Does a crossover age effect exist for African American and Hispanic binge drinkers? Findings from the 2010-2013 National Study on Drug Use and Health

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Abstract

Background—Among general population studies, lower rates of binge drinking tend to be found among African Americans and Hispanics compared to Whites. However, among older adult populations, minority groups have been shown to be at higher risk for binge drinking, suggesting the presence of a crossover effect from low to high risk as a function of age.

Aims—To date, limited research has examined the crossover effect among African American and Hispanic populations compared to non-Hispanic Whites across large developmental time frames or explored variation in risk based on income or gender. The current study aimed to fill these gaps in the literature.

Methods—Data were compiled from the 2010-2013 National Survey on Drug Use and Health surveys, which provide annual, nationally representative data on substance use behaviors among individuals age 12 and older. Hispanic, non-Hispanic African American, and non-Hispanic White respondents were included (N = 205,198) in the analyses.

Results—A crossover effect was found for African American males and females among the lowest income level (i.e., incomes less than $20,000). Specifically, after controlling for education and marital status, compared to Whites, risk for binge drinking was lower for African American males at ages 18-24 and for females at ages 18-34, but higher for both African American males and females at ages 50 to 64. No crossover effect was found for Hispanic respondents.

Conclusions—Although African Americans are generally at lower risk for binge drinking, risk appears to increase disproportionately with age among those who are impoverished. Social determinants of health prevalent within low-income African American communities (e.g., lower

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education, violence exposure, housing insecurity) and potential areas for intervention programming are discussed.

Keywords

Alcohol abuse is the third leading preventable cause of death in the United States, responsible for an average of 88,000 deaths per year (Centers for Disease Control and Prevention [CDC], 2014). Approximately half of all alcohol-related deaths stem from one type of alcohol consumption—binge drinking, defined as consumption of four or more drinks for females or five or more drinks for males in a two-hour period (CDC, 2014, National Institute of Alcohol Abuse and Alcoholism [NIAAA], 2004). The acute health and social consequences associated with binge drinking are also profound and include unintentional injuries (e.g., motor vehicle crashes, falls, drowning, hypothermia, and burns), interpersonal violence (e.g., homicide, assault, domestic violence, rape, and child abuse) alcohol poisoning, cognitive difficulties, and alcohol dependence (NIAAA, 2000, CDC, 2014).

According to national surveys, individuals who are younger (aged 18-34 years), male, and White are at greatest risk for binge drinking (CDC, 2012, Courtney and Polich, 2009, Karlamangla et al., 2006, Lo and Cheng, 2013, Mossakowski, 2008, Naimi et al., 2003). These findings are consistent with developmental drinking trends, which indicate that binge drinking increases during adolescence, peaks in early adulthood, and declines with older age (CDC, 2012, Courtney and Polich, 2009, Naimi et al., 2003). Maturation theories posit that the increase and later decline in alcohol use over the life span is a consequence of transitioning into conventional adult social roles and an increase in responsibilities (i.e., family roles, vocational responsibilities) that are incompatible with excessive alcohol consumption (Donovan et al., 1983, Jackson et al., 2001, Sampson, 1990).

Interestingly, the risk for binge drinking as a function of age differs across racial/ethnic groups, particularly among African Americans and Hispanics relative to Whites. In comparison to Whites, African Americans and Hispanics tend to report lower rates of binge drinking during adolescence and young adulthood (Chen and Jacobson, 2012, Johnson et al., 1998), with greater odds for binge drinking found during late adulthood (Johnson et al., 1998, Herd, 1990). For example, using the 2005-2008 National Health Examination Survey, Wilson et al. (2014) found that African American drinkers aged 65 and older were at significantly greater odds of hazardous consumption than same-aged White drinkers. Similarly, Merrick et al. (2008) found that among a subsample of excessive drinkers (i.e., individuals who consumed more than 30 drinks per month or more than 4 drinks in a single day) aged 65 and older, African American participants were 3.3 times more likely to engage in heavy episodic drinking than their White counterparts. Moreover, risk for heavy episodic drinking was 2.2 times greater for Hispanics than for their White counterparts.

Although, there is evidence to support racial/ethnic differences in alcohol consumption based on specific age cohorts, limited research has been conducted examining changes in risk across large developmental time frames (Johnson et al., 1998, Keyes et al., 2015, Watt,

2008, Vogt Yuan, 2010). To date, only five studies have been conducted examining the "crossover effect" (i.e., change in risk from low to high as a function of age) for binge or heavy alcohol use to the mid-30s. Specifically, Evans-Polce et al. (2015) utilized four waves of data from the National Longitudinal Study of Adolescent Health to examine a crossover effect in regular heavy episodic drinking (i.e., drinking 5 or more drinks in a row more than monthly within the past 12 months) among respondents aged 14 to 32, finding similar rates of use during adolescence among White, Hispanic, and African American respondents and higher rates among Whites during adulthood. Thus no crossover effect was found. Watt (2008) utilized the 1999-2002 National Survey on Drug Use and Health (NSDUH) to examine the crossover effect for heavy drinking (i.e., five or more drinks in a row on five or more occasions in the last month) among a similar developmental timeframe (i.e., 12-35 and older), finding evidence for an effect among African American females as they approached age 35. However, the effect disappeared after controlling for socioeconomic status. Moreover, no effect was observed for African American males or Hispanics (Watt, 2008).

