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Racial and Ethnic Bias in the Diagnosis of Alcohol Use Disorder in Veterans

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Abstract

Objective: Studies show that racially and ethnically minoritized Veterans have a higher prevalence of alcohol use disorder (AUD) than White Veterans. We examined whether the relationship between self-reported race and ethnicity (i.e., a social construct) and AUD diagnosis remains after adjusting for alcohol consumption, and if so, whether it varies by self-reported alcohol consumption.

Methods: The sample included 700,012 Black, White, and Hispanic Veterans enrolled in the Million Veteran Program cohort. Alcohol consumption was defined as an individual's maximum score on the Alcohol Use Disorders Identification Test–Consumption (AUDIT-C) questionnaire, a screen for unhealthy alcohol use. The primary outcome, AUD, was defined by the presence of ICD-9/10 codes in the electronic health record. We used logistic regression with interactions to assess the association between race and ethnicity and AUD by maximum AUDIT-C score.

Results: Black and Hispanic Veterans were more likely to have an AUD diagnosis than White Veterans despite similar levels of alcohol consumption. The difference was greatest between Black and White men who, at all but the lowest and highest levels of alcohol consumption, had 23%-109% greater odds of an AUD diagnosis. The findings were unchanged after adjustment for alcohol consumption, alcohol-related disorders, and other potential confounders.

Conclusions: The large discrepancy in the prevalence of AUD across groups despite a similar distribution of alcohol consumption levels suggests that there is racial and ethnic bias, with Black and Hispanic Veterans more likely to receive an AUD diagnosis than White Veterans. Efforts are needed to reduce bias in the diagnostic process to address racialized differences in AUD diagnosis.

Introduction

Diagnosis is a foundation of clinical decision making and treatment (1). Diagnoses, as "clinical labels," can produce lasting stigma and, when inappropriate, lasting damage to individuals who receive a diagnosis (2). Diagnoses that are stigmatized, such as alcohol use disorder (AUD) can be particularly damaging. Further, misdiagnosis can result in ineffective treatment, inaccurate prognostic assessments, poor outcomes, and mistrust in the healthcare system (3, 4). Factors that can influence the diagnosis of behavior-based conditions include medical conditions, varying symptom presentation, the clinician's level of education and experience, the patient's willingness to disclose symptomatology, cultural factors, and the application of standardized criteria or assessments (5). A patient's race or ethnicity and ethnic and racial differences between patients and providers can also influence diagnostic decisions through explicit or implicit bias (3, 6, 7), i.e., clinicians' conscious or unconscious prejudices or stereotypes (8, 9).

Studies in the Veterans Health Administration (VA) have shown that the rate of clinically recognized alcohol use disorder (AUD) is higher among Black and Hispanic Veterans than White Veterans (10). Black Veterans are also more likely than White Veterans to be identified as needing an intervention (11) and to receive psychosocial interventions (11, 12), but less likely to receive pharmacotherapy for AUD (13). One potential explanation for the observed group disparities is that they differ on alcohol consumption patterns (14); alternatively, AUD in White patients may be viewed as a biological illness and viewed as a behavioral disorder or lifestyle choice among Black and Hispanic patients (15). While these studies suggest the presence of racial and ethnic bias in AUD diagnosis and treatment, collateral information upon which to

assess bias in the diagnosis of AUD, such as recent or lifetime measures of alcohol consumption, was unavailable.

Here we examined the contribution of self-reported alcohol consumption to the likelihood of receiving an AUD diagnosis among Black, Hispanic, and White Veterans. To facilitate the identification of individuals with unhealthy alcohol use, beginning in 2007 the VA has routinely screened primary care patients using the AUDIT-C (16, 17), comprised of the first three items of the 10-item Alcohol Use Disorders Identification Test (18). We examined the association of AUDIT-C scores with AUD diagnosis codes across the three racial and ethnic groups in a national cohort of more than 700,000 Veterans. Importantly, we are examining race and ethnicity in the context of differential racialization, i.e., whereas no biological basis for these groups exists, they are best understood as social constructs and proxies for the experience of racism and discrimination. Specifically, we evaluated: (i) the relationship between race and ethnicity and AUD diagnosis adjusting for self-reported alcohol consumption, (ii) if this relationship exists, whether it varies by consumption levels, and (iii) sociodemographic and clinical correlates of an AUD diagnosis. Analyses were stratified by sex to account for biological differences (19) related to that variable and also to examine the intersectionality of race and ethnicity and sex. Based on previous studies that suggest the presence of racial and ethnic bias in diagnosis and treatment within the VA (10-13, 20) with variation by alcohol consumption level (21), we hypothesized that Black and Hispanic Veterans would have a higher frequency of AUD diagnosis than White Veterans after adjusting for alcohol consumption and that the frequency of an AUD diagnosis among racial and ethnic groups would vary by alcohol consumption level.

Methods

Study Sample

The sample for this cross-sectional study was drawn from the Million Veteran Program (MVP), a longitudinal cohort study of U.S. Veterans (22). Veterans who receive care in the VA and consent to participate in MVP complete two self-report surveys and provide access to their electronic health records (EHR). MVP enrollment began in early 2011, and more than 850,000 Veterans have been enrolled. We had access to data for 790,091, of whom 739,411 had AUDIT-C, race, ethnicity, and sex data available in their EHR (Figure S1 is a flow diagram of study inclusion). The primary analysis included 700,012 individuals who are described below. MVP received approval from the Central Veterans Affairs Institutional Review Board and site-specific institutional review boards. The study was conducted following all relevant human subject protections.

Measures

Race and ethnicity. Race and ethnicity are included in our study as socially defined categories that serve as proxies for the experience of internalized, interpersonal, institutional, and/or structural racism. Race and ethnicity were self-reported in both an MVP questionnaire and the VA EHR; when race and ethnicity data were missing from the MVP survey, we used data from the EHR (23). We focus here on three groups: non-Hispanic Black (Black), non-Hispanic White (White), and Hispanic. Self-identified Hispanic individuals were classified irrespective of race (24). Analyses of other racial and ethnic groups (including multi-racial) are presented in supplementary materials (see Tables S1a & S1b and Figures S2a & S2b).

Self-reported alcohol consumption. The AUDIT-C is a valid, reliable screening instrument routinely used to identify individuals with unhealthy alcohol use (17). It comprises the first three items of the 10-item AUDIT (18) and measures past-year alcohol consumption. The items include: (i) How often do you have a drink containing alcohol? (Drinking Frequency–

response options: never, monthly or less, 2 to 4 times a month, 2 to 3 times a week, 4 or more times a week); (ii) How many standard drinks containing alcohol do you have on a typical day? (Drinking Quantity–response options: 1 or 2, 3 or 4, 5 or 6, 7 to 9, 10 or more); and (iii) How often do you have 6 or more drinks on 1 occasion? (Heavy Episodic Drinking Frequency–response options: never, less than monthly, monthly, weekly, daily, or almost daily). The responses to each question are scored 0–4, and summed for a total AUDIT-C score of 0–12. AUDIT-C scores of ≥3 for women and ≥4 for men reflect unhealthy alcohol use (17) and call for further assessment. When used to identify individuals with current DSM-IV alcohol abuse or dependence, the AUDIT-C at these cutoffs had a sensitivity/specificity of 0.79/0.56 among men (16) and 0.80/0.87 among women (25). When used to identify individuals with alcohol use disorders or unhealthy alcohol use, the AUDIT-C at those cutoffs had a sensitivity/specificity of 0.67/0.92 among African-American women, 0.70/0.91 among White women, 0.85/0.88 among Hispanic women, 0.76/0.93 among African-American men, 0.95/0.89 among White men, and 0.85/0.84 among Hispanic men (26).

For maximal reported alcohol consumption, we extracted the highest AUDIT-C recorded in participants' VA EHR, restricting AUDIT-C observations to those from October 1, 2007, i.e., when AUDIT-C screening began in the VA, to September 30, 2019, the latest available data at the time of analysis. In sensitivity analyses, we used age-adjusted mean AUDIT-C, with age 50 as the reference point, and we up-weighted AUDIT-C scores for individuals older than 50 and down-weighted scores for those younger than 50. Each AUDIT-C score was multiplied by the weight corresponding to age at the time of the AUDIT-C assessment, and weighted AUDIT-C scores were summed and divided by the weights for each individual (27).

Heavy episodic drinking, whose frequency is assessed by AUDIT-C item 3, is particularly harmful and indicative of greater vulnerability to AUD (28). To evaluate whether, in addition to total AUDIT-C score, the relationship between race and ethnicity and AUD diagnosis is impacted by heavy episodic drinking frequency, we examined the association between the maximum score on item 3 and AUD diagnosis by race and ethnicity.

