



Published in final edited form as:

Drug Alcohol Depend. 2011 November 1; 118(2-3): 375–382. doi:10.1016/j.drugalcdep.2011.04.024.

Race/ethnicity and sex differences in progression from drinking initiation to the development of alcohol dependence

Anika A. H. Alvanzo,

Division of General Internal Medicine, Johns Hopkins University School of Medicine, 1830 East Monument Street, Room 8047a, Baltimore, MD 21205 USA, aalvanz1@jhmi.edu, Phone: 410-502-2048, Fax: 410-502-6952

Carla L. Storr,

Department of Family and Community Health, University of Maryland School of Nursing, Baltimore, MD, 21201, USA

Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland 21205 USA

Lareina La Flair,

Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205 USA

Kerry M. Green,

Department of Behavioral and Community Health, University of Maryland School of Public Health, College Park, MD, 20742 USA

Fernando A. Wagner, and

Prevention Sciences Research Center, Morgan State University, Baltimore, MD 21251 USA

School of Community Health and Policy, Morgan State University, Baltimore, MD 21251 USA

Rosa M. Crum

Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205 USA

Department of Psychiatry and Behavioral Sciences, Johns Hopkins University School of Medicine, Baltimore, MD 21287 USA

Department of Mental Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205 USA

Abstract

Background—Prior studies on the course of alcohol use disorders have reported a “telescoping” effect with women progressing from drinking initiation to alcohol dependence faster than men. However, there is a paucity of population-based analyses that have examined progression to alcohol dependence comparing race/ethnicity subgroups, and little is known about whether the telescoping effect for women varies by race/ethnicity. We examined whether a telescoping effect

© 2011 Elsevier Ireland Ltd. All rights reserved.

Correspondence to: Anika A. H. Alvanzo.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

is present in the general population comparing race/ethnicity subgroups and comparing men and women stratified by race.

Methods—This study uses data from Wave I of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) to compare a nationally representative sample of White, Black and Hispanic adults 18–44 years of age ($n = 21,106$). Time to event analyses compare the risk of alcohol initiation, onset of alcohol dependence, and the transition from initial use to onset of alcohol dependence in the three race/ethnicity groups and for males and females in each race/ethnicity group.

Results—Whites were younger than Blacks and Hispanics of the same sex at drinking onset and progressed to alcohol dependence at a faster rate than both Blacks and Hispanics. In addition, we found no evidence of a telescoping effect in women for any race/ethnicity group.

Conclusions—The present study illustrates differences in the course of transition from alcohol initiation to the development of dependence by race/ethnicity but not sex. Our findings highlight the need for additional study of factors resulting in race/ethnicity differences in order to inform culturally relevant prevention and intervention initiatives.

1. Introduction

Research has shown a differential risk for alcohol use and alcohol use disorders based on sociodemographic characteristics. Specifically, White race has consistently been identified as a risk factor. Non-Hispanic Whites have lower rates of lifetime abstinence, have higher rates of current drinking and are younger at initiation of drinking than Blacks (Grucza et al., 2008b; Hubbard et al., 1986; Johnson et al., 2005; National Institute on Alcohol Abuse and Alcoholism (NIAAA), 2006; Substance Abuse and Mental Health Services Administration, 2009). Additionally, multiple studies have demonstrated higher rates of alcohol abuse and dependence in Whites when compared to Blacks or Hispanics (Anthony et al., 1994; Grant et al., 2004; Kalaydjian et al., 2009). Analyses from Wave I data of the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC) found that the risk of both current and lifetime alcohol dependence was lower for both Blacks and Hispanics as compared to Whites (Hasin et al., 2007). Using data from the National Comorbidity Survey, Kalaydjian and colleagues (2009) found that non-Hispanic Whites were more likely than Blacks and Hispanics to initiate alcohol use and transition from first use to regular use, and more likely than Blacks only to progress from regular use to alcohol abuse. This study found no racial differences in risk of progressing from alcohol abuse to dependence. A more recent study by Lopez-Quintero and colleagues (2011) using data from Wave 1 and 2 of the NESARC found that Whites were more likely to transition from alcohol use to dependence than Blacks. The same study found no differences in the probability of transitioning between Whites and Hispanics.

Male sex has also been identified as a risk factor for early onset of drinking (Grucza et al., 2008b; Keyes et al., 2010; Schuckit et al., 1998) and the development of alcohol use disorders (Hasin et al., 2007; Keyes et al., 2008; Rice et al., 2003). Analyses of more than 6,000 respondents between 15 and 44 years of age in the National Comorbidity Survey found that while the number of men and women alcohol drinkers was similar, there were almost twice as many cases of alcohol dependence among men (Wagner and Anthony, 2007). Further, the same study found that the cumulative probability of alcohol dependence ten years after initiating alcohol use was approximately three times higher for men. Lopez-Quintero et al. (in press) found that men were more likely than women to transition from alcohol use to dependence.

Research on the progression from first alcohol use to the development of alcohol use disorders has shown a sex difference, with women moving faster than men from the initiation of drinking to the onset of first alcohol-related problems, alcohol dependence and treatment entry (Hernandez-Avila et al., 2004; Piazza et al., 1989; Randall et al., 1999; Schuckit et al., 1998). While this “telescoping” effect has been demonstrated in several samples, it seems to be less common in younger age cohorts (Johnson et al., 2005; Randall et al., 1999). However, the majority of studies examining telescoping were conducted in treatment samples, limiting the generalizability of findings. A recent study from a general population sample did not find that women progressed from drinking onset to alcohol dependence faster than men; in fact, it found the opposite, with men demonstrating a faster transition (Keyes et al., 2010).

