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Racial/Ethnic Disparities in Alcohol-related Problems: Differences by Gender and Level of Heavy Drinking

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Abstract

Objective—While prior studies have reported racial/ethnic disparities in alcohol-related problems at a given level of heavy drinking, particularly lower levels, it is unclear whether these occur in both genders and are an artifact of racial/ethnic differences in drink alcohol content. Such information is important to understanding disparities and developing specific, targeted interventions. This study addresses these questions and examines disparities in specific types of alcohol problems across racial-gender groups.

Method—Using 2005 and 2010 National Alcohol Survey data (N=7,249 current drinkers), gender-stratified regression analyses were conducted to assess black-white and Hispanic-white disparities in alcohol dependence and negative drinking consequences at equivalent levels of heavy drinking. Heavy drinking was measured using a gender-specific, composite drinking-patterns variable derived through factor analysis. Analyses were replicated using adjusted-alcohol consumption variables that account for group differences in drink alcohol content based on race/ethnicity, gender, age and alcoholic beverage.

Results—Compared to white men, black and Hispanic men had higher rates of injuries/accidents/health and social consequences, and marginally greater work/legal consequences ($p < .10$). Hispanic women had marginally higher rates of social consequences. In main effects models controlling for demographics, light drinking and heavy drinking, only black women and men had greater odds of alcohol-related problems relative to whites. Interaction models indicated that compared to whites, black women had greater odds of dependence at all levels of heavy drinking, while both black and Hispanic men had elevated risk of alcohol problems only at lower levels of heavy drinking. Drink alcohol content adjustments did not significantly alter findings for either gender.

Conclusions—This study highlights the gender-specific nature of racial/ethnic disparities. Interventions focused on reducing heavy drinking might not address disparities in alcohol-related problems that exist at low levels of heavy drinking. Future research should consider the potential role of environmental and genetic factors in these disparities.

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Keywords

racial disparities; alcohol problems; heavy drinking; drink size estimation; gender differences

Considerable evidence suggests that some racial/ethnic minority groups in the U.S. may be particularly prone to experiencing problems associated with heavy drinking (Chartier and Caetano, 2010). Compared to whites, blacks and Hispanics have elevated rates of alcohol-related morbidity and mortality related to general injury, motor vehicle crashes, cirrhosis, homicide and certain alcohol-linked cancers (Hilton, 2006; Keyes et al., 2012; Russo et al., 2004; Stinson et al., 1993; Yoon and Yi, 2007), and black and Hispanic male drinkers are more likely to experience alcohol dependence symptoms and negative drinking consequences (Caetano and Clark, 1998; Kandel et al., 1997). Although it is well documented that high alcohol consumption and binge drinking contribute to alcohol-related problems (Naimi et al., 2003; Rehm et al., 2003), these racial/ethnic disparities cannot be assumed to reflect heavier drinking among blacks and Hispanics. Several studies indicate that even at a given level of consumption or heavy drinking, black and Hispanic drinkers are still at greater risk for negative consequences and alcohol dependence symptoms (Herd, 1994b; Jones-Webb et al., 1997; Mulia et al., 2009). Two of these studies, including our own prior research, found that it is at *lower* levels of consumption and heavy drinking where disparities appear most pronounced (Jones-Webb et al., 1997; Mulia et al., 2009).

If true, this has implications for alcohol screening and brief intervention efforts whose goal is to prevent the development of alcohol problems by reducing heavy drinking. As these evidence-based interventions become increasingly widespread, we can expect to see a decline in alcohol-related problems at the general population level. But among the sizeable segment of the population who seldom, if ever, drinks heavily, the striking racial/ethnic disparities observed in prior research could persist.

Several questions remain to be answered, however. First, it is unclear whether racial disparities in the risk of alcohol problems at a given level of consumption exist among both women and men. Several studies based on national data collected roughly 20 or more years ago suggest that such disparities might be gender-specific. Caetano and Clark (1998), for instance, found that a 10-drink increase in weekly alcohol volume is associated with a much greater risk for alcohol problems in white and Hispanic women than in white and Hispanic men, and black women and men. By contrast, Herd (1994b) found that black men experience more alcohol problems than white men as the frequency of heavy drinking increases (Herd, 1994b). The reverse racial/ethnic disparity was observed among women, with black women overall at lower risk for alcohol problems than white women (Herd, 1993). Yet, a subsequent study found no evidence for black-white disparities in alcohol problems among women in general, nor at a given level of drinking (Jones-Webb et al., 1997). In light of these mixed findings for women, a contemporary re-examination of racial/ethnic disparities in alcohol problems by gender is warranted.

There is also a question of whether the observed disparities may be an artifact of racial/ethnic differences in drink alcohol content. Recent studies show that survey respondents often consume greater alcohol per drink than the U.S. standard of 0.60 ounces of ethanol per

drink. In methodological studies conducted by Kerr and colleagues, beverages consumed at home had an average ethanol content of 0.55 ounces for beer, 0.67 ounces for wine, and 0.84 ounces for spirits drinks (Kerr et al., 2005). In bars and restaurants, similar results were found for spirits drinks, yet beer and wine drinks were even stronger than the standard (Kerr et al., 2008). What is important to note is that black and Hispanic men consumed more ethanol per drink on average relative to white men (i.e., essentially they had larger drinks) (Kerr et al., 2009), and bars serving predominantly black patrons tended to serve larger drinks than bars with mainly white or more ethnically diverse patrons (Kerr et al., 2008).