Demographics and clinical diagnoses. Sex (male or female) and age at enrollment (calculated from month and year of birth and date of MVP enrollment) were extracted from questionnaires and EHR data; as described above, when sex or age was missing from the MVP survey, data from the EHR were used (23). We used sex in our study because gender is not well captured in the VA EHR. Clinical diagnoses, including AUD, alcohol-related medical disorders (cirrhosis, neuropathy, cardiomyopathy, gastritis, fatty liver disease, hepatitis, and liver damage), drug use disorder (DUD: abuse/dependence on opioids, cannabis, barbiturates, cocaine, amphetamines and other stimulants, sedatives, and psychoactive substances), and mental disorder (schizophrenia, schizoaffective disorders, bipolar disorder, PTSD, and anxiety disorders) required the presence of one inpatient or two outpatient ICD-9/10 diagnostic codes in the EHR (Table S2 lists specific ICD codes).

Data Analysis

All statistical tests were two-tailed, with alpha of 0.05 to denote statistical significance, and were performed using SAS 9.2 (Cary, NC). Descriptive statistics by racial and ethnic group include means, standard deviations, and frequencies. We compared characteristics across race and ethnicity using ANOVA with Tukey's *post hoc* tests, chi-square, and Fisher's exact tests. We used Spearman's rho as the unadjusted correlation between maximum AUDIT-C score and AUD diagnosis and a chi-square test to examine the relationship between heavy episodic

drinking frequency and AUD diagnosis. We used logistic regression to measure the adjusted association between AUDIT-C score and AUD and other factors associated with an AUD diagnosis. We used a composite variable comprising race and ethnicity and maximum AUDIT-C score to assess the interaction effect on the likelihood of an AUD diagnosis. This 39-level nominal variable was created by combining the three-level race and ethnicity variable with the 13-level AUDIT-C variable (e.g., race=Black, AUDIT-C=0, composite=Black_0), representing all possible combinations of the two variables. We probed significant interactions with AUDIT-C-stratified logistic regression models and applied a Bonferroni correction to adjust for multiple comparisons. To examine sex differences by race and ethnicity, we used race-and-ethnicity-stratified logistic regression models. To assess the robustness of estimates in the primary analysis, we conducted three sensitivity analyses: (i) substituting age-adjusted mean AUDIT-C score for maximum AUDIT-C score, (ii) removing individuals with a maximum AUDIT-C=0 (i.e., lifetime abstainers and those who quit drinking, often due to alcohol-related problems; a heterogeneous group described in detail in (29, 30)), and (iii) removing individuals with an AUD diagnosis date prior to October 1, 2007 (i.e., the date of the earliest AUDIT-C score in the analysis). For all models, C-statistics served to assess goodness of fit.

Results

Ninety-one percent of the study sample were men (n=638,204) and 9% women (n=61,808).

Men

Sample characteristics

The racial and ethnic distribution was White (74%), Black (19%), and Hispanic (7%; Table 1). The modal maximal AUDIT-C score range was 1-3 across the three groups, reflecting

moderate risk for harmful drinking. Black male Veterans had more AUDIT-C assessments (mean=9.5; SD=4.6) than Hispanic (mean=8.3; SD=4.3) or White (mean=8.8; SD=4.3) male Veterans and a higher frequency of AUD (34%, 25%, and 18%, respectively) and DUD diagnoses (29%, 16%, and 11%, respectively) than Hispanic or White males. Although statistically significant, differences in the prevalence of alcohol-related diagnoses across racial and ethnic groups were small. White men had a lower frequency of a mental disorder diagnosis (47%) than Black (58%) or Hispanic men (61%).

Racial and ethnic differences in the association between AUDIT-C and AUD

The correlation between AUDIT-C and AUD diagnosis was lowest among White men (rho=0.36; $P<0.0001$), followed by Hispanic (rho=0.42; $P<0.0001$) and Black men (rho=0.47; $P<0.0001$). At every maximum AUDIT-C score, White men were less likely than Black men to receive an AUD diagnosis (Figure 1a; all $P<0.0001$). The greatest difference was at AUDIT-C=4 (i.e., the positive screening cutoff for men), where White men were approximately one-third as likely to have an AUD diagnosis as Black men. Although Hispanic men had a lower AUD frequency than Black men across all AUDIT-C scores, it was generally higher than among White men, with the greatest difference also at AUDIT-C=4 ($P<0.0001$). The greatest difference between Hispanic and Black men was at AUDIT-C=7, where Hispanic men were almost one-third less likely to have an AUD diagnosis than Black men ($P<0.0001$).

Irrespective of heavy episodic drinking frequency, Black men were significantly more likely than Hispanic or White men to have an AUD diagnosis (all $P<0.0001$; Figure S3a). Overall, Hispanic men were more likely to have an AUD diagnosis than White men irrespective of heavy episodic drinking frequency.

Multivariable analysis

Multivariable analyses, which adjusted for alcohol consumption and other potential confounders (Table 2), showed that White men were less likely to receive an AUD diagnosis than Black or Hispanic men. *Post hoc* analysis of the significant interaction between race and ethnicity and AUD diagnosis by alcohol consumption level (Figure 2) revealed that Black men had 23%-109% greater odds of an AUD diagnosis than White men at maximum AUDIT-C=1-10 (all $P \leq 0.0002$). At AUDIT-C=4, Black men had more than double the odds of an AUD diagnosis of White men ($P<0.0001$). Hispanic men were significantly more likely than White men to have an AUD diagnosis at maximum AUDIT-C=2-4 (all $P \leq 0.0002$), with the highest odds at AUDIT-C=2 ($P<0.0001$). Hispanic men were significantly less likely than Black men to have an AUD diagnosis at maximum AUDIT-C=1-8 (all $P<0.0001$), with the lowest odds at AUDIT-C=4 ($P<0.0001$).

Among all men, having a DUD diagnosis was associated with a nearly 13-fold increased odds of an AUD diagnosis ($P<0.0001$). Greater age, a mental disorder diagnosis, and alcohol-related medical disorders were also associated with significantly greater odds of an AUD diagnosis ($P<0.0001$).

Women

Sample characteristics

The racial and ethnic distribution among women was White (62%), Black (30%), and Hispanic (8%; Table 1). The modal maximal AUDIT-C score range was 1-2 for each group, reflecting moderate risk for harmful drinking. Black female Veterans had more AUDIT-C assessments on average (mean=9.2; SD=4.3) than Hispanic (mean=7.8; SD=4.1) and White (mean=8.9; SD=4.3) females. The frequency of an AUD diagnosis among Black women (15%) was significantly higher than among White or Hispanic women (both 13%; $P<0.0001$ and

P=0.001, respectively). Black women had the highest frequency (13%) and Hispanic women the lowest frequency (10%) of a DUD. Hispanic women were more likely to have a mental disorder diagnosis (73%) than Black (71%) or White women (70%). Significant racial or ethnic group differences in the prevalence of other alcohol-related diagnoses were small.

Racial and ethnic differences in the association between AUDIT-C and AUD

The correlation between AUDIT-C and AUD diagnosis was lower among White women (rho=0.30; *P*<0.0001) than Hispanic (rho=0.37; *P*<0.0001) or Black women (rho=0.40; *P*<0.0001). Black women had a higher likelihood of an AUD diagnosis at nearly every level of alcohol consumption than White or Hispanic women (Figure 1b), which was significant at AUDIT-C scores of 2 and 4-7 (all *P*<0.05). At AUDIT-C scores of 0 and 7, White women were more likely to have an AUD diagnosis than Hispanic women. The maximal difference in the proportion of AUD diagnoses between Black and White women was at AUDIT-C=4 (22% vs. 12%; *P*<0.0001).

Racial and ethnic differences in the association between AUD frequency and heavy episodic drinking were also observed among women. Black women were more likely to receive an AUD diagnosis than Hispanic women when reporting heavy episodic drinking weekly or less often (AUDIT-C question 3 scores=0-3; all *P*≤0.01; Figure S3b).

Multivariable analysis

The overall interaction between race and ethnicity and maximum AUDIT-C on AUD diagnosis was significant (*P*<0.0001; Table 2). Specifically, Black women had a higher probability of an AUD diagnosis than Hispanic or White women at moderate AUDIT-C scores, and Hispanic women had a lower probability of an AUD diagnosis than Black or White women at higher AUDIT-C scores (Figure S4). A DUD diagnosis was associated with a >13-fold

increased odds of an AUD diagnosis (P<0.0001; Table 2). Older women and those with a mental disorder diagnosis or alcohol-related health conditions had significantly greater odds of an AUD diagnosis (all P<0.001; Table 2).

Sex differences in AUD diagnosis

After adjusting for alcohol consumption and other potential confounders, women had significantly lower odds of an AUD diagnosis than men overall and when stratified by race and ethnicity (Table 2). Compared to their male counterparts, Black women had the lowest odds of an AUD diagnosis (adjusted odds ratio [aOR]=0.57), followed by White women (aOR=0.68) and Hispanic women (aOR=0.70; all P<0.001; Table S3).

Sensitivity analysis using age-adjusted mean AUDIT-C score

Using age-adjusted mean rather than maximal AUDIT-C score did not substantially affect the findings overall or by sex (Table S4).