Despite at least two decades of research on telescoping, there is a paucity of data on race/ethnicity differences in the progression from drinking onset to development of alcohol dependence. One study of participants recruited from substance abuse treatment programs included in the National Drug and Alcoholism Treatment Unit Survey (NDATUS) database found that while Blacks were older than Whites and Hispanics at onset of first regular alcohol use, both Blacks and Hispanics progressed from first regular use to intoxication faster than Whites (Johnson et al., 2005). However, this study did not examine time to development of alcohol dependence. Less is known about whether differences in progression vary when examining race/ethnicity subgroups by sex.

The current study uses data from a nationally representative survey to examine the length of time from first drink to development of alcohol dependence, comparing White, Black, and Hispanic men and women. The sample focuses on individuals younger than 45 years of age in an effort to minimize recall bias (Wagner and Anthony, 2007) and the possibility of differential alcohol-related mortality (Keyes et al., 2010). We report on age at drinking initiation, age of first episode of alcohol dependence, and time to progression from initiation of drinking to development of alcohol dependence with participants stratified by race/ethnicity and sex. In addition to exploring differences by race/ethnicity, we also examine sex differences within race/ethnicity subgroups in an effort to explore whether sex-related telescoping effects vary by race/ethnicity.

2. Methods

2.1 Sample

The data in this analysis came from the 2001 – 2002 Wave 1 of the NESARC, a nationally representative survey initiated by the National Institute on Alcohol Abuse and Alcoholism (Grant et al., 2004). Using multi-stage probability sampling, 43,093 non-institutionalized adults 18 years and older participated in structured computer-assisted personal interviews. Blacks, Hispanics, and young adults (18 – 24 years old) were oversampled. Detailed sampling procedures, training, and quality control methods are described in detail elsewhere (Grant et al., 2004). The overall survey response rate for the NESARC baseline survey was 81%. The current analyses were restricted to only those persons identified as Black, White, or Hispanic and those under the age of 45 years (N=21,106).

2.2 Measures

Alcohol initiation and dependence, as well as ages of onset, were assessed using the Alcohol Use Disorder and Associated Disabilities Interview Schedule- DSM IV Version (AUDADIS-IV), which was administered through a structured computer-assisted personal interview (CAPI) (Grant et al., 2003; Grant et al., 1995). The AUDADIS assesses alcohol and other drug consumption data as well as selected Axis I and Axis II psychiatric disorders.

Whereas initiation of drinking was operationalized directly from a question asking about the age of first use of alcohol (“not counting small tastes or sips”), the onset age of alcohol dependence was based on the reported age the first time criteria for dependence were met. The time between age of dependence onset and age of alcohol initiation was a simple calculation of the lapse in years.

The race/ethnicity variable was constructed from self-reports and recoded according to an algorithm developed by the Census Bureau. Individuals who reported Hispanic or Latino origin were coded as Hispanic or Latino regardless of race. Non-Hispanic/Latino individuals who reported multiple races were coded into a single category in the following order of priority: 1) Black, 2) American Indian/Alaska Native, 3) Asian/Native Hawaiian/Pacific Islander, and 4) White.

Covariates assessed in the analyses include age, age of onset of drinking, family history of alcohol problems (first degree relative identified as “ever an alcoholic or problem drinker”), and alcohol consumption (typical number of drinks in a day during the heaviest drinking period). These covariates were chosen based on findings from prior literature. Age, particularly younger age, is associated with increased rates of drinking and increased prevalence of alcohol use disorders with an estimated lifetime prevalence of alcohol dependence of 17% in 18-29 years olds compared to 11% in 45 -64 year olds (Hasin et al., 2007). Multiple studies have shown that risk for lifetime alcohol dependence is higher in those with familial alcoholism (Dawson et al., 1992; Heath et al., 1997) and in those who initiated drinking at an earlier age (Dawson et al., 2008; DeWit et al., 2000; Hingson and Zha, 2009). The consumption variable we chose, “number of drinks of any alcohol usually consumed on days when drank alcohol during period of heaviest drinking,” was selected because it was felt to be most representative of individuals’ typical pattern of consumption. We also conducted additional analyses using the consumption variable, “largest number of drinks of any alcohol consumed on days when drank alcohol during period of heaviest drinking” and found no notable differences in results.

2.3 Data Analysis

In this study, we first conducted bivariate analyses comparing the mean ages of initiation of drinking, age of onset of alcohol dependence, and the mean time in years from drinking initiation to development of alcohol dependence using a Wald test. Next, we examined the risk of alcohol initiation, alcohol dependence and the transition from initiation of alcohol use to onset of alcohol dependence separately using discrete time survival analyses. For the estimation of the cumulative probability of dependence upon alcohol, we set two time perspectives. According to the first perspective, time is measured chronologically in years since birth. In the second perspective, the time-scale is set as years since first alcohol use. In the survival models, the 3,455 alcohol abstainers were censored at their age at the time of the interview. Additionally there were 270 individuals who had consumed alcohol but had an unknown or missing age of onset and 37 individuals who met criteria for alcohol dependence but had an unknown or missing age of dependence. Their missing ages excluded them from the survival models.

Next unadjusted and adjusted hazard ratios and 95% confidence intervals using Cox regression were calculated with Whites as the reference group. In adjusted models, we controlled for age and family history. Analyses for onset of dependence and progression from drinking initiation to dependence excluded lifetime abstainers and also controlled for age at drinking initiation and alcohol consumption. For the hazard models predicting onset of dependence we did not remove individuals at the time they stopped drinking. We recognize that one strategy might be to remove former drinkers from risk set at the time they stopped drinking; however, we chose to conduct the analyses without doing so because

former drinkers are still at risk of relapse, and we do not have annualized data to account for brief periods of non-drinking. Supplemental analyses attempting to censor former drinkers at their age of last drink were performed and resulted in no differences in the conclusions. Because of the complex survey design employed by the NESARC, analyses were conducted with attention to variation in analytical weights and clustering of respondents within sample strata.