Finally, to better understand the potential causes of disparities, we need to know the specific types of alcohol-related problems that racial/ethnic minorities are more susceptible to experiencing. Compared to traditional dependence symptoms, negative drinking consequences are arguably more influenced by the drinking context and reactions of individuals and institutions (Babor et al., 2010). For instance, social consequences are partly shaped by how one's spouse and family view the drinking behavior, workplace consequences are influenced by the degree of monitoring and leniency in one's job, and legal consequences are determined in part by one's chances of coming into contact with law enforcement officers.

In the present study we address the three issues described above using recent data from a nationally representative sample of white, black and Hispanic drinkers. Extending prior research, we begin by describing racial/ethnic differences in specific types of negative drinking consequences among women and men separately. We then examine racial/ethnic disparities in the risk for negative consequences and alcohol dependence in gender-stratified models, and consider whether disparities are concentrated at a specific level of heavy drinking. Finally, we examine whether racial/ethnic differences in drink alcohol content help to explain disparities. Based on the small literature on this topic, we hypothesize that black and Hispanic drinkers will be at greater risk for alcohol problems at a given level of heavy drinking, particularly among men and particularly at lower levels of heavy drinking. Further, we expect that these disparities among men will be attenuated when racial/ethnic group differences in drink alcohol content are taken into account.

MATERIALS AND METHODS

Dataset

This study pools data from the 2005 and 2010 National Alcohol Surveys (NAS), aggregated for greater statistical power. Both surveys included probability samples of adults ages 18 and older selected via random digit dialing with oversamples of African Americans, Hispanics and residents from sparsely populated states (2005 NAS=7,612; 2010 NAS=6,619). Among these were 6,038 white, 1,155 black, and 1,330 Hispanic current drinkers (respondents who drank at least one alcoholic beverage in the past 12 months) in the current analysis. Cooperation rates for the 2005 and 2010 NAS were 56% and 53%, respectively. Although low, they are similar to other recent U.S. telephone surveys (Curtin et al., 2005). Importantly, studies suggest that increased nonresponse does not necessarily lead to biased population estimates, as most telephone sample losses are due to immediate hang-ups that occur prior to description of the study (Groves, 2006). Further, methodological

studies comparing the NAS telephone surveys with face-to-face surveys with higher response rates, and also analysis of telephone-based replicate subsamples with differing response rates, suggest no significant bias in alcohol estimates associated with this level of response (Greenfield et al., 2006; Midanik and Greenfield, 2003).

Measures of alcohol-related problems

Alcohol dependence was assessed using a 17-item scale representing past 12-month symptoms in each of 7 domains identified by the Diagnostic and Statistical Manual, 4th edition (American Psychiatric Association, 1994)(Greenfield et al., 2006) which has been previously validated (Caetano and Tam, 1995). Meeting symptoms in 3 or more domains indicates dependence.

Negative drinking consequences were assessed with a 15-item index that has been used successfully in the NAS for over 40 years. This index measures consequences attributable to past 12-month drinking in five domains: social problems, such as arguments with a spouse (4 items); injuries and accidents (2 items); and workplace (3 items), legal (3 items) and health (3 items) consequences. Alphas within these domains have ranged from 0.74–0.87, excepting health (0.58–0.67) (Midanik and Greenfield, 2000). Responses were used to create four dichotomous measures: that is, a summary score indicating 2 or more of any consequences, and three separate measures indicating any social consequences; any injuries, accidents or health consequences; and any work or legal consequences. The latter consequences were aggregated based on conceptual similarity and because endorsement for individual domains was otherwise quite low.

Measures of alcohol consumption

Heavy drinking was assessed using a gender-specific *composite heavy drinking (HD)* variable based on 5 variables that are consistent determinants of alcohol-related health and social problems (Midanik, 1999; Room et al., 1995). These variables included two non-overlapping, 12-month alcohol volume variables based on a graduated frequency approach to measuring standard drinks consumed in the past year (Greenfield, 2000): annual volume from occasions involving consumption of 3–4 drinks, and (separately) 5+ drinks. Other variables included frequency of consuming 5+ drinks in a day, frequency of subjective drunkenness, and maximum (in standard drink equivalents) consumed in a single day. Natural log transformations were used to normalize the distributions.