Sensitivity analysis excluding maximum AUDIT-C=0

Restricting the analytic sample to individuals with a maximum AUDIT-C score > 0 (n=552,437) did not meaningfully change the findings overall or among men (Table S5). Among women, although the overall interaction between race and ethnicity and maximum AUDIT-C score remained significant, the comparison of Black and White women at maximum AUDIT-C=3 (i.e., the mean AUDIT-C score among women with maximum AUDIT-C>0) was not significant (Table S5).

Sensitivity analysis restricting AUD diagnosis date

Removing individuals with an AUD diagnosis prior to October 7, 2010 reversed the age effect direction overall and by sex: older age became associated with reduced odds of an AUD diagnosis (Table S6). This is likely because the average age of individuals with an AUD

diagnosis in the primary analysis was 57.9 (SD=12.3) and the average age of those with an AUD diagnosis in the sample for this sensitivity analysis was 55.5 (SD=13.6). Among women, the overall interaction between race and ethnicity and maximum AUDIT-C score remained significant, however, the comparison of Black and White women at maximum AUDIT-C=2 (i.e., the mean AUDIT-C score among women in the date-restricted sample) was not significant (Table S6). No other findings changed significantly.

Discussion

In this sample of 700,000 Veterans, we identified a differential frequency of AUD diagnosis by race and ethnicity. The greatest discrepancy was among Black men who, at all but the lowest and highest levels of alcohol consumption, had 23%-109% greater odds of an AUD diagnosis than White men. Hispanic men had 20%-32% greater odds of an AUD diagnosis than White men. The prevalence of disorders associated with persistent heavy drinking (e.g., alcoholic cirrhosis and hepatitis), whose diagnosis generally relies on objective measures (e.g., laboratory values, ultrasound findings), was similar across the three groups, thus the greater likelihood of an AUD diagnosis among Black and Hispanic Veterans was likely not due to different levels of alcohol consumption. The association between race and ethnicity and AUD diagnosis remained after adjustment for alcohol consumption level, alcohol-related disorders, DUD, and other potential confounders.

We used EHR data on self-reported alcohol consumption and AUD diagnosis in a sample large enough to account for multiple potential contributing factors. The frequency of AUD here (21% overall) is lower than the general population estimate (29%) from the National Epidemiologic Survey on Alcohol and Related Conditions III (NESARC-III) (31), and lower in men (22% here vs. 36% in NESARC-III) and women (14% here vs. 23% in NESARC-III).

Notably, the VA EHR data are cumulative over approximately 20 years of available data compared with lifetime estimates in NESARC-III. In a previous VA study (10), the frequency of AUD was 10% among Black Veterans, 7% among Hispanic Veterans, and 6% among White Veterans, compared with 31%, 24%, and 18%, respectively, in the present study. Despite the use of diagnostic data from a single year in that study, rather than the cumulative estimate from the VA EHR, both studies showed the same order of AUD frequency rates by race and ethnicity, which was opposite that in NESARC-III, where Black individuals had the lowest lifetime AUD prevalence (22%), followed by Hispanic (23%) and White (33%) individuals.

Notably, the NESARC-III used a structured diagnostic interview, which is likely to be more accurate (i.e., less biased) than a clinical interview, as is used in the VA, which could also contribute to the higher prevalence of AUD in the general population than in the VA population. Our findings in the VA population highlight differential clinical assessment of AUD by race and ethnicity, though the difference could be due to overdiagnosis of Black Veterans, underdiagnosis of White Veterans, or, more likely, a combination of the two. Both kinds of misdiagnosis can have harmful effects, as overdiagnosis can be stigmatizing and underdiagnosis can delay treatment. Consistent with the observation that there are disparities in the diagnosis of AUD associated with race and ethnicity, the strength of correlations between AUDIT-C scores and AUD diagnosis increased monotonically in both sexes. Specifically, White Veterans showed the lowest correlation between AUDIT-C score and AUD diagnosis, Hispanic Veterans an intermediate correlation, and Black Veterans the highest correlation. The findings suggest that White Veterans are underdiagnosed with AUD. Despite a higher rate of referral and treatment for AUD among Black Veterans than White or Hispanic Veterans (11), the available data do not allow us to determine the net impact on patient outcomes of the diagnostic differences. Any

potential benefit of greater treatment rates should not overshadow the central issue that racialized inequity in assessment, particularly of Black patients, appears to exist. Studies are needed to examine the mechanism by which Veterans receive an AUD diagnosis and multi-level factors such as bias and systemic racism that likely affect the observed inequity.

The greatest disparity in AUD diagnosis after adjustment for potential confounders occurred at a maximum AUDIT-C score of 3 or 4, near the cutoff for a positive AUDIT-C screen (≥3 for women; ≥4 for men). These findings suggest that, at scores near the threshold, providers are more likely to assign a diagnosis to Black or Hispanic than White Veterans (6, 32, 33). In a series of experiments that evaluated implicit stereotyping, physicians were more likely to associate stigmatizing medical conditions (e.g., drug use, HIV) with Black than White patients (6, 32), suggesting that diagnostic disparities may reflect implicit bias. Studies of diagnostic disparities suggest that they could result from the differential presentation of psychiatric symptoms across racial and ethnic groups (10, 21). Although this perspective could reflect the impact of culture on psychiatric symptom presentation (34), it also indirectly acknowledges that diagnostic science and practice reference the White experience.

Research has also shown that psychological distress and social disadvantage (including factors such as poverty, racial and ethnic stigma, unfair treatment, and cumulative disadvantage) can contribute to persistent racial and ethnic disparities in individuals with alcohol dependence despite lower levels of heavy alcohol consumption (21, 35, 36). Although social disadvantage likely mediates and/or moderates the associations identified herein, as observed in other studies using national samples (21, 35, 36), we did not have access to such measures. The interrelationship of race and ethnicity and social disadvantage and their effects on alcohol-related problems are complex and merit in-depth exploration in the Veteran population.

We found that the presence of a DUD diagnosis and an AUD diagnosis were highly correlated. These disorders commonly co-occur, both in the VA (37) and the general population (31, 38). In the NESARC-III the prevalence of a concurrent AUD and DUD (which may include cannabis and tobacco use disorders) does not differ substantially by race and ethnicity (Black=9%, Hispanic=7%, White=8%) (34). However, in this sample, Black men were over three times (23%) and Hispanic men 1.5 times as likely (12%) to have at least one comorbid DUD as White men (8%). This may be because once a patient receives an AUD diagnosis, providers are more likely to query the patient about other substance use or vice-versa. Findings may also reflect implicit bias toward Black and Hispanic Veterans, which prompts additional screening for other substance use in these populations (6, 39, 40).

More research is needed to understand the source of these differences. To aid in the valid diagnosis and treatment of multiple substance use, standardized screening and assessment are recommended. This, by itself, however, may not be adequate, as there are multiple examples of racial bias in medicine that occur even when objective tests are used. A commonly cited example is the estimated glomerular filtration rate (EGFR), different formulas for which have been used for Black and White patients. This has led to less access to kidney transplant for Black than White individuals, despite comparable severity of renal disease. Other examples of biased algorithms include those used to predict the risk posed by a trial of labor in women who have previously delivered a baby via cesarean section, risk of developing breast cancer, risk of developing a kidney stone, and the use of spirometry to measure lung function, among others (41).

In our study, women were less likely than men to receive an AUD diagnosis, consistent with population estimates (42) and findings among Veterans (43). Although women consume

less alcohol than men, this difference has been decreasing in recent years (44). In studies of unhealthy alcohol use, women experience greater alcohol use-related stigma than men (45), which could impact how providers respond to (46) and document (20) alcohol use among women. More research is needed to understand sex and gender differences, and their intersection with race and ethnicity, in substance use reporting and documentation in the medical record.

As among men, at nearly every level of alcohol consumption, Black women were more likely than Hispanic and White women to receive an AUD diagnosis, despite having a similar distribution of alcohol consumption and prevalence of alcohol-related disorders among the groups. There were few differences in the relationship between AUD frequency and alcohol consumption between Hispanic and White women. Where such differences are present, White women had a greater AUD frequency than Hispanic women, consistent with estimates from the 2019 National Survey on Drug Use and Health, where alcohol use prevalence is higher among non-Hispanic White women than Hispanic women (42).

Our study has several limitations. Despite obvious differences in the frequency of an AUD diagnosis by racial and ethnic group, the basis for the discrepancies cannot be ascertained using EHR data nor did we have information on how diagnoses were made. Second, self-reported measures of alcohol consumption may be subject to recall bias. In two U.S. national surveys (total N>494,000) that used AUDIT-C data from participants who reported past-year drinking (47) approximately 20% of male and female Veterans reported drinking levels that were inconsistent with standard cutoff scores. Because the available data did not permit a conclusion to be drawn as to the source of the discrepancies, objective measures of alcohol use (e.g., biomarkers) are needed to validate self-reports. Third, we did not have data on socioeconomic or social disadvantage factors, which may have mediated or moderated the associations identified

herein. Fourth, findings from a sample of U.S. Veterans enrolled in a genetic cohort study may not generalize to other populations, including the general Veteran population. Lastly, the substantially smaller number of women Veterans provided less statistical power to detect differences than among men.