The aforementioned analyses were first conducted to explore potential differences in the course of alcohol dependence by race/ethnicity. Based on previous findings of sex differences (Grucza et al., 2008b; Keyes et al., 2010) men and women were examined separately for all analyses. Next, we conducted analyses to determine if a telescoping effect existed by sex and if this effect varied by race/ethnicity. For these analyses, the sample was stratified by race/ethnicity, and women were compared to men of the same race/ethnicity group. All analyses were done using the STATA SE software package.

3. Results

3.1 Prevalence and Mean Ages of Onset and Years to Transition

3.1.1 Initiation of Drinking: Race/ethnicity and Sex Differences—An estimated 85.4% of the study sample reported lifetime alcohol use, and the average age of drinking onset was 18.22 years. As shown in Table 1, men had a younger mean age of drinking initiation than women overall and within the same race/ethnicity. This difference varied from nearly one year for Whites to one and a half years for Hispanics. White men and women initiated drinking at younger ages than Black and Hispanic men and women, respectively (all p -values < 0.001). There were no statistically significant differences in the age of initiation at the $p < 0.05$ level between Black and Hispanic men or among the women.

3.1.2 Onset of Dependence: Race/ethnicity and Sex Differences—Almost 1/5 (17.7%) of persons developed alcohol dependence with 22.9% of men and 12.7% of women experiencing at least one episode of dependence in their lifetime (see Table 1). The mean age of onset of alcohol dependence was 21.61 years. Despite younger age of drinking initiation among men, there were no sex differences within race/ethnicity groups for age at first episode of dependence. However, Black men were significantly older than White men ($F_{1, 715} = 19.13$; $p < 0.001$) and Hispanic men ($F_{1, 337} = 4.07$; $p = 0.044$) at onset of dependence, and Hispanic men were older than White men ($F_{1, 728} = 4.26$; $p = 0.039$). Black women were significantly older than both White and Hispanic women, respectively ($F_{1, 598} = 29.10$; $p < 0.001$ and $F_{1, 241} = 8.79$; $p = 0.003$). While there was a trend for Hispanic women to be older than White women, the difference was not statistically significant ($F_{1, 611} = 3.33$; $p = 0.069$).

3.1.3 Time to Progression from Initiation of Drinking to Alcohol Dependence: Race/ethnicity and Sex Differences—One fifth (20.8%) of persons reporting an age of drinking initiation (excluding lifetime abstainers) progressed to alcohol dependence. As shown in Table 1, the mean time from initiation of drinking to the development of alcohol dependence was 5.19 years. Similar to age at first episode of dependence, there were no sex differences overall or by race/ethnicity. White men and women had a shorter mean time from onset of drinking to development of dependence than Black men ($F_{1, 714} = 10.00$; $p = 0.002$) and women ($F_{1, 598} = 12.93$; $p < 0.001$), respectively. Hispanics were not significantly different from Whites or Blacks.

3.2 Survival Analyses

3.2.1 Initiation of Drinking: Race/ethnicity and Sex Differences—Figure 1 shows the survival curves for age at drinking initiation, panel “A” for males and panel “B” for females. Whites, both men and women, began drinking earlier and had higher rates than Blacks and Hispanics (men: logrank $\chi^2 = 157.58$, $p < 0.001$; women: logrank $\chi^2 = 589.39$, $p < 0.001$). There were no differences between Blacks and Hispanics.

For all races/ethnicities, men transitioned to drinking initiation faster than women (Whites: logrank $\chi^2 = 118.96$; Blacks: logrank $\chi^2 = 105.44$; Hispanics: logrank $\chi^2 = 175.73$, all p -values < 0.001).

3.2.2 Onset of Dependence: Race/ethnicity and Sex Differences—The survival curves for onset of dependence are shown in Figure 2, again with panel “A” depicting survival for men and panel “B” for women. Among men, Whites had a lower survival probability consistent with an earlier onset and higher rate of alcohol dependence when compared to both Blacks (logrank $\chi^2 = 76.75$, $p < 0.001$) and Hispanics (logrank $\chi^2 = 91.93$, $p < 0.001$). There were no differences between Black and Hispanic men ($p = 0.315$). Similarly, White women had a lower survival probability than Black and Hispanic women, respectively (Blacks: logrank $\chi^2 = 159.05$, $p < 0.001$; Hispanic: logrank $\chi^2 = 108.20$, $p < 0.001$). Additionally, Hispanic women had lower survival probability than Black women (logrank $\chi^2 = 8.84$, $p = 0.003$).

When examining sex differences within each specific race/ethnicity subgroup, men of all race/ethnicities developed alcohol dependence at a higher rate than women of the same race/ethnicity (Whites: logrank $\chi^2 = 155.91$; Blacks: logrank $\chi^2 = 54.75$; Hispanics: logrank $\chi^2 = 42.10$, all p -values < 0.001).

3.2.3 Time to Progression from Initiation of Drinking to Alcohol Dependence: Race/ethnicity and Sex Differences—The survival curves for the lag period between initiation of drinking and development of alcohol dependence are presented in Figure 3. For both men and women, Whites had a lower survival probability suggesting a higher rate and a faster transition from drinking onset to alcohol dependence than both Blacks and Hispanics (men: logrank $\chi^2 = 53.97$, $p < 0.001$; women: logrank $\chi^2 = 46.66$, $p < 0.001$). Additionally, Hispanic women had a lower survival probability than Black women (logrank $\chi^2 = 9.00$, $p < 0.003$).

As with both initiation of drinking and onset of dependence, men of all race/ethnicities transitioned from drinking initiation to development of alcohol dependence at a higher rate than women of the same race/ethnicity (Whites: logrank $\chi^2 = 124.00$; Blacks: logrank $\chi^2 = 29.33$; Hispanics: logrank $\chi^2 = 13.24$, all p -values < 0.001).

