Associations Between Alcohol Use and Alcohol-Related Negative Consequences Among Black and White College Men and Women

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ABSTRACT. Objective: The gender gap in alcohol use has been narrowing among young adults, while race differences in alcohol problems change throughout the life course, with Whites experiencing more problems before middle adulthood and Blacks experiencing more after. Yet, there is a paucity of research on the intricate relationship among gender, race, alcohol use, and alcohol problems in emerging adults. The present study addressed this gap in the literature. **Method:** The sample included White ($n = 14{,}772$) and Black ($n = 458$) college students from multiple colleges across the United States (59% female; 51% freshmen; $M_{age} = 20$ years). **Results:** With alcohol use levels adjusted for, women were more likely to report consequences related to damage to self and dependence-like symptoms than men. There were no significant race differences in either the type or the number of alcohol problems. Further, there was no Race × Alcohol Use interaction in relation to alcohol problems. We found a statistically significant interaction between gender and alcohol use in predicting alcohol problems, suggesting that, at higher levels of drinking, the risk for women to experience alcohol problems was significantly greater than that for men. **Conclusions:** The reverse race gap in alcohol use and problems may not surface until young adulthood or may not be relevant for those who attend college. College interventions should help both Black and White students reduce problems associated with drinking and focus on limiting harm among female students. (*J. Stud. Alcohol Drugs, 74,* 521–531, 2013)

SUBSTANTIAL RESEARCH HAS DOCUMENTED that there are racial/ethnic and gender differences in alcohol use and alcohol-related negative consequences (Alvanzo et al., 2011; Caetano et al., 1998). However, most epidemiological studies have been restricted to adolescents and middle-aged to older adults (Caetano, 1997; Herd, 1994; Johnston et al., 2012a; Mulia et al., 2009). This restricted focus on specific populations leaves a significant gap in the literature, which limits our understanding of racial/ethnic differences among college students in terms of their experience of alcohol-related negative consequences, especially in relation to their alcohol use. It is important to examine such differences because colleges are becoming more racially diverse, and there is a growing national concern regarding the high rates of heavy drinking and negative consequences among college students. College drinking is associated with severe alcohol-related negative consequences, such as physical impairment (e.g., hangovers, blackouts), poor academic performance (e.g., missing class, failing exams), difficulties with interpersonal relationships (e.g., arguing, fighting with peers), and poor psychological well-being (e.g., increased risk of depression and anxiety; Ham and Hope, 2003).

A better understanding of race/ethnic and gender differences in alcohol use and consequences can lead to the development of prevention and intervention programs that are more uniquely targeted for the potentially different needs of diverse groups, which can move us beyond using the "one-size-fits-all" approach. The current study focused exclusively on race and gender differences, specifically Black and White male and female college students from multiple campuses across the United States. Black and White students were the focus of this study because there is a paucity of research comparing these two groups during college, a time when alcohol use is at its peak.

Race and alcohol-related consequences

Both longitudinal and cross-sectional studies have found that White adolescents drink more and experience more alcohol-related negative consequences than Black adolescents (Barnes et al., 1994). For example, a recent national study of 12th graders found that Blacks reported the lowest rate (11%) of heavy drinking in the past 2 weeks when compared with Whites (26%) and other racial groups (Johnston et al., 2012a). Consequently, White adolescents may be at a higher risk for alcohol-related negative consequences than Black adolescents (Barnes et al., 1994; Curtis et al., 1990).

Drinking increases, however, as Blacks move through young adulthood and into middle age, whereas Whites are more likely to mature out of heavy drinking typically by

their mid-to-late 20s (Jones-Webb, 1998). A recent study showed some evidence of this reversal in alcohol use patterns. Lee et al. (2010) examined two cohorts of Black and White male adolescents from a community sample from childhood into emerging adulthood. They found that among the younger cohort (followed from ages 8 to 19 years), Blacks were less likely to drink than Whites, and this racial gap increased through age 19. Also, Black drinkers had fewer drinks per occasion than White drinkers, and this gap also increased through age 19. However, in the older cohort (followed from ages 12 to 25 years), Black drinkers consumed alcohol significantly more frequently than White drinkers, especially during emerging adulthood. Therefore, the racial gap that existed during adolescence narrowed with advancing age, and Black drinkers started to drink on par with, if not more than, White drinkers. It is unclear what percentage of these youths went to college, which might have affected their drinking patterns during emerging adulthood for Blacks (see Paschall et al., 2005). A difference with age in the relative drinking rates among Blacks, compared with Whites, may be the result of Blacks feeling more marginalized from economic and employment services. Consequently, they may use alcohol as a coping mechanism (Barr et al., 1993), and this change may start to happen during college. For example, a recent longitudinal study of racially diverse college students identified that discrimination was linked to alcohol-related problems through negative affect and coping motives (Hatzenbuehler et al., 2011). Thus, these results suggest that emerging adults, ages 18–24 years, are an important population to study to better understand how Blacks emerge as a vulnerable group for alcohol-related problems in adulthood.