To create the *composite HD* variable, these 5 variables were subjected to principal components analysis (PCA), separately for each gender, using SPSS (SPSS Inc., 2008). Results suggested a single factor accounting for 73% and 75% of the common variance for females and males respectively. Factor loadings ranged from .76 (frequency of drunkenness) to .92 (maximum consumed) in the PCA for females and .68 (volume from 3–4 drink occasions) to .95 (volume from 5+ occasions) in the PCA for males. PCA was also conducted for each racial/ethnic group within gender to confirm the consistency of the unidimensional structure by these subgroups, and results again revealed a single factor. Factor scores (i.e., standardized continuous estimates derived from the PCA) were used to define the HD variable. Factor scores were also used to create a measure of heavy drinking

level for stratified analyses. Level 1 entailed no heavy drinking, and comprised respondents with a daily maximum of <3 for females and <5 for males, and no drunkenness within the past year. These limits were chosen based on recent low-risk drinking guidelines (Dawson et al., 2012; Room and Rehm, 2012). Levels 2, 3 and 4 were coded based on gender-specific composite HD scores, and to reflect the skewed distribution of heavy drinking in the U.S. general population (Kerr and Greenfield, 2007). Level 4 was comprised of HD scores from the top tenth percentile (within a given gender), while the remainder were split into levels 2 and 3 based on a median split.

Additional variables include demographic characteristics: race/ethnicity, gender, age, marital status, education, and income. These variables and yearly drink volume from 1–2 drinks were added as covariates to multivariate models (described below).

Statistical analyses

To test whether associations between heavy drinking and alcohol-related problems varied across race/ethnicity, we estimated logistic regression models including race/ethnicity, composite HD scores, and their interaction as predictors of DSM-IV dependence and 2+ negative consequences (separately). These multivariate models adjusted for demographic variables that varied by race/ethnicity and were associated with disparities in drinking outcomes in our prior work (Mulia and Karriker-Jaffe, 2012), as well as volume from light drinking occasions (1–2 drinks) and survey year. To identify racial/ethnic differences in the risk of problems at specific heavy-drinking levels, adjusted regression models were estimated stratified on the four heavy-drinking levels, separately by gender. To address whether differences in drink size (ethanol content) might explain racial/ethnic disparities in the risk for alcohol problems at a given level of heavy drinking, identical regressions were estimated using drink-size adjusted variables (see below).

Data were weighted to adjust for the probability of selection and nonresponse, and post-stratification weights were applied to the combined surveys to match the U.S. adult population as reflected by the U.S. Census/American Community Surveys on gender, age, region and race/ethnicity, as well as education (NAS 2012) and nativity and income (NAS 2005, Hispanics only). Analyses were conducted in Stata (Stata Corp., 2009).

Accounting for drink alcohol content through drink-size adjustment

Analyses were replicated using consumption variables adjusted for estimated alcohol content in drinks consumed at home and on-premise (at bars and restaurants). Respondents answered detailed questions about usual beer brand and type; malt liquor consumption; preferred spirits drink; and home spirits pour method. These data were used to estimate percentage alcohol by volume (%ABV) for *beer drinks consumed at home* by linking brand/type to %ABV using the Alcohol Research Group's list of brand %ABV's, maintained for this purpose. Where beer brand was not given, sales-weighted average %ABV was used. Beer drinks were assumed to be 12 ounces. Alcohol content for *home spirits drinks* was estimated by linking respondent data on drink type and pour method to the corresponding estimated %ABV as derived from our 2003 and 2006 NAS Methods studies on home drinks (Kerr et al., 2005; Kerr et al., 2009). *Home wine drinks* were likewise adjusted based on the

NAS Methods studies, but here we used mean %ABV for groups defined by gender, age, and race/ethnicity to generate adjustments for those groups. To adjust *beer, spirits, and wine drinks consumed on-premise*, we used data from our 2007 Bar Study (Kerr et al., 2008), which provided information on typical drink sizes in bars and restaurants. Data were used to generate overall adjustments appropriate for each beverage type. Drink-size adjustments were applied for each participant accounting for the proportion of total consumption attributable to beer, spirits, and wine, as well as consumption attributed to home versus on-premise drinking. Adjustments were applied to total volume and our "interval" volume measures (e.g., volume from occasions of 1–2 drinks), the latter by shifting interval cut-points. Once the heavy-drinking volume measures were adjusted for bias, the PCA analyses were recalculated and the adjusted HD variable was applied to regression analyses identical to those conducted with the unadjusted HD variable.

RESULTS

Descriptive analyses

Table 1 highlights differences in demographic characteristics by racial/ethnic group. Levels of consumption and drinking patterns reported by white, black and Hispanic drinkers are displayed in Table 2, here, separately for men and women to provide detail on variables used to generate the gender-specific HD measures. Mean composite heavy drinking (HD) scores were similar for whites and Hispanics, but significantly lower for black men (and marginally significant for black women). Notably, this racial/ethnic patterning did not change when drink-size adjustments were applied to derive a new (adjusted) HD score. The racial/ethnic distribution of HD scores across four levels of heavy drinking shows that a greater proportion of black men were in the low heavy-drinking group compared to white men ($p=.002$), and fewer were in the moderate heavy-drinking group ($p<.001$). Significant ($p<.05$) differences were not found for the women. Hispanics and whites were similarly distributed across the four heavy-drinking levels.

Table 3 shows rates of alcohol dependence and negative drinking consequences across racial/ethnic-gender groups. Racial/ethnic differences were more evident among males, with minority men reporting higher rates of alcohol-related problems than white men, particularly for injuries/accidents/health and work/legal consequences where rates were roughly twice as high. By contrast, a marginally significant Hispanic-white female difference was found for social consequences ($p=.074$).