Our study also has notable strengths. The availability of annual assessments of alcohol consumption and an informative EHR enabled us to analyze relationships between measures of alcohol consumption and an AUD diagnosis, with analyses that included multiple clinical factors that could influence the associations. Whereas previous studies could analyze data spanning only several years (10-13, 20), we analyzed data from individuals' entire VA EHR. Second, the large and diverse sample, particularly of men, provided good statistical power to examine factors that affect the likelihood of an AUD diagnosis.

Conclusions and recommendations

In summary, we identified a large, racialized difference in AUD diagnosis, with Black and Hispanic Veterans more likely to receive the diagnosis than White Veterans at the same level of alcohol consumption. The absence of other factors to explain this discrepancy strongly suggests the presence of racial and ethnic biases in the diagnosis of AUD by VA practitioners. These findings should encourage the VA to examine the causes of observed differences by conducting prospective studies, which could include simulated patients and a diverse group of practitioners whose interactions are recorded and analyzed. These, together with *post hoc* interviews with practitioners could provide insights into the diagnostic thought process and how it is affected by race and ethnicity. Insights resulting from such efforts could guide changes in screening and diagnostic methods. Other options for addressing these disparities include greater use of structured diagnostic interviews, enhanced education in diagnosing AUD, and the

identification and remediation of multi-level bias and racism-related contributors to racialized differences in diagnosis could help to reduce diagnostic disparities.

Table 1. Demographic and clinical characteristics of the sample, by sex and race and ethnicity (n=700,012).

Men	Black		Hispanic		White		*P*
n=638,204	18.6%	n=118,600	7.1%	n=45,330	74.3%	n=474,274	
	%	n	%	n	%	n	
Age (y) – mean (SD)*	59.2	11.7[a,b]	56.0	15.4[a,c]	64.7	13.2[b,c]	<0.0001
Alcohol-Related Characteristics							
Highest AUDIT-C harmful drinking risk level (highest AUDIT-C score)							<0.0001
Low (0)	21.7%	25,733[a]	16.9%	7,637[a,c]	21.7%	103,114[c]	
Moderate (1-3)	39.1%	46,371[a,b]	42.1%	19,090[a,c]	40.9%	193,946[b,c]	
High (4-7)	23.6%	28,004[a,b]	25.4%	11,531[a,c]	26.7%	126,711[b,c]	
Severe (8+)	15.6%	18,492[b]	15.6%	7,072[c]	10.7%	50,503[b,c]	
Number of AUDIT-C assessments – mean (SD)	9.5	4.6[a,b]	8.3	4.3[a,c]	8.8	4.3[b,c]	<0.0001
AUD	33.5%	39,690[a,b]	24.9%	11,296[a,c]	18.1%	85,981[b,c]	<0.0001

Cirrhosis**	1.5%	1,825[a,b]	2.3%	1,025[a,c]	1.4%	6,404[b,c]	<0.0001
Neuropathy**	0.3%	305[a]	0.1%	48[a,c]	0.3%	1,188[c]	<0.0001
Cardiomyopathy**	0.3%	395[a,b]	0.1%	54[a]	0.2%	726[b]	<0.0001
Gastritis**	0.4%	457[a,b]	0.3%	114[a]	0.2%	1,111[b]	<0.0001
Fatty liver disease**	0.5%	619[a,b]	0.7%	310[a,c]	0.5%	2,209[b,c]	<0.0001
Hepatitis**	0.7%	842[b]	0.7%	296[c]	0.5%	2,530[b,c]	<0.0001
Liver damage**	0.4%	517[b]	0.5%	226[c]	0.3%	1,495[b,c]	<0.0001
Other Clinical ICD-9/10 Diagnoses							
Drug abuse/dependence	29.0%	34,443[a,b]	16.2%	7,347[a,c]	10.8%	51,143[b,c]	<0.0001
AUD + drug abuse/dependence	23.0%	27,232[a,b]	12.0%	5,459[a,c]	7.5%	35,477[b,c]	<0.0001
Mental disorder	57.6%	68,290[a,b]	60.6%	27,455[a,c]	46.5%	220,536[b,c]	<0.0001
AUD + mental disorder	26.3%	31,181[a,b]	21.0%	9,498[a,c]	13.9%	65,847[b,c]	<0.0001
Women	Black		Hispanic		White		*P*
n=61,808	29.9%	n=18,460	8.2%	n=5,092	61.9%	n=38,256	
	%	n	%	n	%	n	

Age (y) – mean (SD)*	49.2	11.3[a,b]	43.7	13.1[a,c]	52.6	13.9[b,c]	<0.0001
Alcohol-Related Characteristics							
Highest AUDIT-C harmful drinking risk level (highest AUDIT-C score)							<0.0001
Low (0)	19.9%	3,664[a,b]	13.6%	694[a,c]	17.5%	6,694[b,c]	
Moderate (1-2)	46.8%	8,639[b]	47.7%	2,431[c]	45.5%	17,389[b,c]	
High (3-7)	27.5%	5,080[a,b]	32.3%	1,647[a]	31.8%	12,172[b]	
Severe (8+)	5.8%	1,077[b]	6.3%	320[c]	5.2%	2,001[b,c]	
Number of AUDIT-C assessments – mean (SD)	9.2	4.3[a,b]	7.8	4.1[a,c]	8.9	4.3[b,c]	<0.0001
AUD	15.0%	2,772[a,b]	13.2%	672[a]	13.2%	5,052[b]	<0.0001
Cirrhosis**	0.3%	53[b]	0.3%	17	0.4%	152[b]	0.1150
Neuropathy**	0.1%	13	0.0%	2	0.1%	31	0.5740
Cardiomyopathy**	0.0%	8	0.0%	0	0.0%	8	0.1589
Gastritis**	0.1%	20	0.1%	5	0.1%	44	0.9326

Fatty liver disease**	0.1%	24[a]	0.3%	14[a]	0.2%	74	0.0651
Hepatitis**	0.2%	33[b]	0.2%	12	0.3%	103[b]	0.1182
Liver damage**	0.1%	26	0.1%	5	0.2%	57	0.6636
Other Clinical ICD-9/10 Diagnoses							
Drug abuse/dependence	13.2%	2,436[a,b]	9.7%	495[a,c]	11.2%	4,276[b,c]	<0.0001
AUD + drug abuse/dependence	8.6%	1,578[a,b]	6.0%	307[a]	6.5%	2,468[b]	<0.0001
Mental disorder	71.3%	13,154[a,b]	73.4%	3,739[a,c]	70.0%	26,773[b,c]	<0.0001
AUD + mental disorder	14.2%	2,621[a,b]	12.7%	645[a]	12.5%	4,786[b]	<0.0001

SD = standard deviation; AUDIT-C = Alcohol Use Disorders Identification Test – Consumption; AUD = alcohol use disorder. *Number of observations with missing age: Black men (n=5); Hispanic men (n=8); White men (n=42); Black women (n=1); Hispanic women (n=1); White women (n=3). **Alcohol-specific diagnosis.

[a]Black vs Hispanic pairwise comparison significant at $P<0.05$; [b]Black vs White pairwise comparison significant at $P<0.05$; [c]Hispanic vs White pairwise comparison significant at $P<0.05$.

Table 2. Factors associated with AUD diagnosis, overall and stratified by sex.

	Overall			Men			Women		
	n=699,952*			n=638,149*			n=61,803*		
Variables	aOR	95% CI	*P*	aOR	95% CI	*P*	aOR	95% CI	*P*
Race and ethnicity x highest AUDIT-C score**			<0.0001[a]			<0.0001[a]			<0.0001[a]
Black (ref=White)	1.92	1.81, 2.03	<0.0001	2.03	1.91, 2.15	<0.0001	1.21	1.02, 1.44	0.0318
Hispanic (ref=White)	1.25	1.14, 1.38	<0.0001	1.27	1.15, 1.40	<0.0001	1.04	0.77, 1.41	0.8013
Women (ref=men)	0.67	0.65, 0.69	<0.0001	-	-	-	-	-	-
Age (10-yr increments)	1.05	1.04, 1.05	<0.0001	1.05	1.04, 1.05	<0.0001	1.08	1.06, 1.11	<0.0001
Alcohol-Related Characteristics									
Cirrhosis***	15.94	14.80, 17.18	<0.0001	15.76	14.61, 16.99	<0.0001	20.40	12.24, 34.02	<0.0001
Neuropathy***	14.34	11.52, 17.85	<0.0001	13.79	11.06, 17.19	<0.0001	174.67	17.41, >999.99	<0.0001
Cardiomyopathy***	16.48	13.27, 20.46	<0.0001	16.28	13.10, 20.24	<0.0001	32.17	4.83, 214.21	0.0003
Gastritis***	30.24	19.62, 46.60	<0.0001	30.65	19.60, 47.94	<0.0001	21.23	3.99, 113.02	0.0003
Fatty liver disease***	4.67	4.15, 5.25	<0.0001	4.68	4.15, 5.28	<0.0001	4.70	2.52, 8.77	<0.0001
Hepatitis***	14.74	11.70, 18.56	<0.0001	15.50	12.22, 19.66	<0.0001	4.77	1.89, 12.05	0.0009
Liver damage***	8.36	6.80, 10.28	<0.0001	8.03	6.50, 9.90	<0.0001	21.62	7.09, 65.96	<0.0001

Other Clinical ICD-9/10 Diagnoses									
Drug use disorder	12.79	12.53, 13.05	<0.0001	12.66	12.40, 12.93	<0.0001	13.16	12.27, 14.12	<0.0001
Mental disorder	3.21	3.16, 3.27	<0.0001	3.16	3.10, 3.22	<0.0001	5.08	4.53, 5.69	<0.0001
C-statistic	0.91			0.90			0.91		

aOR=adjusted odds ratio; 95% CI =95% confidence interval; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; AUD=alcohol use disorder.