Three studies have been conducted examining binge drinking into late adulthood. Using data from the 1990-1992 National Comorbidity Survey, which includes respondents age 15 to 54, Vogt Yuan (2010) found support for the crossover effect for alcohol abuse among African Americans. Specifically, after controlling for sociodemographic variables, African Americans were less likely to abuse alcohol prior to age 50, but more likely to abuse alcohol after age 50 relative to Whites. Hispanics were not included in the study. A second study by Johnson and colleagues (1998) utilized data from a general population survey among 13,553 participants aged 12 to 80 to examine changes in drinks per occasion among African American, Hispanic, and White respondents. The researchers found evidence of a crossover effect for African Americans at age 55, with no effect found for Hispanics. Lastly, Wardian (2013) utilized data from the 2010 Arizona Health Survey (n = 7700) to examine the moderating effect of ethnicity on average number of drinks per day among respondents age 18-102, finding that Hispanics were less likely to drink at younger ages compared to Whites and tended to drink significantly less as they aged. African Americans were not included in the study. Thus, although limited research has been conducted on the crossover effect, there is evidence to suggest a crossover effect for binge drinking among African Americans as they approach later adulthood, with no clear evidence of such an effect of Hispanics. Yet, it remains unclear whether this crossover effect varies based on gender and socioeconomic status.

Current Study

The current study aims to fill these gaps by examining the crossover effect for binge drinking across development (aged 12 and older) among African Americans and Hispanics in comparison to Whites. We use a dichotomized variable for binge drinking, as the study aim is to determine if endorsement of binge drinking, regardless of level of use, differs among African American and Hispanic American respondents from that of White respondents. Given evidence of greater risk for binge drinking among older African Americans and Hispanics compared to Whites (Merrick et al., 2008; Wilson, Knowles, Huang, & Fink, 2014) and that lower socioeconomic status is a risk factor for binge drinking, particularly among minority populations (Karlamangla et al., 2006, Lo and Cheng,

2013, Mossakowski, 2008, Stimpson et al., 2007, DePadilla et al., 2012) we propose that the crossover effect of binge drinking will be observed for African Americans after the age of 50 at lower income levels (i.e., annual family income less than $20,0000). Conversely, within higher income brackets (i.e., annual family income of $20,000 or greater), we hypothesize that findings will be similar to those of other national studies (Naimi et al., 2003) – that is, risk for binge drinking will be lower at younger ages (aged 12-34) for African Americans compared to their White counterparts, but risk will be statistically similar across racial groups at older ages. It is unclear whether gender differences in the crossover effect will be observed or if a similar crossover effect will be found for Hispanic respondents; thus, these are exploratory aims.

Materials and Methods

Data Source

We used public-use data files from the 2010-2013 NSDUH, a series of general population surveys designed to provide annual nationwide data on substance use patterns and behaviors in the United States. The survey uses a multistage area probability sample for each of the 50 states and the District of Columbia, selecting a representative sample of the civilian, noninstitutionalized population of individuals aged 12 and older. The design oversampled younger age groups (aged 12–25) as well as African–Americans and Hispanics. Interviews were administered by computer-assisted personal interviewing and audio computer-assisted self-interviewing for illegal drug use and other sensitive behaviors (refer to Substance Abuse and Mental Health Services Administration (2014) for more detailed survey methodology). For the current study Hispanic, non-Hispanic African American, and non-Hispanic White participants who provided responses on the alcohol use measure were included in the study. The final sample included 205,198 participants. The majority of participants identified as White (67%), followed, by Hispanic (19%) and African American (14%). See Table 1 for complete demographic details.

Measures

Demographic variables. Participants were asked the following demographic questions: (1) age; (2) gender; (3) race/ethnicity (for the current study only individuals self-categorized as Hispanic, non-Hispanic African American, and non-Hispanic White were included in the analyses); and (4) past year family income. Age was stratified into six categories: 12-17, 18-25, 26-34, 35-49, 50-64, and 65 and older. Total family income was stratified into four categories: less than $20,000, $20,000-$49,999, $50,000-74,999, and $75,000 or more. A dichotomized income variable was also constructed to examine whether a crossover effect was evident in low vs. higher income groups (i.e., <$20,000 versus $20,000).

Binge drinking. Binge drinker status was assessed based on endorsement of consumption of five or more drinks in the same occasion (i.e., at the same time or within a couple of hours of each other) on at least one day in the 30 days prior to the survey (yes/no). For the current analysis, respondents who were classified within the NSDUH as either binge drinkers (i.e. consumption of five or more alcoholic beverage on a single occasion on at least 1 day in the past 30 days) or heavy drinkers (i.e., binge drinking on at least 5 days in the past 30 days)

were categorized as binge drinkers and were compared to those respondents classified in the NSDUH as being either a current non-binge drinker or a non-drinker.