3.3. Hazard Ratios

Hazard ratios for each stage of alcohol involvement and the transition to dependence are presented in Table 2 for all race/ethnicity and sex subgroups with Whites as the referent group. As shown in Table 2, Whites had a significantly higher hazard for all outcomes compared to Blacks and Hispanics of the same sex (drinking initiation, age of onset of dependence and time from initiation to dependence: all p -values ≤ 0.001). This finding persisted after adjusting for age and family history, as well as adjusting for age at initiation of drinking and typical daily consumption during heaviest drinking period for both onset of dependence and time from initiation to dependence (all p -values < 0.019).

As shown in Table 3, compared to women of the same race/ethnicity, men had significantly higher hazards for drinking initiation (all p-values ≤ 0.001). Black men had a higher hazard than Black women for onset of dependence ($p = 0.030$). There were no other statistically significant sex differences in the hazards for onset of dependence or time to progression from drinking initiation to development of alcohol dependence for Whites, Blacks or Hispanics.

4. Discussion

The majority of research on drinking initiation and alcohol dependence has focused on cumulative probability of dependence based on age at first drink or differential risk by sex. This research on the progression from first drink to development of alcohol dependence has often demonstrated sex differences, specifically the telescoping effect with women initiating drinking later but progressing to dependence and other alcohol-related problems faster than men. This study extends prior research by examining race/ethnicity differences together with sex differences in the onset of drinking and alcohol dependence, as well as progression from first drink to alcohol dependence. Our analyses resulted in several significant findings, which we highlight below.

First, similar to other recent studies conducted in general population samples, we found no evidence for a telescoping effect for women (Keyes et al., 2010; Lopez-Quintero et al. in press; Wagner and Anthony, 2007). While White, Black, and Hispanic women in our study were older than men of the same race/ethnicity at onset of alcohol use, they did not progress to dependence in a shorter time period than men. These results are in concert with a recent study by Keyes and colleagues (2010) that combined data from both the NESARC and the National Longitudinal Alcohol Epidemiologic Survey, which was conducted ten years earlier. In that study, not only was there an absence of a telescoping effect for women, but men progressed to dependence at a faster rate than women. In our sample, there were no sex differences in time to progression to alcohol dependence for Whites, Blacks or Hispanics. One potential explanation for their finding of a faster transition to dependence for men is the fact that the Keyes study did not include alcohol consumption as a covariate. In our study, the adjusted model excluding the consumption variable (not shown) found that White men progressed to dependence faster than White women only; however, with the addition of alcohol consumption as a covariate there was no difference. Thus, the greater consumption typical for men may account for sex differences in progression to alcohol dependence for Whites at least.

Our lack of a telescoping effect for women is in contrast to the many earlier studies (Hernandez-Avila et al., 2004; Johnson et al., 2005; Piazza et al., 1989; Randall et al., 1999), which were conducted in treatment samples and thus less able to generalize to the general population. By analyzing data from a population-based sample, consisting of individuals with and without alcohol dependence, and by removing the potential selection biases of treatment populations, our findings are expected to represent the course from first alcohol use to dependence in the general population of the United States.

It is also possible that our results may be reflective of secular trends in rates of alcohol use and use disorders such that while telescoping may have at one time existed in the general population it is no longer evident. Several recent studies have demonstrated an increase in the prevalence of both alcohol use and alcohol dependence by birth cohort, with higher rates in younger cohorts compared to older cohorts (Gruza et al., 2008a; Keyes et al., 2008; Keyes et al., 2010; Rice et al., 2003). This increase is most prominent in women and has resulted in a progressive decrease in the odds ratio of dependence between men and women (Gruza et al., 2008a; Keyes et al., 2008). Further, younger cohorts have an earlier age of

drinking onset than older cohorts, but the net decrease in age at drinking initiation is twice as large for women (Gruza et al., 2008b). Thus, it is possible that the absence of a telescoping effect may be reflective of the restriction of our analyses to a younger sample (age < 45 years old). However, as discussed earlier, restricting our sample to younger participants was important to decrease both the potential for recall bias and differential alcohol-related mortality (Keyes et al., 2010; Wagner and Anthony, 2007).

Second, we found notable differences by race/ethnicity. In general, White men and women had a younger mean age at onset of drinking, younger mean age of onset of alcohol dependence, and faster progression from drinking initiation to dependence than Black and Hispanic men and women, respectively. These findings are consistent with other studies showing increased odds of ever using alcohol, earlier age of regular alcohol use, and higher prevalence of alcohol dependence in Whites when compared to Blacks or Hispanics (Hasin et al., 2007; Johnson et al., 2005; Kalaydjian et al., 2009). However, few studies have explored race/ethnicity differences in progression from drinking initiation to development of alcohol dependence. In a recent study, using both Waves of the NESARC, Lopez-Quintero and colleagues (in press) found that White alcohol users were more likely to transition to alcohol dependence than Black users but found no significant difference in the hazard of transitioning to dependence between Whites and Hispanics. Our study examines race/ethnicity differences in transition from use to dependence in a general population sample and builds on the existing literature by examining these differences, stratifying race/ethnicity groups by sex. While our results for Blacks are consistent with the Lopez-Quintero study, our findings for Hispanics differ. These differences may be explained by differences in sampling strategy, including the restriction of their sample to persons who participated in both Waves 1 and 2 and the restriction of our sample to Wave 1 participants younger than 45 years of age. Additionally, our studies used different covariates in the adjusted models.