*Number of observations with missing age: Black men (n=5); Hispanic men (n=8); White men (n=42); Black women (n=1); Hispanic women (n=1); White women (n=3). **Odds ratios displayed at mean highest AUDIT-C score (mean=3, 3, 2 for overall, men, and women, respectively). ***Alcohol-specific diagnosis.

[a]*P*-value for overall interaction.

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Figure Titles and Captions

Figure 1a. Percentage of men with an AUD diagnosis by maximum AUDIT-C score, stratified by race and ethnicity (n=638,204).

Figure 1 Caption: AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption.
Note: The connecting lines are for visualization purposes only and should not be interpreted as continuous.

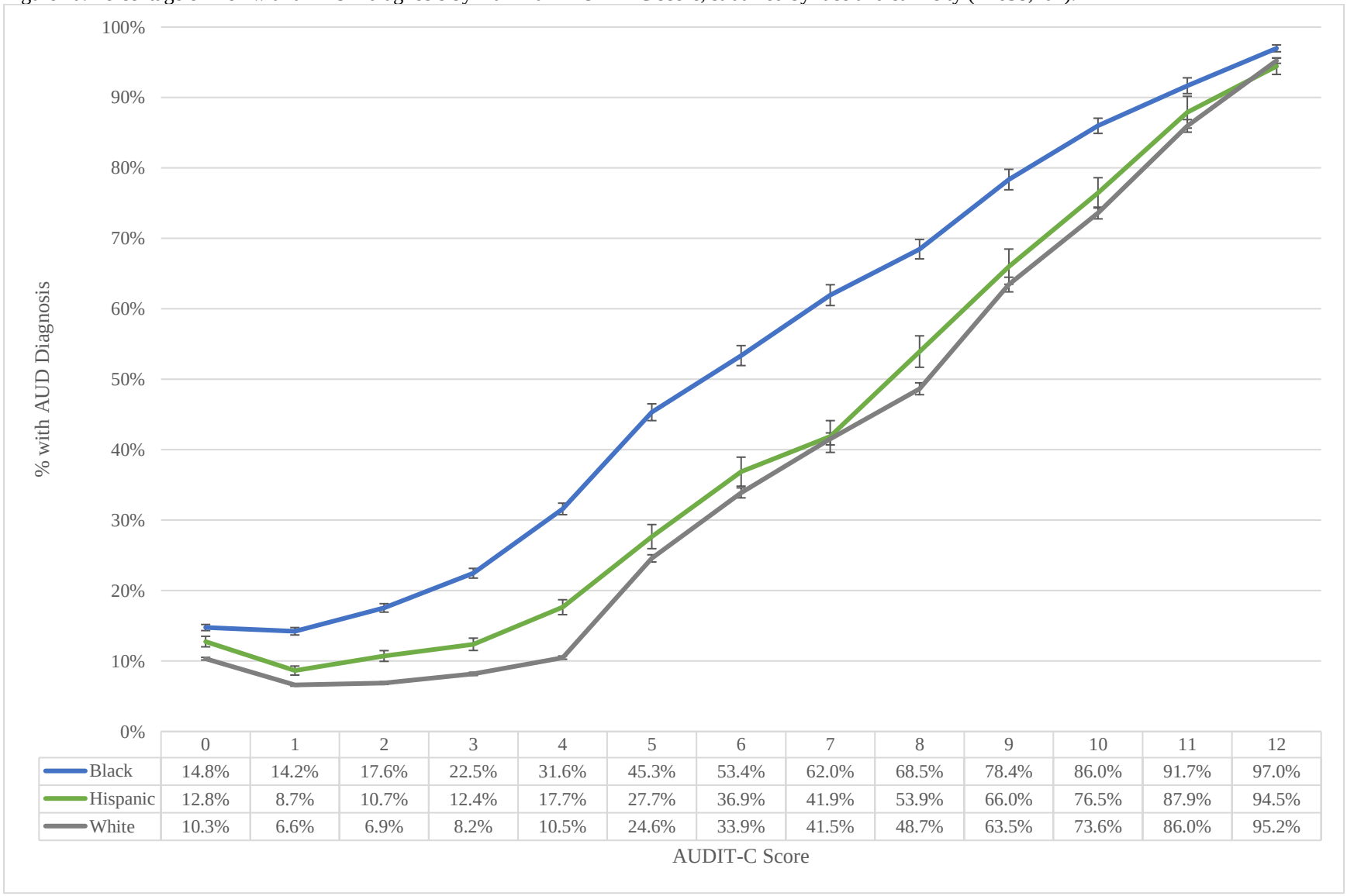
Figure 1b. Percentage of women with an AUD diagnosis by maximum AUDIT-C score, stratified by race and ethnicity (n=61,808).

Figure 1b Caption: AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption.
Note: The connecting lines are for visualization purposes only and should not be interpreted as continuous.

Figure 2. Forest plot of adjusted odds ratios for the association between race and ethnicity and AUD diagnosis among men, stratified by maximum AUDIT-C score (n=612,112).

Figure 2 Caption: AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; aOR=adjusted odds ratio; 95% CI=95% confidence interval.
Note: Models are adjusted for age at enrollment; drug abuse/dependence; mental disorder; alcohol-specific: cirrhosis, neuropathy, cardiomyopathy, gastritis, fatty liver disease, hepatitis, liver damage. A Bonferroni-corrected alpha of 0.001 was used to denote statistical significance.

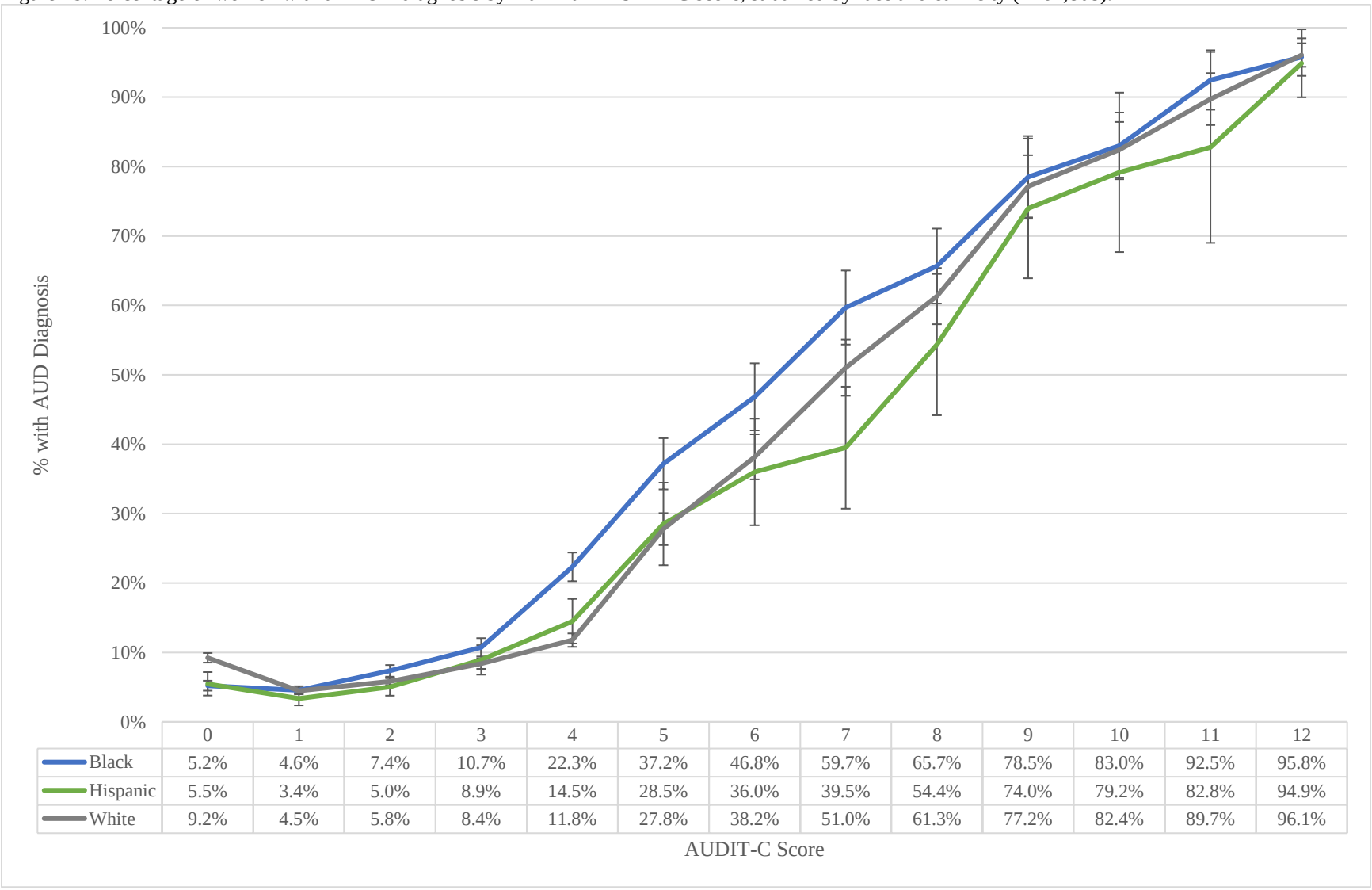
Figure 1a. Percentage of men with an AUD diagnosis by maximum AUDIT-C score, stratified by race and ethnicity (n=638,204).