Statistical Analysis

Logistic regression was used to model the outcome of binge use versus current non-binge use or no use of alcohol. Separate models for females and males were estimated. Independent variables included in the analysis were income level (4 levels), age group (6 levels), and race/ethnicity. All possible two-way interactions and the three-way interactions between these variables were included in the model. Year of survey, education level, and marital status were used as covariates. Within each income and age group, model-estimated odds ratios were obtained for African-American and Hispanic versus White comparisons. To account for multiple testing of odds ratios, which may have resulted in chance significant findings, we used the false discovery rate method (Benjamini, 1995) to obtain adjusted p-values. This method controls the type I error rate when there are multiple tests. The false discovery method provides adjusted p-values to keep the type I error rate at the .05 level. An adjusted p-value of less than .05 was used to determine if an odds ratio was significantly different from 1.00. The NSDUH incorporated a complex survey sample design for data collection. Using the supplied weighting, cluster and stratification variables in the dataset, we applied appropriate methodology to obtain correct standard errors for model effects. PROC SURVEYLOGISTIC and MULTTEST of the SAS software (version 9.4) were used for model estimation and p-value adjustment.

Results

Interaction between income, age, and race/ethnicity

The three-way interaction between income, age, and race/ethnicity was significant for both the female (Wald chi-square=64.79, df=30, p = .0002) and male models (Wald chi-square=157.22, df=30, p < .0001), indicating that the proportion of binge drinking varies across the different levels of income, age, and race/ethnicity. A dichotomized income variable was also constructed to examine the interaction between low (<$20,000) versus high ($20,000) income, age, and race/ethnicity. This three-way interaction was also significant for both female (Wald chi-square=29.34, df=10, p = .0011) and male models (Wald chi-square=56.22, df=10, p < .0001), indicating that the proportion of binge drinking varies across income, age and race/ethnicity groups when income was defined with low- vs. high-income categories.

Binge Drinking Risk among Lower-Income Bracket

African American and Hispanic Males Versus White Males—Within the less than $20,000 annual income bracket, odds of binge drinking were significantly lower for African American males than White males at the 12-25 age group. Statistically similar odds of binge drinking were found at ages 26-34 and 35-49, although they trended towards higher risk for African Americans in the latter age group (OR = 1.32. p = .13). A crossover effect was observed among the 50-64 age group, such that risk was 1.70 times higher for African American males compared to their White male counterparts (p = .006). Higher odds for binge drinking were also observed for African American males aged 65 and older, but not

significantly different from White males (OR=1.41, *p* = .62). For Hispanic males, lower odds of being a binge drinker were observed at younger ages, with statistically similar risk found after age 35. See Table 2 and Figure 1 for more detail.

African American and Hispanic Females Versus White Females—Within the less than $20,000 annual income bracket, odds of binge drinking were significantly lower for African American females than White females at ages 12-34. No racial/ethnic differences in odds of binge drinking were observed among respondents aged 35-49 (OR = .97, *p* = .94), but African American females were observed to be at higher risk for binge drinking than White females at ages 50-64 (OR=1.72, *p* = .02). Among African American female respondents aged 65 and older, the odds for binge drinking were not statistically different from White female respondents (OR= .98, *p* = .97). For Hispanic females, risk was statistically similar to that of White females at all age groups, except the 18-25 and 35-49 age groups in which risk was lower for Hispanic females (OR = .53, *p* < .001 and OR = .66, *p* = .03, respectively). See Table 2 and Figure 1 for more detail.

Binge Drinking Risk among Middle- and High-Income Brackets

Within each of the higher income brackets (i.e., $20,000-$49,999, $50,000-$74,999, and $75,000 or more), risk for binge drinking was generally lower for African Americans in comparison to Whites at younger ages, with statistically similar odds of binge drinking with increasing age. For example, within the $75,000 or higher income bracket, African American males demonstrated lower odds of binge drinking compared to White males at ages 12-17 (OR = 0.26, *p* < .0001), 18-25 (OR = 0.41, *p* < .0001), 26-34 (OR = 0.35, *p* < .0001), and 35-49 (OR = 0.46, *p* < .0001), but no differences were observed among respondents over the age of 50. Similarly in comparison to White females, African American females reported lower odds of binge drinking at ages 18-25 (OR = 0.48, *p* < .0001), 26-34 (OR = 0.40, *p* < .0001), and 35-49 (OR = 0.56, *p* = .05) and similar odds of binge drinking at ages 50 and older. Although some variability was observed with lower odds for binge drinking observed among Hispanic respondents at younger ages compared to White respondents, risk was generally statistically similar across age groups. See Table 2 and Figure 1 for complete results.

Discussion

The current study examined the crossover effect for binge drinking among African American and Hispanic populations as a function of both income and gender. It was hypothesized that after controlling for the effect of both education and marital status, a crossover effect would be observed after the age of 50 among African Americans within lower income brackets compared to their White counterparts, with no effect observed at higher income brackets—this hypothesis was largely supported. Specifically, at the less than $20,000 income bracket, African Americans reported lower or statistically similar risk for binge drinking as their White counterparts up to the age of 49, with higher risk found for African Americans within the 50-64 age cohort. Although odds of binge drinking were higher for African American males than their White counterparts within the 65 and older age cohort, differences were not statistically significant. It is possible that this was due to low numbers of individuals in these

stratified cells (n = 89 for African Americans, n = 450 for Whites; see supplemental Table 1 for cell size information), as studies with larger samples of older individuals have found higher rates of binge drinking for African Americans compared to Whites (Merrick et al., 2008; Wilson et al., 2014). Further research is needed that oversamples for older respondents (age 65 and older) to examine whether the crossover effect is observed, as hypothesized into late adulthood among lower income individuals. As hypothesized, the crossover effect was not observed within the higher income levels (i.e., annual family income greater than or equal to $20,000). Thus, consistent with previous research (Naimi et al., 2003) and in support of our second hypothesis, risk for binge drinking was generally higher among Whites in comparison to African Americans at younger ages (i.e., ages 12-34), with statistically similar odds of binge drinking at older ages.