A few studies have examined race, alcohol use, and alcohol-related consequences among college students. These studies have found that Whites, compared with Blacks, experienced more alcohol-related problems overall, specifically more of certain types of alcohol problems (e.g., poor class attendance, interpersonal conflict, and engaging in behavior that they later regretted; Siebert et al., 2003; Williams et al., 1993). However, findings from these existing studies should be interpreted with caution because of the small number of Black students and the use of a single college sample (Hatzenbuehler et al., 2011; Siebert et al., 2003; Skidmore et al., 2012; Williams et al., 1993). Most importantly, in many of the studies that examined racial differences in alcohol-related problems, racial differences in alcohol use were not considered (e.g., Williams et al., 1993). To better understand racial differences in alcohol-related problems among this age group, it is important to examine this issue in the context of alcohol use, especially given that alcohol use patterns change with age differently for Blacks and Whites.

One notable exception with respect to controlling for alcohol use is a recent study conducted by Skidmore and colleagues (2012). They examined the relationships between race and alcohol-related problems, and between gender and alcohol-related problems, after controlling for drinking using a modest sample (n = 451; 32% men) of Black (37%) and White (63%) college students. The results showed that White students endorsed significantly more problems than Black students and that female students experienced more problems than male students when different drinking levels across these groups were controlled for.

Gender and alcohol-related consequences

Gender is a significant correlate of both alcohol use and alcohol-related consequences among adolescents, college students, and older adults (Ham and Hope, 2003; McCabe, 2002; O'Malley and Johnston, 2002; Perkins, 2002). Male college students typically engage in more heavy episodic and daily drinking than female students, a phenomenon linked to greater alcohol-related problems among college men (Engs and Hanson, 1990). However, a more recent epidemiological study reported that the prevalence of alcohol use is becoming fairly equal for men and women (Johnston et al., 2012b). For instance, in 2011, 65% of male and 63% of female college students reported using alcohol in the past month, although men drink more often and in greater quantity than women.

Research has found that women are more susceptible to the biological and psychological negative consequences of alcohol than men (Ham and Hope, 2003). One explanation for the greater vulnerability in women, given the same levels of drinking, is the result of women typically having lower body weight, greater fat relative to muscle, and fewer enzymes that metabolize alcohol than do men. These differences can lead to a greater concentration of ethanol in the bloodstream for women compared with men (Kay et al., 2010). These biological vulnerabilities place women at greater risk for complications from heavy alcohol use, which is very prominent during college. Thus, it is important to examine alcohol-related consequences across gender in the context of different drinking levels (i.e., adjusting for alcohol use). Two studies examined gender differences in consequences, and both found that women reported more consequences than men when alcohol use was controlled (Skidmore et al., 2012; Sugarman et al., 2009). In addition, Skidmore et al. (2012) found a nonsignificant interaction effect between race and gender on alcohol-related negative consequences, suggesting that this greater disadvantage for women is similar for Black and White women.

Previous studies may have underestimated the negative consequences that women experience from alcohol, in part, because of the screening measures used to assess alcohol problems. For example, the CAGE (Ewing, 1984), a screening measure that has been used to assess alcohol-related problems among college students, has been found to have low predictive power among college women (O'Hare and Tran, 1997). Nonetheless, available research has found that

women typically endorsed consequences related to damage to self, whereas men were more likely to endorse consequences related to harm to others and damage to property (Perkins, 2002; Robbins and Martin, 1993; Sugarman et al., 2009). Therefore, it is important to consider the different types of consequences experienced when examining gender differences in alcohol-related consequences. The current study used the Rutgers Alcohol Problem Index (RAPI; White and Labouvie, 1989), which contains mostly unbiased items, as reported by Earleywine and colleagues (2008). More specifically, Earleywine et al. (2008) found that college women were more likely to endorse the following items from the RAPI: "passed out or fainted suddenly" and "went to work or school high or drunk," whereas men were more likely to endorse "missed out on other things because you spent too much money on alcohol" and "kept drinking when you promised yourself not to." In that study, the remaining items were bias free. Understanding the observed male and female differences in types of consequences experienced may provide useful information to design prevention and intervention programs for college students.