	0	1	2	3	4	5	6	7	8	9	10	11	12
Black	14.8%	14.2%	17.6%	22.5%	31.6%	45.3%	53.4%	62.0%	68.5%	78.4%	86.0%	91.7%	97.0%
Hispanic	12.8%	8.7%	10.7%	12.4%	17.7%	27.7%	36.9%	41.9%	53.9%	66.0%	76.5%	87.9%	94.5%
White	10.3%	6.6%	6.9%	8.2%	10.5%	24.6%	33.9%	41.5%	48.7%	63.5%	73.6%	86.0%	95.2%

AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption.
Note: The connecting lines are for visualization purposes only and should not be interpreted as continuous.

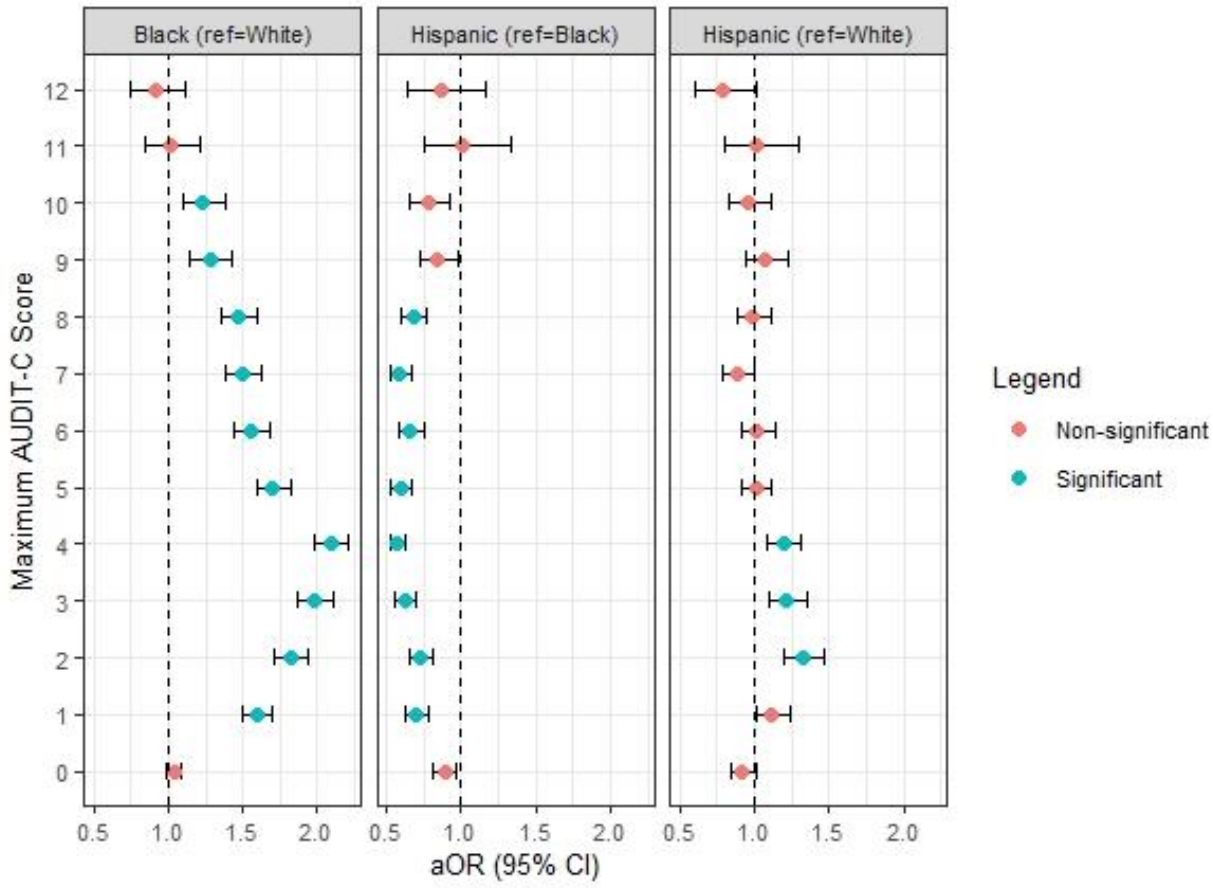
Figure 1b. Percentage of women with an AUD diagnosis by maximum AUDIT-C score, stratified by race and ethnicity (n=61,808).



	0	1	2	3	4	5	6	7	8	9	10	11	12
Black	5.2%	4.6%	7.4%	10.7%	22.3%	37.2%	46.8%	59.7%	65.7%	78.5%	83.0%	92.5%	95.8%
Hispanic	5.5%	3.4%	5.0%	8.9%	14.5%	28.5%	36.0%	39.5%	54.4%	74.0%	79.2%	82.8%	94.9%
White	9.2%	4.5%	5.8%	8.4%	11.8%	27.8%	38.2%	51.0%	61.3%	77.2%	82.4%	89.7%	96.1%

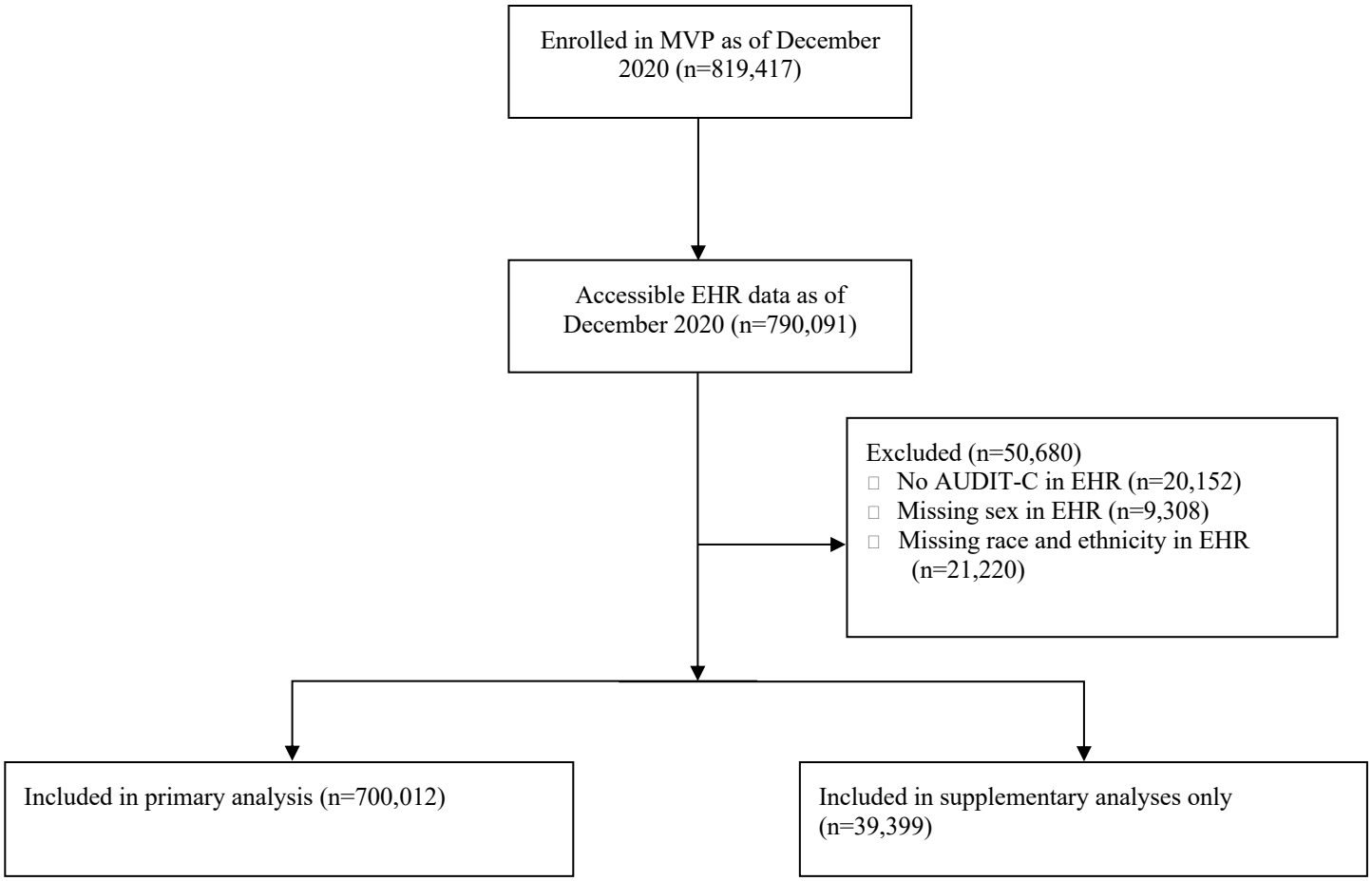
AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption.
Note: The connecting lines are for visualization purposes only and should not be interpreted as continuous.