The present study's findings of increased risk for binge drinking in mid-to late-adulthood for low-income African Americans can help advance both research and clinical practice. Although studies have documented the general negative impact of poverty on drinking risk (Lo and Cheng, 2013, Mossakowski, 2008, Stimpson et al., 2007, Cerda et al., 2010), based on our findings, the impact of poverty appears particularly detrimental for African American populations. Moreover, given that we controlled for education and marital status, which are both correlated with income and are associated with higher risk for binge drinking (Naimi, Nelson, & Brewer, 2010), we postulate that the race disparities in drinking risk among impoverished populations may be partially due to other sociocultural factors, such as disproportionate exposure to social stressors (i.e., adverse early life experiences, violence exposure, discrimination, racial stigma), adverse living conditions (i.e., poor built environments, food insecurity, housing insecurity), and other forms of social disadvantage (i.e., social exclusion, un(under)employment, employment instability, limited community resources; Acevedo-Garcia, 2008, Bluthenthal et al., 2008, Bonilla-Silva, 1997, Compton, 2015, Lin, 2009, Zapolski et al., 2014, Zenk et al., 2005). Exposure to these life stressors can impact the psychological and physical health of African Americans by weathering down on the system (Geronimus, 2000), ultimately increasing risk for substance use as a coping mechanism to manage distress (Cerda et al., 2010; Martin et al., 2003; Mulia et al., 2008, Schmitt et al., 2014, Zemore et al., 2011).

Interestingly, although consistent with some previous literature (Johnson et al., 1998, Watt, 2008), we found no evidence of a crossover effect for Hispanics. This lack of an effect may be due to the heterogeneity of respondents who identify as Hispanic, as great variability has been documented in prevalence rates of alcohol abuse among Puerto Rican Americans, Mexican Americans, and Cuban Americans (Lipsky & Caetano, 2009). Differences in alcohol use patterns have also been observed between U.S. born Latinos and those born outside the U.S. (Vaughan, Robbins, & Escobar, 2014). Thus, although a crossover effect was not observed in our study using a single Hispanic category, an effect may be observed when examining specific subgroups of Hispanic respondents. Alternatively, it may be the case that age does not impact risk for binge drinking in the same manner for Hispanics, as some have found that older age is associated with lower odds of binge drinking (Vaughan et al., 2014). Rather, other factors, such as acculturation, may have a stronger impact on substance use among Hispanics (Lipsky and Caetano, 2009). Studies have documented that Hispanics more aligned with mainstream culture have greater odds of problem alcohol use

than do those more aligned with their culture of origin (Karriker-Jaffe and Zemore, 2009). Moreover, this relationship has been shown to vary as a function of income (Karriker-Jaffe and Zemore, 2009). Additionally, a recent national study examining frequency of heavy drinking found a crossover effect for Hispanic men at ages 35-40 with Hispanic and Whites converging at later ages (Mulia et al., 2017). It is possible that a lack of an effect in the current study is due to the measurement of binge versus non-binge drinking. Thus, more research is needed to better understand the impact of acculturation, age, and income on problem drinking among Hispanic subgroups, as well as differences in the presence of a crossover effect based on measurement of binge drinking.

Limitations

This study is not without limitations. First, the age variable provided by the public access NSDUH data was categorical, thus limiting analysis of age on a continuous scale to determine at what specific age the crossover effect might occur. Also, due to the cross-sectional design of the data, individual drinking patterns could not be tracked across the lifespan; as such, the possibility of cohort effects could not be ruled out. For example, Kerr et al. (2009) found evidence of cohort effects for alcohol volume and heavy drinking, such that high rates of drinking were found among younger cohorts, particularly when utilizing more recent national data. However, this study did not examine cohort effects based on both age and race. Thus, it is unclear whether older African Americans are part of a particular birth cohort that engages in greater binge drinking or if the crossover effect is truly an effect of changes in drinking behaviors based on age. We attempted to address a potential cohort effect by combining data over four years of data collection. Subsequent studies are warranted that utilize longitudinal data, providing a more stringent test of the crossover effect. Relatedly, we also combined data over four years and controlled for year of data collection to account for potential period effects, as the 2010 data collection occurred at the height of the 2009 recession, which negatively impacted substance use among minority groups more so than Whites (Jones-Webb, Karriker-Jaffe, Zemore, & Mulia, 2016; Zemore, Mulia, Jones-Webb, Liu, & Schmidt, 2013). Of note, when the crossover effect was examined separately by wave of data collection, a similar trend of lower risk for African Americans at younger ages and higher risk at older ages comparative to White respondents was observed among respondents in the lower income brackets.