Current study

The purpose of the current study was to examine the type and number of alcohol-related negative consequences experienced by Black and White college students using a large sample of students from several different colleges. The goals of the current study were twofold. First, this study aimed to extend the work of Skidmore et al. (2012) using a larger sample of Black and White college students from multiple university campuses and using a more sophisticated analytical method to ensure unbiased results. Specifically, we used Poisson regression to accommodate the positively skewed distribution of alcohol-related problems and log-transformed the alcohol use variable (control variable). Furthermore, we used the Holm procedure (Holm, 1979) to protect the familywise alpha rate (see Analytic Plan for detail).

Second, and more important, we examined the interactions between race and drinking and between gender and drinking to probe how drinking might differentially affect consequences for one group compared with the other. This approach probes the possibility that, for example, female or Black students may experience greater problems when their drinking is at the high (vs. low) end of the drinking spectrum. We also explored a three-way interaction among race, gender, and alcohol use to probe whether differences in drinking patterns by race and gender may be associated with the total number of consequences experienced.

We expected to find significant race and gender differences in the types of consequences endorsed. We also anticipated that, without controlling for drinking, White students and men would endorse more consequences than Blacks and women, respectively. However, when we controlled for drinking, we expected that these differences would disappear. In addition, we expected that at the high (vs. low) end of the drinking spectrum, female and Black students would experience greater problems compared with their respective counterparts (i.e., men and Whites).

Method

Participants

Data came from Project INTEGRATE (Mun et al., 2011). Of the 24 studies included in the Project INTEGRATE data set, pooled data from 15 independent studies conducted at public and private universities across the United States were collectively analyzed in the present study because these studies included the RAPI items. All studies were designed to assess the efficacy of brief alcohol interventions for college students and were conducted between 1990 and 2007. Participant recruitment and selection varied across these studies, ranging from volunteer students recruited with flyers to mandated students who were sanctioned to complete an alcohol assistance program because they violated university rules and regulations about alcohol. We used baseline screening assessment data, which included both eligible and ineligible students for the intervention studies. For this analysis, we limited the sample to only White (n = 14,772; 97.0%) and Black (n = 458; 3.0%) undergraduates who were current drinkers (i.e., drank in the last 1 or 3 months, depending on the study). Approximately 91% of Blacks and 95% of Whites were current drinkers. Fifty-nine percent were female, 51% were freshmen, 21% belonged to a sorority or fraternity, and the mean age of the sample was 20 years old (SD = 3.48). All frequencies and descriptive statistics reported were based on complex sample analysis (see Analytic Plan).

Measures

Alcohol-related negative consequences. We used the short (18-item) version of the RAPI (White and Labouvie, 1989) to measure alcohol-related negative consequences. The RAPI covers many different types of serious (as well as less serious, but common) consequences, allowing us to differentiate among men and women in their reporting of different types of consequences (Earleywine et al., 2008). In this study, the RAPI time frames ranged from the past 1 to 6 months (we controlled for time frame, see below). Frequency counts were dichotomized into 0 = did not occur and 1 = did occur due to the different response options across studies. The total count score ranged from 0 to 18, with higher scores indicating more problems. Martens et al. (2007) found that the dichotomized RAPI was reliable and valid among college students.