Racial/ethnic-gender differences in the risk of dependence and negative drinking consequences

Tables 4 and 5 highlight racial/ethnic disparities in alcohol problems after adjusting for potential confounders and (separately) heavy drinking patterns. As shown in Table 4 (Models 1 and 2), racial/ethnic disparities in the risk of alcohol problems emerged only after controlling for differences in heavy drinking. Doing so revealed greater odds of alcohol dependence among black women relative to white women (AOR=3.3, $p=.033$), and greater odds of both dependence and negative consequences among black versus white men (AOR = 2.1, p=.07 and 2.5, $p=.021$).

Importantly, further analyses revealed significant interactions between race/ethnicity and heavy drinking in predicting alcohol dependence and 2+ negative consequences among men, but not women (Model 3). The finding of non-significant interactions among women indicates that as heavy drinking increased, the likelihood of dependence and 2+ consequences increased similarly across the racial/ethnic groups. The significant main effects for race/ethnicity in Model 2, suggests that black women are at greater risk for alcohol dependence at all levels of heavy drinking relative to white women.

By contrast, significant interactions of race/ethnicity by HD score among men indicate that the influence of race/ethnicity on dependence and 2+ negative consequences varies across heavy drinking level. To more easily interpret these interactions, Table 5 shows racial/ethnic differences in the odds of alcohol dependence and 2+ consequences at each of three levels of heavy drinking among men. Given the extremely low rate of problems/consequences at level 1, levels 1 and 2 were combined. Adjusted models show that black men with no/low levels of heavy drinking had greater odds of 3+ dependence symptoms compared to white men (AOR=10.2, *p=.002*), and greater odds of 2+ negative drinking consequences (AOR=4.8, *p*=.034). Hispanic (vs. white) men whose heavy drinking was reportedly ‘low’ or ‘moderate’ also had significantly elevated odds of dependence (AOR=8.6, *p=.002* & AOR=3.2, *p=.009*, respectively). A sizeable, marginally significant Hispanic-white disparity in negative consequences was found at the lowest level of heavy drinking (AOR=4.1, *p=.068*).

To aid interpretation of the interaction effects in the above analyses, Figure 1 illustrates the relationship between the logit probability of having dependence at increasing levels of heavy drinking for white, black and Hispanic males based on results of the fully adjusted, multivariate model. At low levels of heavy drinking, the log odds of reporting 3+ dependence symptoms are much higher for blacks and Hispanics than whites, but at higher levels these racial/ethnic differences among men disappear. The slopes intersect rather than running parallel paths, as would be the case if we plotted the dependence results for women.

Drink-size adjusted differences

To assess whether previously documented racial/ethnic group differences in drink alcohol content would help explain the observed disparities, the interaction models from Table 4 were replicated using adjusted drink-size consumption measures that accounted for ethanol content. Estimates for race/ethnicity and the race/ethnicity by HD interaction (Models 3 and 4) across drink-size adjusted and unadjusted models for women and men indicated some difference. Adjusting for group differences in drink alcohol content did reduce the odds of dependence among black women (AOR=5.2 vs. 6.1), Hispanic men (AOR=7.8 vs. 9.3) and black men (AOR=11.3 vs. 12.3), but these differences appear rather small, as Figure 1 displays.

DISCUSSION

This study sheds light on several issues that are important to understanding racial/ethnic disparities in alcohol-related problems. First and foremost, the study highlights the gender-specific nature of racial/ethnic disparities in alcohol problems and, thus, significantly extends findings from our prior research (see Mulia et al., 2009). Here, gender-stratified

descriptive analyses showed similarly low rates of dependence and consequences across black, Hispanic and white women, with one exception. Hispanic women were marginally more likely than white women to experience arguments and fights due to their drinking. Notably, post hoc analyses showed that a greater proportion of Hispanic vs. white women reporting social consequences were non-heavy/low-level heavy drinkers (22% vs. 6%, data not shown), suggesting that there may be less permissive attitudes towards women's drinking in Latino cultures (Caetano and Clark, 1999).

By contrast, among men there were clear racial/ethnic disparities in rates of alcohol dependence and in all types of drinking consequences. Black and Hispanic men thus appear more prone to an array of problems that are strongly associated with level of consumption and drinking pattern as well as social and cultural contexts. This is consistent with descriptive findings from national surveys in the early 1980s and 1990s showing, for example, elevated rates of financial, job, legal and social consequences among minority men (Caetano, 1997).

The gender-specific nature of disparities in alcohol problems was further underscored by our multivariate results. Across all levels of heavy drinking, black women had greater odds of alcohol dependence relative to white women, but no other significant differences were noted among black, Hispanic and white women.