Additionally, people who were institutionalized (in jails/prisons or long-term hospitals) or homeless were not included in NSDUH, and these groups often have higher rates of drinking problems than the general population. This is particularly important when examining risk for binge drinking among lower-income African American men, given disparities in incarceration rates (Mukku et al., 2012, Carson, 2014, Pettit, 2014). As nearly 90% of those incarcerated will return to communities primarily concentrated in low socioeconomic status areas (Travis, 2005), the detrimental impact of incarceration on problem use and alcohol-related problems may be exacerbated among older, low-income African American males. Lastly, the binge drinking variable used in the NSDUH did not distinguish amounts of use by gender. Given that four or more drinks constitutes the cut off for women, NSDUH's cut off of five or more drinks may underestimate binge drinking among female respondents. Prevalence of binge drinking may have also been underestimated by measuring past month

binge drinking versus a past year. Future research is warranted examining the crossover effect based on these different assessment modalities, as well as examining variations in risk based on frequency of binge drinking.

Conclusions

Our study investigated risk for binge drinking as a function of race/ethnicity, gender, income, and age. Consistent with our hypothesis, a crossover effect was observed such that African Americans within low-income brackets shifted from low to high risk for binge drinking as a function of age. These results underscore a vital need for healthcare providers screening for alcohol use to pay greater attention to older African Americans, who are not typically considered an "at-risk" group (CDC, 2012, Naimi et al., 2003). Surprisingly, a crossover effect was not observed for Hispanics. Further research is needed to unpack potential differences in drinking behaviors among Hispanic subgroups, as well as differences in risk based on the measurement of binge drinking (i.e., frequency of binge drinking versus presence/absence of binge drinking). By identifying populations at highest risk of engaging in problem levels of alcohol use across development, tailored preventative interventions can be developed to reduce both use and associated consequences.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

References

Acevedo-Garcia D, Ospuk T, McArdle N, Williams DR. Toward a policy relevant analysis of geographic and racial/ethnic health disparities. Health Affairs. 2008; 27:321–333. [PubMed: 18332486]

Benjamini Y, Hochberg Y. Controlling the false discovery rate: a practical and powerful approach to multiple testing. Journal of the Royal Statistical Society Series B (Methodological). 1995; 57:289–300.

Bluthenthal RN, Cohen DA, Farley TA, Scribner R, Beighley C, Schonlau M, Robinson PL. Alcohol availability and neighborhood characteristics in Los Angeles, California and southern Louisiana. Journal of Urban Health. 2008; 85:191–205. [PubMed: 18228148]

Bonilla-Silva E. Rethinking racism: Toward a structural interpretation. American Sociological Review. 1997; 62:465–480.

Carson, AE. Prisoners in 2013. Bureau of Justice Statistics; 2014 Sep.

Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. Atlanta, GA: 2012. Vital signs: Binge drinking prevalence, frequency, and intensity among adults—United States, 2010.

Centers for Disease Control and Prevention. Excessive drinking costs U.S. $223.5 billion. 2014. Retrieved from http://www.cdc.gov/features/alcoholconsumption/

Cerda M, Diez-Roux AV, Tchetgen ET, Gordon-Larsen P, Kiefe C. The relationship between neighborhood poverty and alcohol use: estimation by marginal structural models. Epidemiology. 2010; 21:482–9. [PubMed: 20498603]

Chen P, Jacobson KC. Developmental trajectories of substance use from early adolescence to young adulthood: gender and racial/ethnic differences. Journal of Adolescent Health. 2012; 50:154–63. [PubMed: 22265111]

Compton, MTS., R, S. The social determinants of mental health. Arlington, VA: American Psychiatric Publishing; 2015.

Courtney KE, Polich J. Binge drinking in young adults: Data, definitions, and determinants. Psychological Bulletin. 2009; 135:142–56. [PubMed: 19210057]

DePadilla L, Elifson K, McCarty F, Sterk C. Excessive drinking among African American men: individual and contextual correlates. Journal of Ethnicity in Substance Abuse. 2012; 11:113–29. [PubMed: 22679893]

Donovan JE, Jessor R, Jessor L. Problem drinking in adolescence and young adulthood. A follow-up study. Journal of Studies on Alcohol. 1983; 44:109–37. [PubMed: 6865420]

Evans-Polce RJ, Vasilenko SA, Lanza ST. Changes in gender and racial/ethnic disparities in rates of cigarette use, regular heavy episodic drinking, and marijuana use: ages 14 to 32. Addictive Behaviors. 2015; 41:218–22. [PubMed: 25452068]

Geronimus AT. Understanding and eliminating racial inequalities in women's health in the United States: the role of the weathering conceptual framework. Journal of the American Medical Women's Association. 2001; 56(4):133–136.

Herd D. Subgroup differences in drinking patterns among black and white men: results from a national survey. Journal of Studies on Alcohol. 1990; 51:221–32. [PubMed: 2342362]

Jackson KM, Sher KJ, Gotham HJ, Wood PK. Transitioning into and out of large-effect drinking in young adulthood. Journal of Abnormal Psychology. 2001; 110:378–91. [PubMed: 11502081]

Johnson FW, Gruenewald PJ, Treno AJ, Taff GA. Drinking over the life course within gender and ethnic groups: a hyperparametric analysis. Journal of Studies on Alcohol. 1998; 59:568–80. [PubMed: 9718110]

Jones-Webb R, Karriker-Jaffe KJ, Zemore SE, Mulia N. Effects of economic disruptions on alcohol use and problems: why do African Americans fare worse? Journal of Studies on Alcohol and Drugs. 2016; 77(2):261–271. doi:http://dx.doi.org/10.15288/jsad.2016.77.261. [PubMed: 26997184]