Alcohol use. The Daily Drinking Questionnaire (Collins et al., 1985) is a self-report measure that is designed to assess
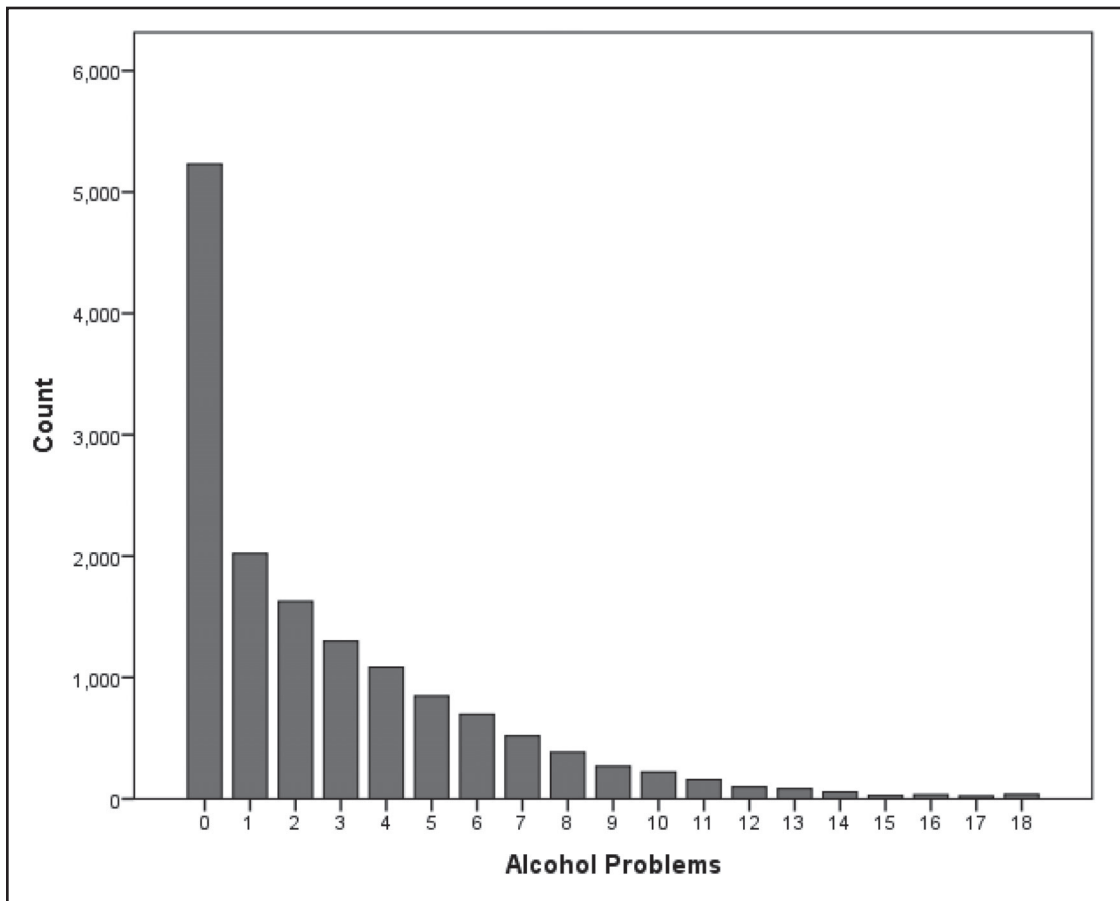
FIGURE 1.   Distribution of Rutgers Alcohol Problem Index (RAPI) total scores (sum of 18 binary RAPI items), which was positively skewed with a skewness of 1.582 (*SE* = 0.020) and a kurtosis of 2.651 (*SE* = 0.040)

the quantity and frequency of alcohol consumption each day during a typical week in the past 1 or 3 months (depending on the study). We included current drinkers only, defined as having at least one standard drink of alcohol during a typical week within the past month or 3 months.

Demographic variables. Race and gender were dummy coded. Black was coded as 1, and male was coded as 1.

Control variables. We controlled for the differences across the original studies by including 14 dummy variables. Also, by using two dummy variables, we controlled for the effects of the time frame differences, for which the consequences were measured (i.e., within the last month, 3 months, and 6 months). Six months was used as the reference group.

Analytic plan

To examine whether the type of alcohol problem experienced was different across race and gender, univariate logistic regressions were performed between each dichotomized alcohol problem and race and between each problem and gender, with and without adjusting for levels of alcohol use. Alcohol use was log-transformed because its distribution was highly positively skewed (unlogged variable for drinks per week had a skewness of 2.76 and a kurtosis of 13.40). Because we performed 18 tests at the same time, we protected the family-wise α rate of .05 by using the Holm's multiple comparison method (Holm, 1979).

A total alcohol problem score (i.e., sum of 18 binary RAPI scores) was created. The total scores ranged from 0 to 18 (*M* = 2.7, *SD* = 3.3), and the distribution of these scores is presented in Figure 1. The distribution of this variable was positively skewed and monotonically decreasing. Thus, this did not meet the assumption required for ordinary least squares regression. Therefore, we conducted Poisson regression analysis. In the Poisson regression, the nonlinear relationship between the total alcohol problem scores and the predictors was adjusted by log-transforming the dependent variable, the total RAPI score. As discussed above, alcohol use was also log-transformed in the logistic regression because the distribution was highly skewed, and it showed evidence of heteroscedasticity in residuals and a nonlinear

TABLE 1. Individual RAPI items and rates of problems endorsement by race and gender