Figure 2. Forest plot of adjusted odds ratios for the association between race and ethnicity and AUD diagnosis among men, stratified by maximum AUDIT-C score (n=612,112).



AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; aOR=adjusted odds ratio; 95% CI=95% confidence interval.
Note: Models are adjusted for age at enrollment; drug abuse/dependence; mental disorder; alcohol-specific: cirrhosis, neuropathy, cardiomyopathy, gastritis, fatty liver disease, hepatitis, liver damage. A Bonferroni-corrected alpha of 0.001 was used to denote statistical significance.

Figure S1. Flow chart of study inclusion.



MVP = Million Veteran Program; EHR = electronic health record; AUDIT-C = Alcohol Use Disorders Identification Test – Consumption.

Table S1a. Demographic and clinical characteristics of men excluded in the primary analysis by race/ethnicity (n=34,056).

	American Indian/ Alaska Native 13.7% (n=4,677)	Asian 21.0% (n=7,135)	Native Hawaiian/ Pacific Islander 9.1% (n=3,102)	Other/Multiple Races 56.2% (n=19,142)
Age (y) – mean (SD)[*]	60.1 (12.7)	53.8 (17.0)	57.3 (14.7)	61.4 (12.5)
Alcohol-Related Characteristics				
Highest AUDIT-C				
0	26.2% (1,223)	20.7% (1,477)	22.2% (689)	22.5% (4,305)
1-3	36.8% (1,721)	49.5% (3,534)	40.3% (1,250)	43.8% (8,381)
4-7	22.5% (1,050)	21.8% (1,558)	23.5% (729)	23.2% (4,446)
8+	14.6% (683)	7.9% (566)	14.0% (434)	10.5% (2,010)
Number of AUDIT-C assessments – mean (SD)	8.9 (4.4)	7.1 (3.7)	8.4 (4.0)	9.1 (4.3)
AUD	28.7% (1,343)	11.8% (840)	21.9% (678)	21.0% (4,022)
Cirrhosis[†]	2.5% (117)	0.3% (19)	1.6% (49)	1.5% (283)
Neuropathy[†]	0.2% (10)	0.0% (0)	0.1% (4)	0.3% (56)
Cardiomyopathy[†]	0.2% (10)	<0.1% (1)	0.1% (2)	0.2% (31)
Gastritis[†]	0.3% (16)	0.1% (5)	0.1% (3)	0.2% (43)
Fatty liver disease[†]	0.6% (30)	0.3% (19)	0.8% (25)	0.5% (92)
Hepatitis[†]	0.9% (42)	0.1% (8)	0.6% (17)	0.6% (113)
Liver damage[†]	0.5% (24)	0.1% (9)	0.2% (7)	0.3% (62)
Other Clinical ICD-9/10 Diagnoses				
Drug abuse/dependence	19.2% (897)	6.5% (465)	14.5% (451)	15.4% (2,948)
AUD + drug abuse/dependence	14.9% (695)	4.2% (300)	10.3% (318)	10.8% (2,067)
Mental disorder	62.0% (2,900)	47.1% (3,359)	60.0% (1,860)	56.8% (10,878)
AUD + mental disorder	23.7% (1,110)	10.0% (706)	18.1% (562)	17.3% (3,307)

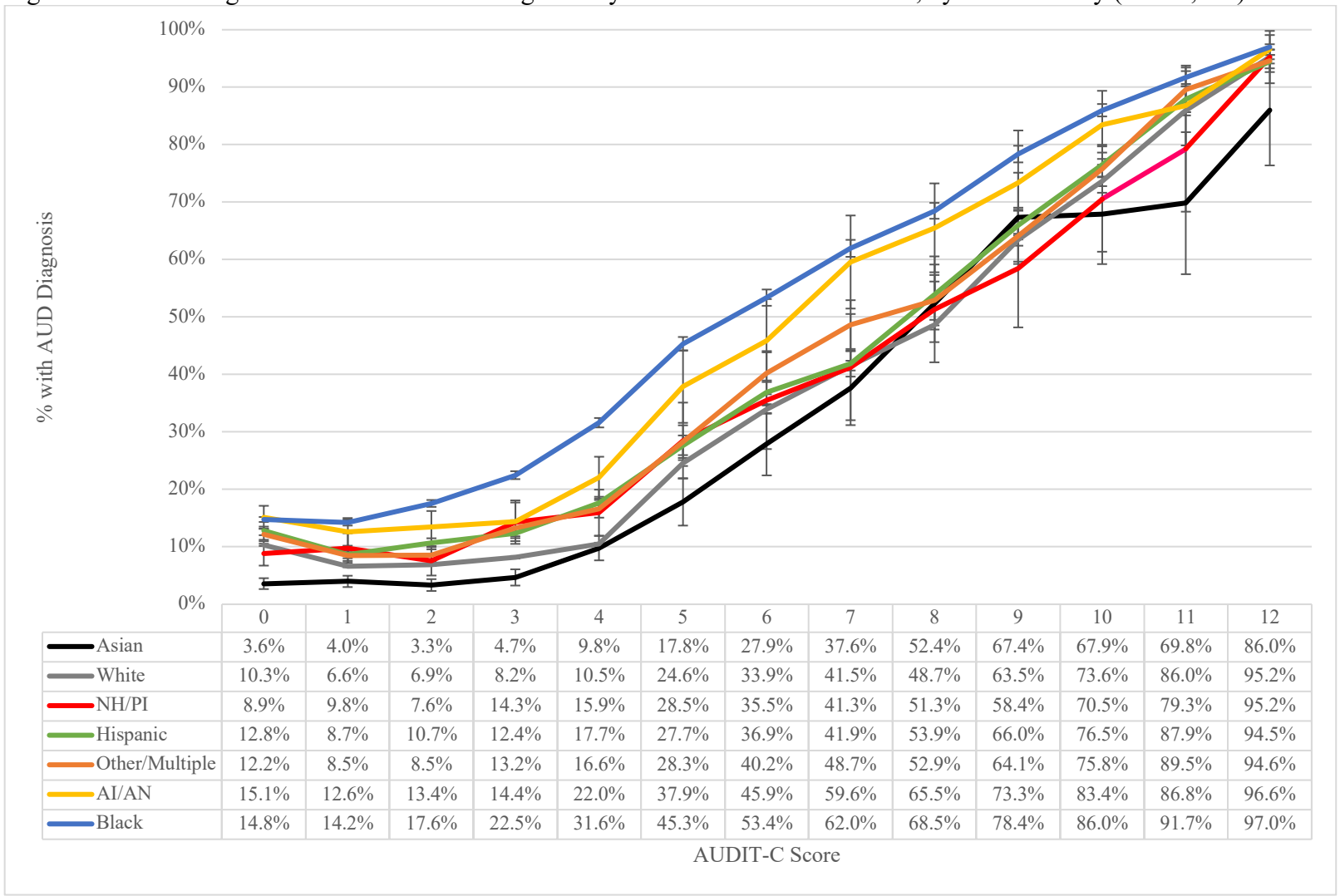
SD = standard deviation; AUDIT-C = Alcohol Use Disorders Identification Test – Consumption; AUD = alcohol use disorder.
[*]Number of observations with missing age: Asian (n=4), Other/Multiple Races (n=2). [†]Alcohol-specific diagnosis.

Table S1b. Demographic and clinical characteristics of women excluded in the primary analysis by race/ethnicity (n=5,343).