Karlamangla A, Zhou K, Reuben D, Greendale G, Moore A. Longitudinal trajectories of heavy drinking in adults in the United States of America. Addiction. 2006; 101:91–9. [PubMed: 16393195]

Karriker-Jaffe KJ, Zemore SE. Associations between acculturation and alcohol consumption of Latino men in the United States. Journal of Studies on Alcohol and Drugs. 2009; 70:27–31. [PubMed: 19118388]

Kerr WC, Greenfield TK, Bond J, Ye Y, Rehm J. Age–period–cohort modelling of alcohol volume and heavy drinking days in the US National Alcohol Surveys: divergence in younger and older adult trends. Addiction. 2009; 104(1):27–37. DOI: 10.1111/j.1360-0443.2008.02391.x

Keyes KM, Vo T, Wall MM, Caetano R, Suglia SF, Martins SS, Galea S, Hasin D. Racial/ethnic differences in use of alcohol, tobacco, and marijuana: is there a cross-over from adolescence to adulthood? Social Science & Medicine. 2015; 124:132–41. [PubMed: 25461870]

Lin AC, Harris DR. The colors of poverty: Why racial & ethnic disparities persist. National Poverty Center Policy Brief. 2009; 16 [Online]. Available: http://www.npc.umich.edu/publications/policy_briefs/brief16/index.php.

Lipsky S, Caetano R. Epidemiology of substance abuse among Latinos. Journal of Ethnicity in Substance Abuse. 2009; 8:242–60. [PubMed: 25985069]

Lo CC, Cheng TC. Heavy drinking during periods of high unemployment: 15-year trend study of the role of race/ethnicity. Drug and Alcohol Dependence. 2013; 133:383–90. [PubMed: 23880246]

Martin JK, Tuch SA, Roman PM. Problem drinking patterns among African Americans: the impacts of reports of discrimination, perceptions of prejudice, and "risky" coping strategies. Journal of Health and Social Behavior. 2003; 44:408–25. [PubMed: 14582316]

Merrick EL, Horgan CM, Hodgkin D, Garnick DW, Houghton SF, Panas L, Saitz R, Blow FC. Unhealthy drinking patterns in older adults: prevalence and associated characteristics. Journal of the American Geriatrics Society. 2008; 56:214–23. [PubMed: 18086124]

Mossakowski KN. Is the duration of poverty and unemployment a risk factor for heavy drinking? Social Science & Medicine. 2008; 67:947–55. [PubMed: 18573582]

Mukku VK, Benson TG, Alam F, Richie WD, Bailey RK. Overview of substance use disorders and incarceration of african american males. Front Psychiatry. 2012; 3:98. [PubMed: 23162480]

Mulia N, Karriker-Jaffe KJ, Witbrodt J, Bond J, Williams E, Zemore SE. Racial/ethnic differences in 30-year trajectories of heavy drinking in a nationally representative US sample. Drug and Alcohol Dependence. 2017; 170:133–141. [PubMed: 27889594]

Mulia N, Ye Y, Zemore SE, Greenfield TK. Social disadvantage, stress, and alcohol use among black, Hispanic, and white Americans: findings from the 2005 U.S. National Alcohol Survey. Journal of Studies on Alcohol Drugs. 2008; 69:824–33. [PubMed: 18925340]

Naimi TS, Brewer RD, Mokdad A, Denny C, Serdula MK, Marks JS. Binge drinking among US adults. JAMA. 2003; 289:70–5. [PubMed: 12503979]

Naimi TS, Nelson DE, Brewer RD. The intensity of binge alcohol consumption among US adults. American Journal of Preventive Medicine. 2010; 38(2):201–207. http://dx.doi.org/10.1016/j.amepre.2009.09.039. [PubMed: 20117577]

National Institute of Alcohol Abuse and Alcoholism [NIAAA]. Tenth Special Report to the US Congress on Alcohol and Health. Bethesda, MD: 2000.

National Institute of Alcohol Abuse and Alcoholism [NIAAA]. NIAAA council approves definition of binge drinking. NIAAA Newsletter. 2004

Pettit B, Western B. Mass imprisonment and the life course: Race and class inequality in US incarceration. American Sociological Review. 2014; 69:151–169.

Substance Abuse and Mental Health Services Administration [SAMHSA]. Results from the 2013 National Survey on Drug Use and Health: Summary of National Findings. Rockville, MD: 2014.

Sampson RJ, Laub JH. Crime and deviance over the life course: The salience of adult social bonds. American Sociological Review. 1990; 55:609–627.

Schmitt MT, Branscombe NR, Postmes T, Garcia A. The consequences of perceived discrimination for psychological well-being: a meta-analytic review. Psychological Bulletin. 2014; 140:921–48. [PubMed: 24547896]

Stimpson JP, Ju H, Raji MA, Eschbach K. Neighborhood deprivation and health risk behaviors in NHANES III. American Journal on Health Behavior. 2007; 31:215–22.

Travis, J. But they all come back: Facing the challenges of prisoner reentry. Washington, DC: The Urban Institute Press; 2005.

Vogt Yuan AS. Black-White differences in aging out of substance use and abuse. Sociological Spectrum. 2010; 31:3–31.