	Race		Gender	
	White (n = 14,772) %	Black (n = 458) %	Female (n = 8,967) %	Male (n = 6,263) %
RAPI items				
Not able to do homework	23.3	12.9	22.6	23.7
Got into fights	21.0	16.0	18.5	24.1
Missed out on other things	13.4	10.2	11.2	16.3
Went to work or school high or drunk	14.3	12.7	11.3	18.4
Caused shame/embarrassment to someone	21.1	16.3	18.1	24.9
Neglected your responsibilities	32.9	17.8	31.9	33.2
Relatives avoided you	2.3	1.5	2.2	2.3
Felt like you needed more alcohol to get the same effect	27.2	13.3	24.9	29.5
Tried to control your drinking	15.5	9.7	14.1	17.1
Had withdrawal symptoms	3.6	3.5	2.9	4.6
Noticed a change in your personality	23.8	17.5	24.4	22.5
Felt you had a problem with alcohol	9.5	4.9	8.4	10.8
Missed a day of school or work	24.7	14.3	23.2	26.1
Suddenly found yourself in a place you cannot remember	19.6	16.2	18.5	20.9
Passed out or fainted	12.9	11.1	11.5	14.7
Kept drinking when you promised not to	14.2	11.9	15.6	12.0
Felt physically or psychologically dependent	7.4	4.8	8.0	6.3
Told by a friend/neighbor to stop or cut down	9.3	6.5	7.9	11.1

Notes: Rates were calculated while taking the complex samples structure with study weights into account. Numbers in parentheses indicate maximum sample size *n,* and sample size slightly varies across items because of missing responses. The maximum sample size was 15,230 for the total, and the minimum sample size for both columns was 14,026. RAPI = Rutgers Alcohol Problem Index.

relationship with the alcohol problems variable. Several Poisson regression models were fit in sequence starting from a simple model. In each model, we included several dummy variables to adjust for the effects of between-study differences and different referent time (in months) for alcohol problems.

In addition, in the present study, individual participants were nested within studies; therefore, individuals within each study were more similar to one another within the study than those in other studies. To accommodate this nested data structure, a sandwich-type standard error estimator (Froot, 1989; Huber, 1967; White, 1980) available in analysis of complex samples was used with appropriate weights to account for differences in sample size across the original 15 studies. This estimator considers that observations were not independent and corrects for standard errors, which, otherwise, would be underestimated. Without this correction, we would risk biased statistical inferences (more false positives with inflated type I errors). Without any specific weight, each subject has the same contribution to the whole model, which results in the contribution of each study proportional to their different sample size. Thus, the overall model across multiple studies will be substantially influenced by large-sample studies, and small-sample studies have very little influence. In the present study, this unbalanced influence across multiple stud-

ies was adjusted by using a weight strategy of an inverse of the square root of each study's sample size. We used IBM SPSS Statistics (Version 20.0; IBM Corp., Armonk, NY) and Mplus (Muthén and Muthén, 1998–2012) for the analyses.

Results

Race and gender differences in the type of alcohol problems

As expected, Whites ($M = 7.96$, $SD = 10.32$) reported significantly, Wald $F(1, 16) = 20.58$, $p < .001$, more drinks per week than Blacks ($M = 4.44$, $SD = 6.03$); and men ($M = 11.08$, $SD = 13.05$) reported significantly, Wald $F(1, 16) = 19.88$, $p < .001$, more drinks per week than women ($M = 5.84$, $SD = 7.28$). Note that the Wald F tests were based on the log-transformed scores using the complex samples design described above, although the means presented here were based on original, unlogged scores for the purpose of easier interpretation. For descriptive purposes, Table 1 shows the percentage endorsing each of the individual RAPI items across race and gender after considering the complex samples design for multiple studies but not controlling for alcohol use. We then performed logistic regression analysis predicting each alcohol consequence to examine separately

TABLE 2. Complex samples logistic regressions without alcohol use controlled (unadjusted) and with alcohol use controlled (adjusted)