Racial/ethnic disparities among men were more pervasive and nuanced. Similar to women, black-white male disparities were apparent only after adjusting for heavy drinking, but were observed for both negative consequences and alcohol dependence. Importantly, black-white disparities were limited to men who never or rarely drank heavily. Post hoc analyses (not shown) reveal that within this drinking subgroup, black men were more likely than white men to experience social consequences (9.6% vs. 2.0%, p=.003), as well as injuries/accidents/health consequences (5.0% vs. 0.7%, p=.037). Further, interaction models illuminated Hispanic-white male disparities that were absent in the main effects model. These showed that Hispanic men had greater odds of dependence at the lowest and moderate levels of heavy drinking, and greater risk for 2+ consequences at the lowest level of heavy drinking. Among non-heavy/low-level heavy drinkers, Hispanic men (unlike black men) had higher rates of work/legal consequences than white men (3.3% vs. 0.2%, p=.024, data not shown), but similar rates of other types of consequences.

The current study's gender-specific findings suggest that our previous report of disparities in alcohol problems at low levels of heavy drinking applies only to men (Mulia et al., 2009). In essence, the relationship between heavy drinking and alcohol problems is weaker among minority versus white men, as the former experience problems even at very low levels of heavy drinking. This runs contrary to Herd's (1994) results for black and white men based on data collected 30 years ago, but is similar to Jones-Webb et al.'s (1997) conclusions based on data from two decades ago. Yet while the latter study found black men's risk for consequences was largely unaffected by their alcohol consumption level, we found a pattern of slowly increasing risk at higher levels of heavy drinking in both black and Hispanic men.

Our examination of drink alcohol content as an explanation for observed racial/ethnic-gender disparities is a unique contribution of the current study. As described, drink size adjustments were made to more accurately estimate drink alcohol content from heavy and light drinking. Both adjustments are important, as indeed it could be argued that light and less experienced drinkers would be least likely to estimate their drink volume accurately. The findings from the drink-size adjustment analyses were somewhat surprising. The adjustments did reduce racial/ethnic differences in alcohol problems among those reporting no heavy drinking, consistent with the above argument regarding estimates for light drinkers. Yet a pronounced disparity remained at low levels of heavy drinking. Importantly, information on drink alcohol content is only just beginning to be integrated into research on racial/ethnic group drinking (e.g., see Caetano et al., 2012). Kerr et al. (2009) previously found that models predicting alcohol problems had improved fit if they adjusted for measured drink ethanol, particularly models predicting alcohol consequences among blacks and dependence among Hispanics. Some limitations to the current adjustment analyses should be acknowledged, however. As described, we used group-level correction factors specific to race/ethnicity, gender, age and alcoholic beverage. These were based on national home drink estimates and Northern California-based bar and restaurant drink estimates that were applied proportionally to the respondent's reported drinks from these specific contexts. While estimates from a national on-premise study would be preferred, no such U.S. data exist. Indeed, the current on-premise study is the only one of its kind at present, and was conducted in 80 randomly sampled drinking establishments in 10 counties representing a demographically diverse population. A more important limitation concerns the lack of individual-specific corrections for drink size, owing to the absence of drink size pour data from respondents in the current study. Given these limitations and the importance of accurate drink size measurement to alcohol-related health outcomes, further research is needed before definitive conclusions may be made regarding the effect of drink alcohol content on racial/ethnic disparities.

Taken together, this study raises several, key questions for future research on racial/ethnic-gender disparities in alcohol-related problems: 1) Why are black and Hispanic men more likely to experience alcohol problems than white men, but only at lower levels of heavy drinking? 2) Unlike their male counterparts, why are black women, but not Hispanic women, at greater risk of alcohol dependence at any given level of heavy drinking than white women? and 3) Why do white, black and Hispanic women have similar risk for negative drinking consequences? The answers to these questions will inform the types of interventions needed to address disparities, and will likely come from investigations of multiple and diverse ways that racial/ethnic and gender groups differ—for instance, with respects to drinking norms and contexts, neighborhood environments, genetic vulnerability, and health status.

Prior research has already suggested that cultural norms and drinking contexts may be relevant to racial/ethnic disparities in negative consequences of drinking. Within relatively "drier", African American communities (Herd, 1993; Herd, 1994a; Herd, 1994b), moderate levels of drinking can result in arguments and social pressures to "cut back" on one's drinking. (The latter might also influence the over-endorsement of particular alcohol dependence symptoms (Zapolski et al., in press)). Some have further speculated that the

adoption of nonconventional drinking norms by black men may be linked to drinking in more high-risk settings and situations that are not socially sanctioned, which could increase the risk of negative drinking consequences (Jones-Webb et al., 1995; Jones-Webb et al., 1997), especially social consequences.

Racial/ethnic differences in legal and work consequences might relate to the kinds of neighborhoods and jobs that minority men are more likely to occupy. Hyper segregated black neighborhoods, like Hispanic enclaves, tend to be lower-SES areas characterized by greater police surveillance and low-wage, inflexible jobs (Inagami et al., 2006; Jargowsky, 2003; Karriker-Jaffe et al., 2012). Such contexts could render minority men more susceptible to legal and work consequences, as our descriptive data suggest for Hispanic men. Relatedly, racial/ethnic bias in arrest might also contribute to these disparities (Brown & Frank, 2006 cited in Zapolski et al., in press).