The etiology of these race/ethnicity differences is not well characterized and additional research is needed to identify the characteristics elevating the risks of earlier drinking initiation and faster transition to dependence for Whites or those attenuating the risks for other groups. Some studies suggest that these racial and ethnic disparities may be partially explained by differences in social and cultural norms. A study by Caetano and Clark (1999) found that both Black and Hispanics reported more conservative alcohol norms and attitudes when compared to Whites. Additionally, multiple studies have found that religiosity is higher among Blacks than Whites (Brown et al., 2001; Donahue and Benson, 1995; Neff and Hoppe, 1993; Taylor et al., 1999). Religiosity has consistently been shown to have an inverse relationship with alcohol use, with those reporting higher levels of religiosity being less likely to initiate alcohol use, consuming fewer drinks per occasion, and reporting fewer alcohol-related problems (Benda, 1997; Brown et al., 2001; Donahue and Benson, 1995; Patock-Peckham et al., 1998). For Hispanics in the United States, acculturation has been identified as a risk factor. A greater degree of acculturation has been associated with increased risk of drinking, alcohol-related problems, and alcohol dependence (Black and Markides, 1993; Caetano et al., 2009; Gil et al., 2000). In addition to sociocultural factors, at least one biological factor has been identified. Up to one quarter of persons of African descent have a variant of the alcohol dehydrogenase enzyme, ADH1B*3, which has been found to be protective against alcohol dependence and alcohol-related birth defects (Scott and Taylor, 2007). This variant of the enzyme is generally not found in Whites.

Our findings must be interpreted with regard to several limitations. First, all data collected was via self-report, which can raise concerns about the validity of the results. In particular, study participants may be reporting on events that happened many years earlier, which introduces the possibility of recall bias. Recall bias threatens the validity of inferences drawn from observational studies, and is an especially vexing problem in cross-sectional

studies, when the exact timing of events under study may be unknown. We attempted to mitigate this risk by restricting our sample to persons less than 45 years of age (Keyes et al., 2010; Wagner and Anthony, 2007). While this strategy may have reduced the potential for recall bias, our results are less generalizable to older populations and may not have exhausted the threat of recall bias entirely. Second, reporting bias may also be a factor particularly when participants are asked to report on potentially stigmatizing behaviors such as underage drinking or excessive alcohol use. However, there is no reason to suspect that recall or reporting bias varies by race or ethnicity and thus should not influence major findings on racial or ethnic differences. Further, there is some evidence for the reliability and stability of retrospectively recalled history of substance involvement and age of first use (Koenig et al., 2009; Labouvie et al., 1997; Prause et al., 2007). Third, the coding scheme of the NESARC does not allow for an exploration of potential differences in persons of mixed race, and this must be considered when interpreting these results. Fourth, due to the limited number of participants of other races, we were unable to examine relationships by sex for such racial subgroups as Asian or Native Americans. Finally, other important variables were not measured or could not be included in the models, thus leaving room for some unaccounted rival explanations (e.g., religiosity, family and/or cultural norms about alcohol use, and neighborhood characteristics, among others). The present study may help motivate new studies that can address these alternative explanations.

Notwithstanding these limitations, this study extends the literature by contributing to our understanding of race/ethnicity differences in men and women in the course of alcohol use and alcohol dependence in the general population. Our findings raise several questions about the etiology of the differences between men and women and Whites, Blacks and Hispanics. In particular, more investigation is needed on both the risk and protective factors underlying these differences in order to inform prevention and intervention initiatives.

References

- Anthony JC, Warner LA, Kessler RC. Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants: basic findings from the National Comorbidity Survey. *Exp Clin Psychopharmacol.* 1994; 2:244–268.
- Benda BB. An examination of a reciprocal relationship between religiosity and different forms of delinquency within a theoretical model. *J Res Crime Delinq.* 1997; 34:163–186.
- Black SA, Markides KS. Acculturation and alcohol consumption in Puerto Rican, Cuban-American, and Mexican-American women in the United States. *Am J Public Health.* 1993; 83:890–893. [PubMed: 8498630]
- Brown TL, Parks GS, Zimmerman RS, Phillips CM. The role of religion in predicting adolescent alcohol use and problem drinking. *J Stud Alcohol.* 2001; 62:696–705. [PubMed: 11702809]
- Caetano R, Clark CL. Trends in situational norms and attitudes toward drinking among Whites, Blacks, and Hispanics: 1984-1995. *Drug Alcohol Depend.* 1999; 54:45–56. [PubMed: 10101616]
- Caetano R, Ramisetty-Mikler S, Rodriguez LA. The Hispanic Americans Baseline Alcohol Survey (HABLAS): the association between birthplace, acculturation and alcohol abuse and dependence across Hispanic national groups. *Drug Alcohol Depend.* 2009; 99:215–221. [PubMed: 18945554]
- Dawson DA, Goldstein RB, Chou SP, Ruan WJ, Grant BF. Age at first drink and the first incidence of adult-onset DSM-IV alcohol use disorders. *Alcohol Clin Exp Res.* 2008; 32:2149–2160. [PubMed: 18828796]
- Dawson DA, Harford TC, Grant BF. Family history as a predictor of alcohol dependence. *Alcohol Clin Exp Res.* 1992; 16:572–575. [PubMed: 1626658]
- DeWit DJ, Adlaf EM, Offord DR, Ogborne AC. Age at first alcohol use: a risk factor for the development of alcohol disorders. *Am J Psychiatry.* 2000; 157:745–750. [PubMed: 10784467]
- Donahue MJ, Benson PL. Religion and the well-being of adolescents. *J Soc Issues.* 1995; 51:145–160.