	Race (Black = 1)			Gender (Male = 1)		
RAPI items	Unadjusted OR	Adjusted OR	Wald F	Unadjusted OR	Adjusted OR	Wald F
Not able to do homework	0.49	0.91	0.17	1.06	0.55	35.35*
Got into fights	0.72	1.38	2.03	1.40	0.83	4.71
Missed out on other things	0.74	1.38	1.21	1.55	0.93	0.69
Went to work or school high or drunk	0.87	1.76	4.77	1.77	1.06	0.40
Caused shame/embarrassment to someone	0.73	1.23	0.76	1.50	1.02	0.04
Neglected your responsibilities	0.44	0.73	1.87	1.06	0.61	32.49*
Relatives avoided you	0.64	0.98	0.00	1.05	0.73	1.47
Felt like you needed more alcohol to get the same effect	0.41	0.74	1.32	1.26	0.67	23.34*
Tried to control your drinking	0.59	0.94	0.03	1.26	0.86	3.73
Had withdrawal symptoms	0.97	1.96	2.50	1.64	0.94	0.07
Noticed a change in your personality	0.68	0.92	0.20	0.90	0.70	15.95*
Felt you had a problem with alcohol	0.49	0.86	0.20	1.32	0.75	5.86
Missed a day of school or work	0.51	1.02	0.01	1.17	0.60	15.72*
Suddenly found yourself in a place you cannot remember	0.79	1.73	5.65	1.17	0.60	31.88*
Passed out or fainted	0.84	1.59	5.91	1.33	0.81	5.46
Kept drinking when you promised not to	0.81	1.29	1.38	0.74	0.45	43.08*
Felt physically or psychologically dependent	0.63	1.02	0.01	0.77	0.48	45.74*
Told by a friend/neighbor to stop or cut down	0.68	1.22	0.43	1.46	0.86	2.40

Notes: Wald F test statistics are for the adjusted odds ratio (OR). *Represents significance while controlling the family-wise α of .05 with Holm's multiple comparison method. N slightly varies across items because of missing responses (maximum $n = 14{,}792$ and minimum $n = 13{,}976$). RAPI = Rutgers Alcohol Problem Index.

the association of each alcohol consequence with race and with gender in the context of alcohol use (Table 2). The odds ratios greater than 1 indicated that Blacks and men were more likely to experience each alcohol consequence, whereas the odds ratios less than 1 indicated that Whites and women were more likely to experience it.

We first examined race differences in each consequence without controlling for the effect of alcohol use (see unadjusted odds ratios in Table 2). Results were quite comparable to the proportions in Table 1, meaning that Whites generally experienced more problems than Blacks. When we controlled for alcohol use (see adjusted odds ratios and significance tests in Table 2), none of these differences was statistically significant, after applying the Holm's multiple comparison procedure.

Next, we examined gender differences in each consequence, first without controlling for alcohol use (unadjusted odds ratios) and second with controlling for alcohol use (adjusted odds ratios). When alcohol use was not controlled, several gender differences emerged, with male college students showing a higher probability of experiencing alcohol-related consequences than female college students (statistical significance tests not shown). However, after adjusting for their different alcohol use levels and using the Holm's multiple comparison method, female college students had a higher probability of experiencing eight alcohol consequence items than male students. These eight consequences were primarily indicative of dependence-like symptoms (e.g., increased

TABLE 3. Poisson regression results

Step	Predictors	B	SE	t
1	(intercept)	1.56	0.02	83.57***
	Race (Black = 1)	-0.31	0.15	-2.08*
	Gender (Male = 1)	0.14	0.04	3.56***
2	(intercept)	-0.12	0.13	-0.94
	Race	0.10	0.11	0.92
	Gender	-0.20	0.03	-6.03***
	Alcohol use	0.71	0.05	14.36***
3	(intercept)	-0.25	0.14	-1.78
	Race	-0.26	0.25	-1.04
	Gender	0.13	0.10	1.41
	Alcohol use	0.77	0.06	13.64***
	Race × Gender	-0.03	0.18	-0.15
	Race × Alcohol Use	0.18	0.11	1.73
	Gender × Alcohol Use	-0.13	0.03	-3.76***
4	(intercept)	-0.26	0.14	-1.82
	Race	-0.10	0.25	-0.40
	Gender	0.15	0.10	1.53
	Alcohol use	0.77	0.06	13.72***
	Race × Gender	-0.52	0.48	-1.09
	Race × Alcohol Use	0.10	0.11	0.95
	Gender × Alcohol Use	-0.13	0.03	-3.90***
	Race × Gender × Alcohol Use	0.23	0.17	1.33

Notes: The dependent variable was the total sum scores of the 18 dichotomous Rutgers Alcohol Problem Index items. Two dummy variables to control for time frame in months and 14 dummy variables to control for study differences were included as control variables in all steps of the Poisson regression model. N slightly varies across the four models because of missing responses (maximum $n = 14{,}716$ and minimum $n = 14{,}343$).
*$p < .05$; ***$p < .001$.

tolerance, inability to cut back), damage to self (blackouts), and neglecting responsibilities (e.g., missing school, not able to do homework).