Finally, differential risk for health-related drinking consequences might be linked to the generally poorer health of minorities. Striking black-white health disparities have long been acknowledged, and there is some evidence that these are more pronounced among men (Subramanian et al., 2005; Williams and Sternthal, 2010). Additionally, to the extent that alcohol dependence is more prolonged or recurring among racial/ethnic minorities than whites (Dawson et al., 2005; Grant et al., 2011), this too might increase minority men's risk for health-related consequences.

Our finding of black-white disparities in alcohol dependence among men and women is in line with other recent investigations (Grant et al., 2011), and raises the possibility that genetic vulnerability might play a role. The ADH1B*3 allele that is prevalent in people of African descent can intensify the effects of alcohol, and is often considered protective against alcohol disorders (Chartier and Caetano, 2010; Scott and Taylor, 2007). But while the allele may deter excessive drinking, it is possible that it also increases risk for alcohol problems (Zapolski et al., in press). Recent experimental work suggests that moderate amounts of alcohol have stronger stimulating effects in blacks than whites, and that this corresponds to increased risk for blackouts, social troubles and legal problems in blacks, but not in whites (Pedersen and McCarthy, 2013). The authors suggest that this might contribute to racial/ethnic differences in drinking consequences. From our perspective, this could be relevant to black-white male disparities we observed at the lowest levels of heavy drinking. Additionally, the experimental study's finding of stronger sedating effects of low alcohol consumption among black (vs. white) women might shed light on our observation of black women's elevated risk for alcohol dependence at low levels of heavy drinking. Given the high levels of stressors to which African Americans are exposed (Hatch and Dohrenwend, 2007), these differential sedating effects warrant consideration in future efforts to understand racial/ethnic disparities.

Lastly, the question of why women evidenced no racial/ethnic disparities in risk for 2+ drinking consequences is somewhat of a puzzle. Compared to men, women may be subject to broad, societal norms that operate across racial/ethnic lines to temper alcohol consumption and limit the contexts in which women drink. Supporting the former, recent analyses of national survey data indicate smaller racial/ethnic differences in heavy drinking

frequency among women than men (Chartier and Caetano, 2010), which is consistent with the gender-specific distributions of low, moderate and high levels of heavy drinking that we observed across race/ethnicity (data not shown).

In summary, this study illuminates important aspects of racial/ethnic disparities in drinking problems that should be borne in mind in future research and intervention efforts aimed at addressing alcohol-related disparities. First, when studying racial/ethnic disparities in alcohol-related problems it is necessary to carefully control for differences in alcohol consumption. This was key to revealing disparities that would otherwise remain hidden, and may be particularly important in studies examining differential vulnerability to drinking problems. Second, stratifying by gender showed that with the exception of black-white female disparities in alcohol dependence, racial/ethnic disparities are most apparent among men and mostly concentrated at low levels of heavy drinking; none of these disparities appear to be an artifact of drink alcohol content. Further, black and Hispanic men appear to differ in the kinds of negative drinking consequences they experience at the lowest levels of heavy drinking. To reduce racial/ethnic disparities in alcohol problems, researchers will need to elucidate complex phenomena giving rise to distinctive racial/ethnic-gender disparities in different types of alcohol-related problems with the aim of developing varied interventions to address these.

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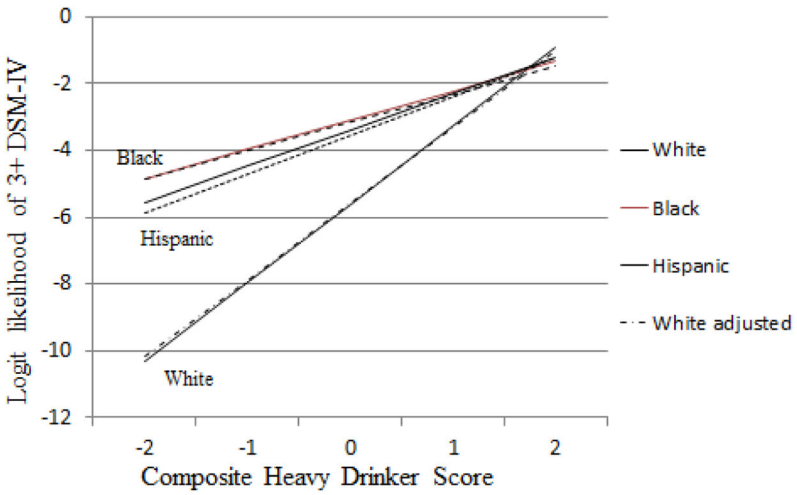

Fig. 1.

Relationship between HD score (unadjusted and adjusted) and DSM-IV dependence for males by race/ethnicity

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Table 1

Background characteristics by racial/ethnic group among current drinkers[a].

	White	Black	Hispanic
(unweighted n)	**(6,026)**	**(1,291)**	**(1,506)**
Women (%)	49.6	48.6	***36.3
Age (mean, SE)	45.7 (.3)	***40.0 (.6)	***37.2 (.6)
Marital status (%)			
Married/live with	68.8	***43.5	*62.9
Separated/divorced/widowed	13.7	*18.0	***8.8
Never in a relationship	17.5	***38.5	***28.3
Education (%)			
< High school	5.6	***13.6	***21.6
High school graduate	25.1	***35.8	28.3
Some college	30.0	26.8	28.3
College graduate/more	39.3	***23.8	**21.8
Income (%)			
0–20k	13.5	*** 34.2	***29.4
20k-40k	18.3	21.5	†21.7
40k-70k	30.0	**23.8	*** 22.9
70k+	26.3	***12.2	***17.0
Missing	11.9	** 8.4	*9.0

Notes:

* < .05,

** <.01,

*** <.001,

† p≤.11 for pairwise tests, white to black & white to Hispanic.