- Gil AG, Wagner EF, Vega WA. Acculturation, familism, and alcohol use among Latino adolescent males: longitudinal relations. *J Comm Psychol*. 2000; 28:443–458.
- Grant BF, Dawson DA, Stinson FS, Chou PS, Kay W, Pickering R. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. *Drug Alcohol Depend*. 2003; 71:7–16. [PubMed: 12821201]
- Grant BF, Dawson DA, Stinson FS, Chou SP, Dufour MC, Pickering RP. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002. *Drug Alcohol Depend*. 2004; 74:223–234. [PubMed: 15194200]
- Grant BF, Harford TC, Dawson DA, Chou PS, Pickering RP. The Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS): reliability of alcohol and drug modules in a general population sample. *Drug Alcohol Depend*. 1995; 39:37–44. [PubMed: 7587973]
- Gruzca RA, Bucholz KK, Rice JP, Bierut LJ. Secular trends in the lifetime prevalence of alcohol dependence in the United States: a re-evaluation. *Alcohol Clin Exp Res*. 2008a; 32:763–770. [PubMed: 18336633]
- Gruzca RA, Norberg K, Bucholz KK, Bierut LJ. Correspondence between secular changes in alcohol dependence and age of drinking onset among women in the United States. *Alcohol Clin Exp Res*. 2008b; 32:1493–1501. [PubMed: 18564104]
- Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2007; 64:830–842. [PubMed: 17606817]
- Heath AC, Bucholz KK, Madden PAF, Dinwiddie SH, Slutske WS, Bierut LJ, Statham DJ, Dunne MP, Whitfield JB, Martin NG. Genetic and environmental contributions to alcohol dependence risk in a national twin sample: consistency of findings in women and men. *Psychol Med*. 1997; 27:1381–1396. [PubMed: 9403910]
- Hernandez-Avila CA, Rounsaville BJ, Kranzler HR. Opioid-, cannabis- and alcohol-dependent women show more rapid progression to substance abuse treatment. *Drug Alcohol Depend*. 2004; 74:265–272. [PubMed: 15194204]
- Hingson RW, Zha W. Age of drinking onset, alcohol use disorders, frequent heavy drinking, and unintentionally injuring oneself and others after drinking. *Pediatrics*. 2009; 123:1477–1484. [PubMed: 19482757]
- Hubbard RL, Schlenger WE, Rachal JV, Bray RM, Craddock SG, Cavanaugh ER, Ginzburg HM. Patterns of alcohol and drug abuse in drug treatment clients from different ethnic backgrounds. *Ann N Y Acad Sci*. 1986; 472:60–74. [PubMed: 3467620]
- Johnson PB, Richter L, Kleber HD, McLellan AT, Carise D. Telescoping of drinking-related behaviors: gender, racial/ethnic, and age comparisons. *Subst Use Misuse*. 2005; 40:1139–1151. [PubMed: 16040374]
- Kalaydjian A, Swendsen J, Chiu W-T, Dierker L, Degenhardt L, Glantz M, Merikangas KR, Sampson N, Kessler R. Sociodemographic predictors of transitions across stages of alcohol use, disorders, and remission in the National Comorbidity Survey Replication. *Comp Psychiatry*. 2009; 50:299–306.
- Keyes KM, Grant BF, Hasin DS. Evidence for a closing gender gap in alcohol use, abuse, and dependence in the United States population. *Drug Alcohol Depend*. 2008; 93:21–29. [PubMed: 17980512]
- Keyes KM, Martins SS, Blanco C, Hasin DS. Telescoping and gender differences in alcohol dependence: new evidence from two national surveys. *Am J Psychiatry*. 2010; 167:969–976. [PubMed: 20439391]
- Koenig LB, Jacob T, Haber JR. Validity of the lifetime drinking history: a comparison of retrospective and prospective quantity-frequency measures. *J Stud Alcohol Drugs*. 2009; 70:296–303. [PubMed: 19261242]
- Labouvie E, Bates ME, Pandina RJ. Age of first use: its reliability and predictive utility. *J Stud Alcohol*. 1997; 58:638–643.

- Lopez-Quintero C, Cobos JPdl, Hasin DS, Okuda M, Wang S, Grant BF, Blanco C. Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug Alcohol Depend.* 2011; 115:120–130. [PubMed: 21145178]
- National Institute on Alcohol Abuse and Alcoholism (NIAAA). *Alcohol Use and Alcohol Use Disorders in the United States: Main Findings from the 2001-2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC)*. U S Alcohol Epidemiologic Data Reference Manual; Bethesda, MD: 2006.
- Neff JA, Hoppe SK. Race/ethnicity, acculturation, and psychological distress: fatalism and religiosity as cultural resources. *J Comm Psychol.* 1993; 21:3–20.
- Patock-Peckham JA, Hutchinson GT, Cheong J, Nagoshi CT. Effect of religion and religiosity on alcohol use in a college student sample. *Drug Alcohol Depend.* 1998; 49:81–88. [PubMed: 9543644]
- Piazza NJ, Vrbka JL, Yeager RD. Telescoping of alcoholism in women alcoholics. *Int J Addict.* 1989; 24:19–28. [PubMed: 2759762]
- Prause J, Dooley D, Ham-Rowbottom KA, Emptage N. Alcohol drinking onset: a reliability study. *J Child Adolesc Subst Abuse.* 2007; 16:79–90.
- Randall CL, Roberts JS, Del Boca FK, Carroll KM, Connors GJ, Mattson ME. Telescoping of landmark events associated with drinking: a gender comparison. *J Stud Alcohol.* 1999; 60:252–260. [PubMed: 10091964]
- Rice JP, Neuman RJ, Saccone NL, Corbett J, Rochberg N, Hesselbrock V, Bucholz KK, McGuffin P, Reich T. Age and birth cohort effects on rates of alcohol dependence. *Alcohol Clin Exp Res.* 2003; 27:93–99. [PubMed: 12544012]
- Schuckit MA, Daeppen JB, Tipp JE, Hesselbrock M, Bucholz KK. The clinical course of alcohol-related problems in alcohol dependent and nonalcohol dependent drinking women and men. *J Stud Alcohol.* 1998; 59:581–590. [PubMed: 9718111]
- Scott, DM.; Taylor, RE. Health-related effects of genetic variations of alcohol-metabolizing enzymes in African Americans. *Alcohol Research and Health, National Institute on Alcohol Abuse and Alcoholism*; Bethesda, MD: 2007. p. 18-21.
- Substance Abuse and Mental Health Services Administration. *Results from the 2008 National Survey on Drug Use and Health: National Findings*. Rockville, MD: 2009.
- Taylor RJ, Mattis J, Chatters LM. Subjective religiosity among African Americans: a synthesis of findings from five national samples. *J Black Psychol.* 1999; 25:524–543.
- Wagner FA, Anthony JC. Male-female differences in the risk of progression from first use to dependence upon cannabis, cocaine, and alcohol. *Drug Alcohol Depend.* 2007; 86:191–198. [PubMed: 17029825]