Wardian J, Wolfersteig W, Schepel E. Alcohol consumption in diverse populations: how ethnicity moderates average number of drinks per day and age. Journal of Substance Use. 2013; 18:229–237.

Watt TT. The race/ethnic age crossover effect in drug use and heavy drinking. Journal of Ethnicity in Substance Abuse. 2008; 7:93–114. [PubMed: 19842303]

Wilson SR, Knowles SB, Huang Q, Fink A. The prevalence of harmful and hazardous alcohol consumption in older U.S. adults: data from the 2005-2008 National Health and Nutrition Examination Survey (NHANES). Journal of General Internal Medicine. 2014; 29:312–9. [PubMed: 24101531]

Zapolski TC, Pedersen SL, McCarthy DM, Smith GT. Less drinking, yet more problems: understanding African American drinking and related problems. Psychological Bulletin. 2014; 140:188–223. [PubMed: 23477449]

Zemore SE, Karriker-Jaffe KJ, Keithly S, Mulia N. Racial prejudice and unfair treatment: interactive effects with poverty and foreign nativity on problem drinking. Journal of Studies on Alcohol Drugs. 2011; 72:361–70. [PubMed: 21513672]

Zemore SE, Mulia N, Jones-Webb RJ, Liu H, Schmidt L. The 2008–2009 recession and alcohol outcomes: differential exposure and vulnerability for black and Latino populations. Journal of Studies on Alcohol and Drugs. 2013; 74(1):9–20. doi:http://dx.doi.org/10.15288/jsad.2013.74.9. [PubMed: 23200146]
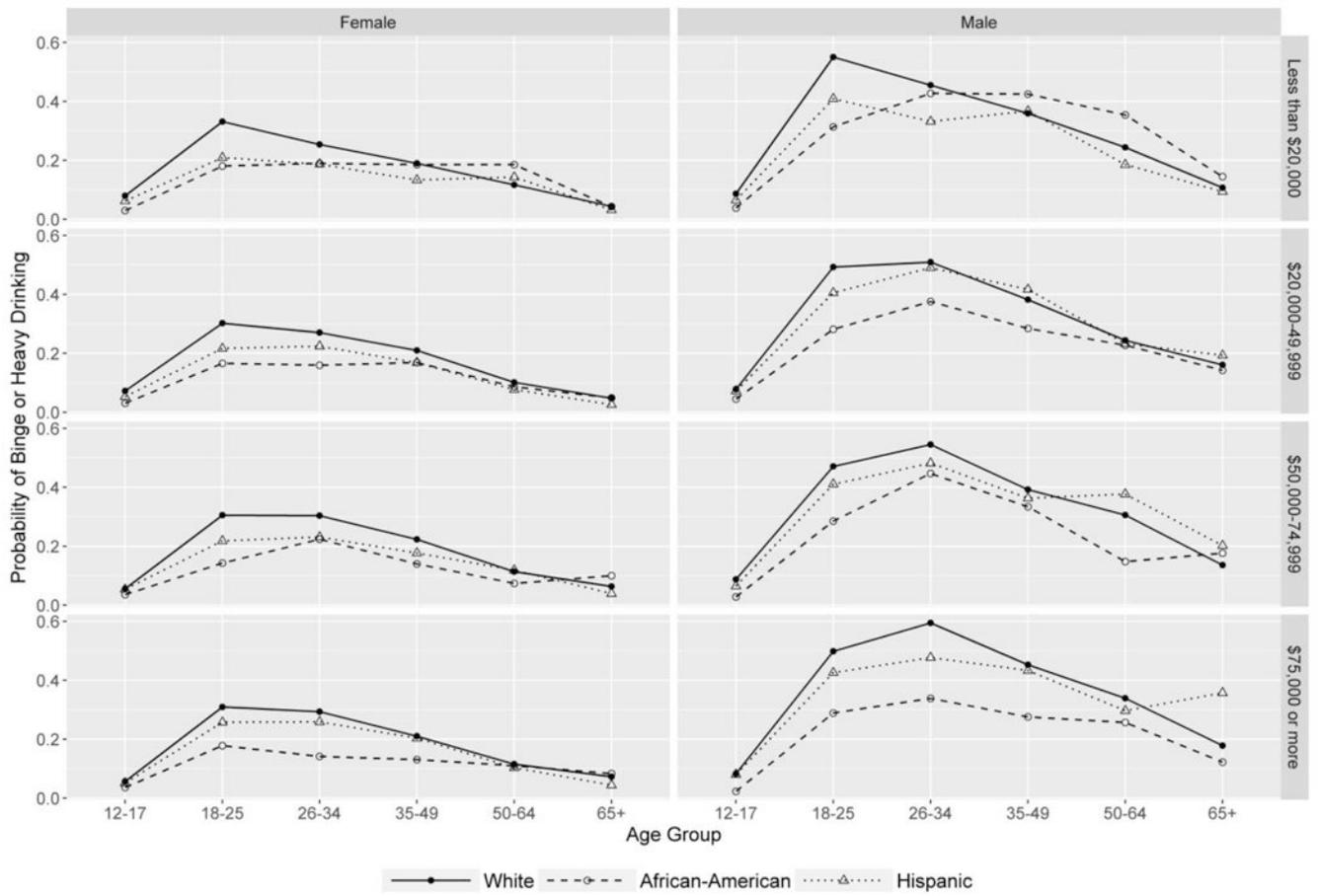
Zenk SN, Schulz AJ, Israel BA, James SA, Bao S, Wilson ML. Neighborhood racial composition, neighborhood poverty, and the spatial accessibility of supermarkets in metropolitan Detroit. American Journal of Public Health. 2005; 95:660–7. [PubMed: 15798127]

Figure 1.
Probability of binge or heavy drinking by age for White, African-American and Hispanics, stratified by sex and income groups.

