0.39	0.30	0.32	-0.17	0.24
4. Avoided drinking games	-0.49*	0.24	-1.17***	0.27	-0.20*	0.46
5. Had a friend tell me when I had enough	-0.77**	0.29	-1.10***	0.20	-0.95**	0.33
6. Ate before/during drinking	-0.79***	0.15	-0.58*	0.27	-0.90**	0.30
7. Kept track of my drinks	0.88**	0.33	0.14	0.36	-0.56*	0.25
8. Pace my drinks to one or fewer per hour	-0.32	0.26	-0.10***	0.25	-0.98***	0.08

Notes:

Always is the referent category for PBS frequency; White students are the reference category for race. We report these coefficients only for the items that showed a statistically significant race and gender difference based on a chi-square independence test while protecting family-wise alpha using Holm's procedure.

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 5

Alcohol-related Problems Regressed onto Race, Gender, and Protective Behavioral Strategies (PBS)

Predictors	<u>Without Interaction</u>	<u>With Interaction</u>
	Est (SE)	Est (SE)
Alcohol problems ON		
PBS	−0.21 (0.04) **	−0.25 (0.05) **
Men	−0.14 (0.02) **	−0.18 (0.04) **
Asian	0.06 (0.05)	0.06 (0.05)
Black	−0.06 (0.08)	−0.06 (0.08)
Alcohol use	0.11 (0.02) **	0.11 (0.02) **
Greek	0.16 (0.08) *	0.16 (0.08) *
PBS × Men		0.09 (0.04) *
R^2	0.364	0.366

Notes: Est = Estimate; SE = Standard Error.

Race was dummy coded with White students as the referent group and gender was dummy coded with women as the referent group. All referent groups were coded 0. Standardized estimates were not reported because they were similar to the regression estimates reported in this table. The 11 dummy variables for study were omitted from the table for ease of presentation.

*
 $p < .05$,

**
 $p < .001$.