Race, gender, and alcohol use in predicting the total number of alcohol problem scores

Table 3 shows the Poisson regression results with the total number of alcohol problems as the outcome variable. We proceeded sequentially. After including the study and time control variables, we tested race and gender differences (Step 1). Both race and gender were significantly (B_{race} = -0.31 and B_{gender} = 0.14) associated with the number of problems experienced. The regression estimates indicated that Blacks on average reported fewer problems than Whites by .73 (= $e^{-0.31}$) times, and men on average reported 1.15 (= $e^{0.14}$) times more problems than women.

In the second step, we added the log-transformed alcohol use variable. As expected, it was statistically significant, and the previously significant race difference was no longer significant. In terms of gender differences, the estimated coefficient for gender, B_{gender}, was -0.20, indicating that at the same levels of alcohol use (i.e., controlling for alcohol use), men reported fewer problems than women by .82 (= $e^{-0.20}$) times. In other words, women experienced more alcohol problems (1.22 times) than men when their different levels

of alcohol use were taken into consideration. The risk for female college students to experience negative consequences went up 1.22 times compared with that of male counterparts per unit of (logged) alcohol use.

In the third step, three two-way interactions (Race × Gender, Race × Alcohol Use, and Gender × Alcohol Use) were added to the second model. Of the three two-way interactions, only the Gender × Alcohol Use interaction was statistically significant (Figure 2). The observation that women experienced more problems than men was much more pronounced at higher levels of drinking. For example, five to seven drinks per week (7 drinks per week for women and 14 drinks for men are the upper limits of moderate drinking; National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2008) would be about 1.8–2 drinks on the log-transformed alcohol use variable, and 15–21 drinks would be about 2.8–3 drinks on the log-transformed variable in Figure 2. In the last step, we tested the three-way interaction effect (Race × Gender × Alcohol Use), which was not statistically significant.

Discussion

This study examined race and gender differences in alcohol-related negative consequences among college students across multiple college campuses in the United States.

FIGURE 2. Gender × Alcohol Use interaction effect on alcohol problems. Both alcohol use and alcohol problems are shown in the units of natural logarithms.

The results indicated that, after controlling for alcohol use, there were no statistically significant differences in the types or total number of consequences experienced among Blacks and Whites. In contrast, there were significant gender differences in types of consequences and the total number of consequences after controlling for alcohol use, which indicated that women experienced more negative consequences than men when alcohol use was taken into consideration. We did not find a significant three-way interaction among race, gender, and alcohol use on the number of alcohol-related negative consequences.

An examination of race differences in alcohol-related negative consequences showed that, as expected, Whites experienced more negative consequences than Blacks. However, when we controlled for alcohol use, Blacks generally had more negative consequences than Whites, although these differences were not statistically significant. Overall, it is possible that the lack of significant findings could indicate that Blacks and Whites are converging in terms of their frequency of experiencing alcohol-related negative consequences. Simply, neither racial group is more or less vulnerable to experiencing negative consequences to alcohol use in a college setting when taking drinking levels into account. Thus, on the surface, Black college students may seem protected from alcohol use and problems. However, for those who drink, they are no more protected than White students from the negative consequences of alcohol.

It has not been well characterized how Blacks and Whites etiologically differ in alcohol use and problems across the life span; therefore, additional research is needed to more closely explore the associations among race, alcohol use, and alcohol-related negative consequences. A better understanding of this complex relationship will help to facilitate the development and implementation of evidence-based interventions on college campuses. Although limited evidence exists to elucidate the efficacy of alcohol interventions for Black college students, a recent study reported that the Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff et al., 1999) was effective in reducing alcohol use relative to computer-based interventions among Black, compared with White, college students (Murphy et al., 2010). Although the Race × Treatment interactions were not statistically significant in either trial reported in Murphy et al., perhaps because of the small number of Blacks (n = 57 in two trials combined), BASICS was promising for Black students. The authors interpreted this finding to mean that BASICS might have been more personalized and culturally relevant for Black students, compared with computerized interventions. Therefore, more epidemiological and intervention studies with larger samples of Black students are sorely needed.

This study found significant gender differences in the types of consequences endorsed by men and women. When we controlled for drinking, men on average endorsed 2 items more often than women, and women endorsed 16 items more often than men, of which 8 items were statistically significant. More specifically, women were more likely than men to experience personal consequences related to neglecting responsibilities ("not able to do homework"), damage to self ("suddenly found yourself in a place you cannot remember"), and dependence-like symptoms ("felt like you needed more alcohol to get the same effect"). This finding is consistent with Sugarman and colleagues (2009), who found that among a sample of 1,331 undergraduates, after controlling for drinks per week and estimated average blood alcohol level, women reported more personal and dependence-like consequences on the RAPI (e.g., developing tolerance, blacking out, and drinking after promising not to) compared with their male counterparts (see also Read et al., 2013).