Table 1

Description of variables used in the model (*N*=205,198).

Variable	Categories	N	%
Outcome variable	Binge drinker	50,876	24.8
	Current non-binge drinker	41,087	20.0
	No use in past 30 days	113,235	55.2
Age	12-17	65,556	32.0
	18-25	67,658	33.0
	26-34	20,241	9.9
	35-49	28,260	13.8
	50-64	14,528	7.1
	65+	8,955	4.4
Income	<$20,000	48,102	23.4
	$20,000-$49,999	68,119	33.2
	$50,000-74,999	33,172	16.2
	$75,000	55,805	27.2
Race	Hispanic	38,172	18.6
	African-American	29,274	14.3
	White	137,752	67.1
Sex	Female	106,517	51.9
	Male	98,681	48.1
Marital status	Married	49,228	24.0
	Widowed	3,628	1.8
	Divorced/separated	13,317	6.5
	Never married	139,025	67.8
Education	Less than high school	87,861	42.8
	High school graduate	45,560	22.2
	Some college	41,357	20.2
	College graduate	30,420	14.8
Year of survey	2010	52,223	25.5
	2011	53,161	25.9
	2012	50,068	24.4
	2013	49,746	24.2

Table 2

Odds ratios and p-values obtained from logistic regression models of the probability of binge drinking vs. current or non-use for females and males by race/ethnicity[*].

Income level	Age group	Females				Males			
		African-American vs. White		Hispanic vs. White		African-American vs. White		Hispanic vs. White	
		OR	p-value[†]	OR	p-value[†]	OR	p-value[†]	OR	p-value[†]
<$20,000	12-17	**0.35**	**<.0001**	0.76	.1634	**0.42**	**<.0001**	0.73	.0950
	18-25	**0.45**	**<.0001**	**0.53**	**<.0001**	**0.37**	**<.0001**	**0.57**	**<.0001**
	26-34	**0.69**	**.0088**	0.67	.0973	0.89	.6469	**0.59**	**.0054**
	35-49	0.97	.9364	**0.66**	**.0306**	1.32	.1311	1.04	.7915
	50-64	**1.72**	**.0157**	1.26	.6026	**1.70**	**.0063**	0.70	.3470
	65+	0.98	.9664	0.72	.7588	1.41	.6183	0.86	.7854
$20,000-49,999	12-17	**0.40**	**<.0001**	**0.72**	**.0088**	**0.55**	**.0041**	0.92	.6469
	18-25	**0.46**	**<.0001**	**0.64**	**<.0001**	**0.40**	**<.0001**	**0.70**	**<.0001**
	26-34	**0.51**	**<.0001**	0.78	.0773	**0.58**	**.0004**	0.93	.6469
	35-49	0.76	.0704	0.76	.0740	**0.64**	**.0015**	1.16	.2436
	50-64	0.84	.7101	0.74	.3607	0.91	.7471	0.94	.7915
	65+	1.02	.9664	0.53	.4115	0.87	.7471	1.25	.6469
$50,000-74,999	12-17	0.63	.1612	0.96	.9364	**0.30**	**<.0001**	0.72	.2193
	18-25	**0.38**	**<.0001**	**0.64**	**.0118**	**0.45**	**<.0001**	0.78	.1137
	26-34	0.66	.2623	0.69	.1624	0.67	.0955	0.78	.3470
	35-49	**0.57**	**.0144**	0.75	.2498	0.78	.2959	0.88	.6469
	50-64	0.62	.4628	1.05	.9611	**0.39**	**.0171**	1.37	.4675
	65+	1.63	.7101	0.60	.7101	1.36	.7104	1.61	.6247
$75,000	12-17	0.62	.1252	0.90	.7101	**0.26**	**<.0001**	0.97	.7915
	18-25	**0.48**	**<.0001**	0.77	.0928	**0.41**	**<.0001**	**0.75**	**.0133**
	26-34	**0.40**	**<.0001**	0.84	.6458	**0.35**	**<.0001**	**0.62**	**.0265**
	35-49	0.56	.0514	0.96	.9364	**0.46**	**<.0001**	0.92	.6942

Income level	Age group	Females				Males			
		African-American vs. White		Hispanic vs. White		African-American vs. White		Hispanic vs. White	
		OR	p-value†	OR	p-value†	OR	p-value†	OR	p-value†
	50-64	0.95	.9521	0.88	.9364	0.67	.1711	0.82	.6469
	65+	1.17	.9364	0.59	.7599	0.64	.6469	2.57	.1711

*
estimates were adjusted by including survey year, education and marital status in the model; separate models were estimated for females and males.

†
p-value have been adjusted using false discovery rate method to account for multiple testing; significant effects are highlighted in bold.