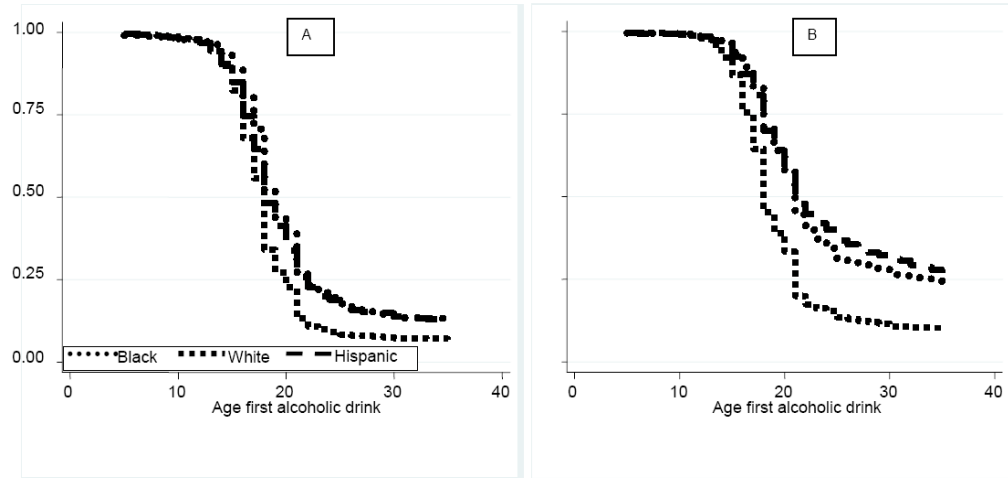


Figure 1. Survival Curves for Onset of Drinking among Persons < 45 Years Old, Men (A) and Women (B)

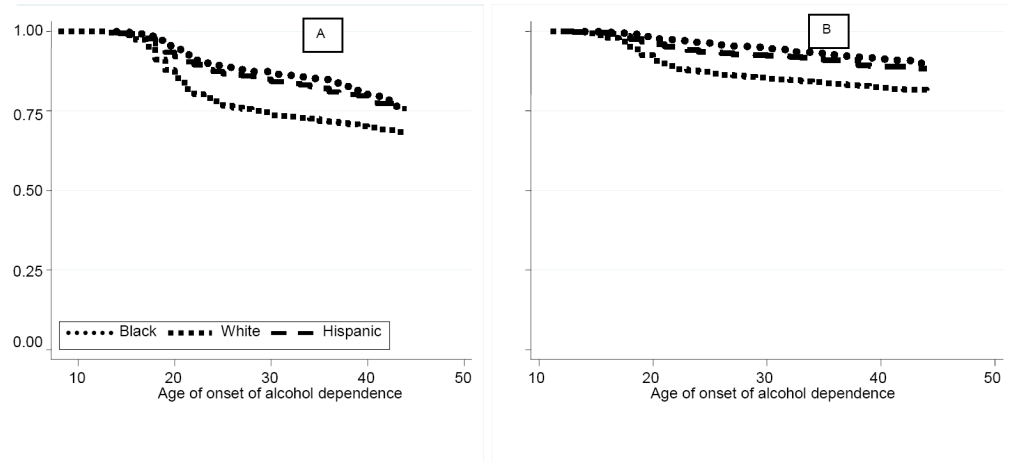


Figure 2. Survival Curves for Onset of Alcohol Dependence among Persons < 45 Years Old, Men (A) and Women (B)

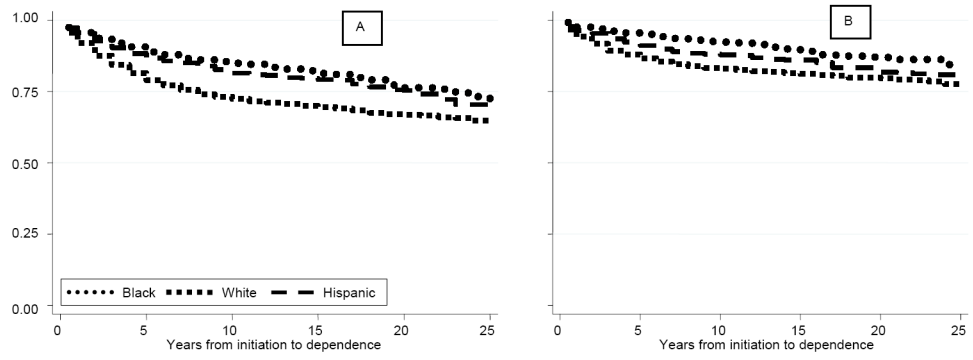


Figure 3. Survival Curves for Time of Progression from Initiation of Drinking to Alcohol Dependence, Men (A) and Women (B)

Table 1

Prevalence and means for initiation of alcohol use, onset of dependence, and time of progression from drinking onset to dependence among persons < 45 years old in NESARC, wave 1, 2001-2002