When alcohol use was included in the Poisson regressions, the results showed that among college students who drink, women are at a greater risk for experiencing more negative consequences when compared with men who drink at the same levels. We found that this differential risk gap emerged near the upper limit of moderate drinking for women and became increasingly widened as women consumed more than moderate levels of alcohol. Grant Harrington and colleagues (1997) previously reported that sorority members who drank four to six drinks on one occasion experienced more problems than fraternity members who drank at similar levels. These two studies suggest that women are at increasingly greater risk for problems at high levels of consumption. Therefore, it is imperative that college campuses institute programs that are geared toward educating college women about the risks of alcohol use and establish routine screenings for alcohol misuse to more accurately identify and refer at-risk women to services (Larimer and Cronce, 2002). In addition, women may need unique interventions that are gender specific in order to reduce the risk of experiencing harmful personal consequences when consuming alcohol. Such interventions need to account for the different gender roles, female socialization, and unique female issues, such as trauma and self-worth.

There was no statistically significant interaction among race, gender, and alcohol use. This suggests that the gender gap in alcohol consequences is similar for Blacks and Whites, provided that their alcohol use levels are the same.

This study was limited in that it did not control for other factors that might have influenced the experience of alcohol-related problems. For example, research has shown that the college environment (4-year vs. 2-year college and presence of a fraternity/sorority system) is related to excessive drinking and alcohol-related problems (Ham and Hope, 2003; NIAAA, 2002). Wechsler and Nelson (2008) examined results from their U.S. college studies conducted over 14 years and concluded that the school, community, and state significantly contribute to alcohol consumption and problems on college campuses. For example, rates of heavy episodic

drinking varied across colleges, but within each college the level of heavy episodic drinking remained relatively stable over time, suggesting that there are factors inherent within each school environment that foster excessive drinking (e.g., location, emphasis on fraternity/sorority and athletic activities, and enforcement of local and state policies related to alcohol within the school and wider community) (Wechsler et al., 2002). In addition, we did not control for individual factors (e.g., impulsivity, depression, expectancies) that have also been shown to predict heavy drinking and alcohol-related problems among college students (White and Jackson, 2004/2005).

This article is based on data from 15 independent studies conducted across the United States. Although these studies used similar measures when assessing drinking and alcohol-related negative consequences, the time frame for these measures varied across studies; however, we controlled for this variation in our analyses. Because of dichotomization of the RAPI items, we were not able to assess the frequency at which students experienced problems, which may have obscured the most severe problem drinkers in the data reported in Tables 1 and 2. For the Poisson regression results reported, however, any impact of dichotomization would be minimal given that the correlations between logged sum of counts and logged sum of frequencies were exceptionally high ($r =$ .97, for example). Additionally, we note that college students are only a subset of emerging adults, although studies have found some similarities in their drinking patterns (White et al., 2005), especially among those who leave their parents' home (White et al., 2006). Longitudinal studies are needed to show how the observed associations change over time to better understand the developmental pathways of alcohol use and problems for Black as well as White college students.

The present study exclusively focused on Blacks and Whites because we were limited by the lack of consistent assessment of Hispanics across the original studies. Asians and Pacific Islanders were also excluded because recent studies report considerable heterogeneity in alcohol use across different Asian subpopulations (e.g., Iwamoto et al., 2012; Lum et al., 2009), and we did not have the necessary information to tease apart these heterogeneous ethnic groups. Given the increasing percentage of Hispanics and Asians and Pacific Islanders residing in the United States, and by extension enrolled in colleges, it is important to explore the associations between alcohol use and problems among these other ethnic/racial groups.

Despite the limitations mentioned above, this study extends the current literature on college drinking and race because it included a broad range of college students from numerous college campuses across the United States and included at-risk and low-risk college students. In addition, advanced statistical analyses were used to fit the models to the data structure. The results from the present study encourage the emphasis on prevention and intervention strategies dur-ing college, which can markedly decrease the development of more severe problems during and after college (Larimer and Cronce, 2002; Skidmore et al., 2012; Wechsler, et al., 2002). In particular, this study suggests that prevention and intervention efforts should target the entire college campus, encompassing several specific population groups with potentially different needs. For example, women should receive specific interventions because they are more vulnerable to the negative effects of alcohol. Similarly, Blacks should receive attention because they are more likely to escalate their drinking after emerging adulthood; therefore, early interventions might prevent this escalation.

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