[a] Respondents who drank at least one alcoholic beverage in the past 12 months.

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Table 2

12-month drinking characteristics by racial/ethnic group and gender among current drinkers.

	Women			Men		
	White	**Black**	**Hispanic**	**White**	**Black**	**Hispanic**
Volume from 1–2 drinks (mean, SE) [c]	91.4 (3.0)	*** 60.0 (6.8)	*** 51.8 (5.3)	110.3 (3.2)	† 90.0 (11.3)	*** 76.9 (6.0)
Adjusted volume from 1–2 drinks (mean, SE) [ab]	106.3 (3.6)	*** 72.0 (7.8)	*** 60.7 (6.3)	125.4 (3.8)	† 105.4 (11.3)	*** 88.4 (7.3)
Variables used in heavy drinking (HD) composite scores (mean, SE)						
Frequency of drunkenness (%)						
Not past year	57.1	61.2	60.3	45.1	46.7	42.9
1–11 times past year	34.1	29.1	35.9	37.0	36.4	36.5
Monthly +	8.8	9.7	3.9	17.8	16.9	20.6
5+ drinking days	7.2	5.3	6.9	29.1	29.8	32.4
Volume from 3–4 drinks	46.6 (3.1)	44.1 (6.1)	† 33.2 (6.1)	82.0 (3.9)	75.8 (10.2)	86.2 (9.9)
Adjusted volume 3–4 drinks [a]	48.3 (3.4)	43.6 (6.4)	** 30.7 (5.5)	84.3 (4.1)	75.8 (11.3)	84.3 (9.7)
Volume from 5+ drinks	55.6 (7.4)	42.8 (9.7)	52.9 (13.5)	252.1 (18.4)	258.3 (54.9)	283.4 (42.4)
Adjusted volume from 5+ drinks [a]	73.8 (9.9)	55.2 (11.4)	66.8 (15.8)	274.3 (20.2)	309.9 (63.2)	304.0 (44.6)
Drink maximum in a day	3.6 (.1)	**3.0 (.2)	3.7 (.2)	6.3 (0.1)	** 4.9 (0.4)	6.6 (0.3)
Adjusted drink maximum in a day [a]	4.3 (.1)	**3.7 (.2)	4.3 (.2)	7.0 (0.2)	†6.0 (0.5)	7.4 (0.4)
Composite HD score (mean, SE) [d]	.203 (.028)	† .068 (.074)	.171 (.071)	0.144 (0.025)	** –0.098 (0.070)	0.247 (0.064)
Adjusted composite HD score (mean, SE) [ad]	.213 (.028)	† .063 (.072)	.149 (.068)	0.140 (0.024)	** –0.088 (0.070)	0.223(0.065)
Heavy drinking levels (%) [b]						
None	43.5	† 50.0	41.8	38.7	†40.9	34.6
Low	17.6	16.4	18.6	22.8	** 33.9	21.0
Moderate	25.3	† 20.8	27.2	25.5	*** 14.1	29.3
High	13.6	12.7	12.4	13.1	†11.1	15.0

Notes:

* < .05,

** <.01,

*** <.001,

† p≤.10 for pairwise tests, white to black & white to Hispanic within gender;

[a] adjusted for drink alcohol content;

[b] "none" indicates drinking within guidelines; low, moderate and heavy levels are based on the gender-specific HD score.

[c] controlled in multivariate models but not used to create the HD scores.

[d] Gender-specific HD mean (SE) values are standardized measures and should not be compared between men and women.

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Table 3

Rates for12-month alcohol dependence and alcohol-related consequences among current drinkers, by racial/ethnic group within gender

(unweighted *n*)	**Women (4,641)**			**Men (4,182)**		
	White	**Black**	**Hispanic**	**White**	**Black**	**Hispanic**
3+ Dependence criteria (mean, SE)	2.5 (.4)	3.3 (1.3)	3.2 (1.1)	5.1 (.6)	† 8.6 (1.2)	** 9.6 (1.6)
2+ Consequences index (mean, SE)	2.8 (.4)	2.3 (.9)	4.0 (1.6)	6.3 (.7)	† 10.3 (2.2)	† 9.5 (1.9)
Consequences domains (mean, SE)						
Social	6.6 (.6)	9.6 (2.4)	†10.7 (2.3)	11.7 (.8)	† 16.3 (2.5)	† 16.3 (2.4)
Injuries/accidents/health	1.8 (.3)	1.8 (.6)	3.5 (1.5)	3.3 (.4)	** 8.2 (1.8)	** 7.7 (1.6)
Work/legal	.8 (.2)	1.3 (1.1)	1.4 (.8)	2.8 (.4)	* 7.0 (2.0)	† 5.3 (1.3)