	Use			Dependence among Total Sample			Dependence among Drinkers		
	TOTAL n	Drinkers n	Weighted Prevalence (SE)	Age Onset Mean (95% CI)	Dependent n	Weighted Prevalence (SE)	Age Onset Mean (95% CI)	Weighted Prevalence (SE)	Years to Onset Mean (95% CI)
Total	21,106	17,651	85.4 (0.4)	18.22 (18.14-18.31)	3,311	17.7 (0.4)	21.61 (21.37-21.85)	20.8 (0.4)	5.19 (4.97-5.42)
Men	9,244	8,155	88.9 (0.5)	17.77 (17.67-17.87)	1,936	22.9 (0.6)	21.66 (21.35-21.97)	25.8 (0.6)	5.35 (5.05-5.65)
White	5,251	4,798	91.1 (0.5)	17.56 (17.45-17.67)	1,350	26.1 (0.7)	21.34 (21.02-21.67)	28.6 (0.8)	5.12 (4.80-5.45)
Black	1,520	1,272	82.8 (1.2)	18.54 (18.28-18.80) ^a	217	14.1 (1.1)	23.95 (22.82-25.08) ^a	17.0 (1.3)	6.91 (5.85-7.97) ^b
Hispanic	2,473	2,085	84.1 (1.1)	18.20 (17.95-18.44) ^c	369	15.7 (1.1)	22.39 (21.42-23.35) ^{d,f}	18.8 (1.3)	5.93 (5.07-6.80)
Women	11,862	9,496	82.0 (0.6)	18.71 (18.60-18.81)	1,375	12.7 (0.4)	21.52 (21.17-21.88)	15.5 (0.5)	4.93 (4.60-5.26)
White	6,205	5,482	87.5 (0.6)	18.33 (18.22-18.44)	985	15.0 (0.5)	21.17 (20.77-21.56)	17.2 (0.6)	4.72 (4.35-5.08)
Black	2,652	1,948	70.5 (1.2)	19.88 (19.65-20.11) ^a	160	6.0 (0.6)	24.88 (23.59-26.17) ^a	8.6 (0.8)	6.89 (5.74-8.05) ^d
Hispanic	3,005	2,066	67.2 (1.4)	19.85 (19.57-20.12) ^c	230	7.8 (0.6)	22.29 (21.18-23.39) ^f	11.7 (1.0)	5.41 (4.42-6.39)

Mean comparisons performed using Wald test.

^a Difference between Whites and Blacks, p < 0.001

^b Difference between Whites and Blacks, p < 0.05

^c Difference between Whites and Hispanics, p < 0.001

^d Difference between Whites and Hispanics, p < 0.05

^e Difference between Blacks and Hispanics, p < 0.001

^f Difference between Blacks and Hispanics, p < 0.05

Table 2

Hazard ratios of race differences within sex strata for initiation of drinking, onset of dependence, and time of progression from drinking onset to dependence in NESARC, wave 1, 2001-2002

	Age of Onset of Drinking		Age of Onset of Dependence ^d		Years from Initiation to Dependence ^d	
	Unadjusted HR (95% CI)	Adjusted ^b HR (95% CI)	Unadjusted HR (95% CI)	Adjusted ^c HR (95% CI)	Unadjusted HR (95% CI)	Adjusted ^c HR (95% CI)
Men						
Whites	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Blacks	0.69 (0.65-0.75)	0.70 (0.65-0.75)	0.57 (0.48-0.67)	0.66 (0.56-0.79)	0.60 (0.50-0.70)	0.69 (0.58-0.82)
Hispanics	0.75 (0.70-0.81)	0.74 (0.69-0.80)	0.65 (0.55-0.75)	0.56 (0.46-0.68)	0.67 (0.58-0.78)	0.58 (0.48-0.69)
Women						
Whites	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Blacks	0.57 (0.53-0.60)	0.57 (0.54-0.60)	0.47 (0.38-0.58)	0.53 (0.39-0.70)	0.51 (0.42-0.63)	0.60 (0.48-0.75)
Hispanics	0.52 (0.48-0.56)	0.56 (0.52-0.60)	0.68 (0.57-0.81)	0.79 (0.65-0.95)	0.74 (0.62-0.89)	0.80 (0.67-0.96)

^a Lifetime abstainers were excluded from the analyses

^b model included covariates for: age and family history

^c model included covariates for: age, family history, typical drinks per day during heaviest drinking period, and age onset of drinking

Table 3

Hazard ratios of sex differences within race strata for initiation of drinking, onset of dependence and time of progression from drinking onset to dependence by race/ethnicity and sex in NESARC, wave 1, 2001-2002

	Age of Onset of Drinking		Age of Onset of Dependence		Years from Initiation to Dependence	
	Adjusted ^b HR (95% CI)	HR (95% CI)	Adjusted ^{a,c} HR (95% CI)	HR (95% CI)	Adjusted ^{a,c} HR (95% CI)	HR (95% CI)
White						
Men	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Women	0.77 (0.74 – 0.81)	0.98 (0.96 – 1.01)	0.98 (0.96 – 1.01)	1.00 (0.96 – 1.04)	1.00 (0.96 – 1.04)	1.00 (0.96 – 1.04)
Black						
Men	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Women	0.63 (0.58 – 0.69)	0.96 (0.93 – 1.00)*	0.96 (0.93 – 1.00)*	1.05 (0.97 – 1.13)	1.05 (0.97 – 1.13)	1.05 (0.97 – 1.13)
Hispanic						
Men	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Women	0.56 (0.51 – 0.62)	1.03 (1.00 – 1.07)	1.03 (1.00 – 1.07)	1.06 (0.99 – 1.14)	1.06 (0.99 – 1.14)	1.06 (0.99 – 1.14)

^a Lifetime abstainers were excluded from the analyses

^b model included covariates for: age and family history

^c model included covariates for: age, family history, typical drinks per day during heaviest drinking period, and age onset of drinking