Notes:

* p<.05,

** p<.01,

† p≤.11 for pairwise tests white to black & white to Hispanic; SE = standard error

Table 4

Effects of race/ethnicity, heavy drinking composite score (HD), and interaction of race/ethnicity by HD in predicting alcohol-related problems among current drinkers by gender

	3+ DSM-IV Dependence criteria				2+ Consequences			
	Model 1 OR (CI)	**Model 2 AOR (CI)**	**Model 3 AOR (CI)**	**Model 4[a] AOR (CI)**	**Model 1 OR (CI)**	**Model 2 AOR (CI)**	**Model 3 AOR (CI)**	**Model 4 [a] AOR (CI)**
Women								
Ethnicity (reference=white)								
Black	1.0 (.4, 2.3)	* 3.3 (1.1, 9.7)	* 6.1 (1.6, 23.9)	* 5.2 (1.4,19.9)	.5 (.2, 1.2)	1.2 (.4, 3.2)	1.3 (.4, 4.2)	1.2 (.4, 4.0)
Hispanic	.9 (.4, 2.2)	1.8 (.7, 4.9)	† 4.2 (.9, 19.7)	3.9† (.9,16.9)	.9 (.3, 2.2)	1.4 (.5,3.5)	1.0 (.3, 3.6)	1.1 (.3, 3.5)
HD score		*** 4.5 (3.3, 6.0)	*** 5.0 (3.3, 7.5)	*** 4.9 (3.3,7.3)		*** 3.1 (2.3,4.1)	*** 3.1 (2.2, 4.3)	*** 3.1* (2.2, 4.3)
Ethnicity interaction								
Black X HD score			.7 (.4, 1.3)	.7 (.4, 1.3)			.9 (.5, 1.7)	1.0 (.5, 1.8)
Hispanic X HD score			.7 (.4, 1.2)	.7 (.4, 1.2)			1.2 (.7, 2.0)	1.1 (.7, 1.9)
Model F	****4.40*		****10.98*	****11.11*	*** 5.56*	****9.78*	*** 9.43*	*** 9.59*
Men								
Ethnicity (reference=white)								
Black	1.1 (.6, 2.0)	2.1† (.9, 4.6)	*** 12.3 (3.7, 41.0)	*** 11.3 (3.6, 35.7)	1.1 (.6, 1.9)	* 2.5 (1.1, 5.3)	*** 8.9 (2.8, 28.2)	*** 8.5 (2.8, 26.0)
Hispanic	1.1 (.7, 1.9)	1.6 (.9, 2.9)	*** 9.3 (3.2, 26.9)	*** 7.8 (2.7, 22.4)	.6 (.3, 1.1)	.7 (.4, 1.5)	†3.3 (.9, 12.1)	† 3.1 (.8, 11.4)
HD score		5.1*** (3.7, 7.1)	*** 10.5 (6.2, 17.7)	*** 9.9 (6.1, 16.3)		*** 5.7 (4.1, 8.1)	*** 9.1 (5.5, 15.0)	*** 9.0 (5.6, 14.6)
Ethnicity interaction								
Black X HD score			***.2 (.1, .5)	***.2 (.1, .5)			** .3 (.2, .7)	**.3 (0.2, .7)
Hispanic X HD score			***0.3 (.1, .6)	**.3 (.2, .6)			* .3 (.2, .8)	*.4 (.2, .9)
Model F	*** *8.77*		*** *11.52*	*** *12.02*	*** *8.01**		*** *11.42*	*** 12.08

Notes:

* p<.05,

** p<.01,

*** p<.001,

† p<0.10; estimates from gender stratified logistic regression models with adjusted odds ratios (AOR) and 95% confidence intervals (CI); all models adjusted for demographics (age, marital status, education, & income), volume from 1–2 drinks, and survey year; Model 4 used drink-size adjusted HD and adjusted volume from 1–2 drinks;

[a] Model 4 is identical to model 3 except that it used the adjusted drink-size variables.

Table 5

Racial/ethnic differences in the odds of alcohol-related problems by heavy drinker (HD) levels, among male current drinkers.

	Black (vs. white) AOR (CI)	Hispanic (vs. white) AOR (CI)
3+ DSM Criteria		
Levels 1–2: none/low	***10.2 (2.3, 45.0)	** 8.6 (2.1, 34.4)
Level 3: moderate	1.9 (.5, 7.4)	** 3.2 (1.3, 7.4)
Level 4: high	.7 (.3, 1.9)	.9 (.4, 2.2)
2+ Consequences		
Levels 1–2: none/low	* 4.8 (1.1, 20.8)	† 4.1 (.9, 18.7)
Level 3: moderate	1.6 (.5, 5.2)	.7 (.3, 1.6)
Level 4: high	1.7 (.6, 4.6)	.7 (.2, 1.9)

Notes:

* $p < 0.05$,

** $p < 0.01$,

† $p < 0.10$; estimates from stratified logistic regression models (6 total) expressed as adjusted odds ratios *(AOR)* with 95% confidence intervals (CI); models adjusted for demographics (age, marital status, education & income), heavy drinking score, volume from 1–2 drinks and survey year.