	American Indian/ Alaska Native 13.1% (n=702)	Asian 17.5% (n=934)	Native Hawaiian/ Pacific Islander 7.4% (n=394)	Other/Multiple Races 62.0% (n=3,313)
Age (y) – mean (SD)*	50.4 (12.8)	43.1 (12.8)	47.1 (12.7)	51.4 (12.6)
Alcohol-Related Characteristics				
Highest AUDIT-C				
0	21.7% (152)	20.6% (192)	20.6% (81)	18.9% (626)
1-2	42.9% (301)	49.7% (464)	50.8% (200)	48.5% (1,607)
4-7	29.8% (209)	26.5% (247)	23.6% (93)	27.8% (921)
8+	5.7% (40)	3.3% (31)	5.1% (20)	4.8% (159)
Number of AUDIT-C assessments – mean (SD)	8.7 (5.2)	7.1 (3.6)	8.4 (4.3)	9.2 (4.4)
AUD	17.2% (121)	8.0% (75)	13.5% (53)	12.4% (409)
Cirrhosis†	0.4% (3)	0.0% (0)	0.5% (2)	0.4% (14)
Neuropathy†	0.1% (1)	0.0% (0)	0.3% (1)	<0.1% (1)
Cardiomyopathy†	0.1% (1)	0.0% (0)	0.0% (0)	0.0% (0)
Gastritis†	0.1% (1)	0.0% (0)	0.5% (2)	0.1% (3)
Fatty liver disease†	0.4% (3)	0.0% (0)	0.3% (1)	0.2% (6)
Hepatitis†	0.3% (2)	0.0% (0)	0.3% (1)	0.2% (8)
Liver damage†	0.6% (4)	0.0% (0)	0.3% (1)	0.1% (2)
Other Clinical ICD-9/10 Diagnoses				
Drug abuse/dependence	15.5% (109)	6.2% (58)	11.4% (45)	12.0% (399)
AUD + drug abuse/dependence	9.5% (67)	3.8% (35)	5.8% (23)	6.4% (212)
Mental disorder	75.6% (531)	59.9% (559)	73.6% (290)	75.0% (2,485)
AUD + mental disorder	16.5% (116)	7.7% (72)	12.7% (50)	11.7% (388)

SD = standard deviation; AUDIT-C = Alcohol Use Disorders Identification Test – Consumption; AUD = alcohol use disorder.
*Number of observations with missing age: Other/Multiple Races (n=1). †Alcohol-specific diagnosis.

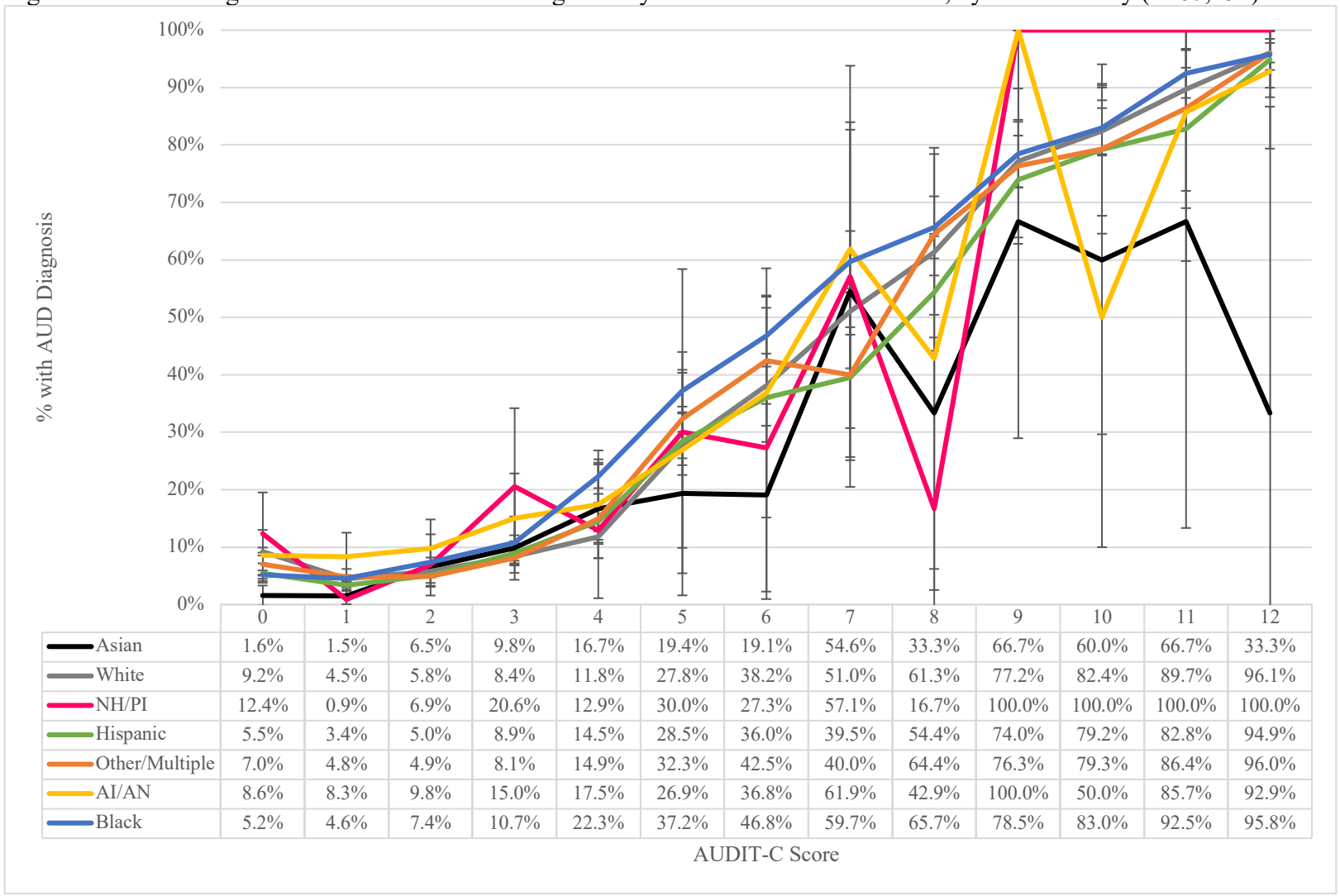
Figure S2a. Percentage of men with an AUD diagnosis by maximum AUDIT-C score, by race/ethnicity (n=672,260).



	0	1	2	3	4	5	6	7	8	9	10	11	12
Asian	3.6%	4.0%	3.3%	4.7%	9.8%	17.8%	27.9%	37.6%	52.4%	67.4%	67.9%	69.8%	86.0%
White	10.3%	6.6%	6.9%	8.2%	10.5%	24.6%	33.9%	41.5%	48.7%	63.5%	73.6%	86.0%	95.2%
NH/PI	8.9%	9.8%	7.6%	14.3%	15.9%	28.5%	35.5%	41.3%	51.3%	58.4%	70.5%	79.3%	95.2%
Hispanic	12.8%	8.7%	10.7%	12.4%	17.7%	27.7%	36.9%	41.9%	53.9%	66.0%	76.5%	87.9%	94.5%
Other/Multiple	12.2%	8.5%	8.5%	13.2%	16.6%	28.3%	40.2%	48.7%	52.9%	64.1%	75.8%	89.5%	94.6%
AI/AN	15.1%	12.6%	13.4%	14.4%	22.0%	37.9%	45.9%	59.6%	65.5%	73.3%	83.4%	86.8%	96.6%
Black	14.8%	14.2%	17.6%	22.5%	31.6%	45.3%	53.4%	62.0%	68.5%	78.4%	86.0%	91.7%	97.0%

AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; NH/PI=Native Hawaiian/Pacific Islander; AI/AN=American Indian/Alaska Native.
Note: The connecting lines are for visualization purposes only and should not be interpreted as continuous.

Figure S2b. Percentage of women with an AUD diagnosis by maximum AUDIT-C score, by race/ethnicity (n=67,151).



	0	1	2	3	4	5	6	7	8	9	10	11	12
Asian	1.6%	1.5%	6.5%	9.8%	16.7%	19.4%	19.1%	54.6%	33.3%	66.7%	60.0%	66.7%	33.3%
White	9.2%	4.5%	5.8%	8.4%	11.8%	27.8%	38.2%	51.0%	61.3%	77.2%	82.4%	89.7%	96.1%
NH/PI	12.4%	0.9%	6.9%	20.6%	12.9%	30.0%	27.3%	57.1%	16.7%	100.0%	100.0%	100.0%	100.0%
Hispanic	5.5%	3.4%	5.0%	8.9%	14.5%	28.5%	36.0%	39.5%	54.4%	74.0%	79.2%	82.8%	94.9%
Other/Multiple	7.0%	4.8%	4.9%	8.1%	14.9%	32.3%	42.5%	40.0%	64.4%	76.3%	79.3%	86.4%	96.0%
AI/AN	8.6%	8.3%	9.8%	15.0%	17.5%	26.9%	36.8%	61.9%	42.9%	100.0%	50.0%	85.7%	92.9%
Black	5.2%	4.6%	7.4%	10.7%	22.3%	37.2%	46.8%	59.7%	65.7%	78.5%	83.0%	92.5%	95.8%

AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; NH/PI=Native Hawaiian/Pacific Islander; AI/AN=American Indian/Alaska Native.
Note: The connecting lines are for visualization purposes only and should not be interpreted as continuous.

Table S2. International Classification of Disease (ICD) 9 and 10 Diagnostic Codes.

Alcohol Use Disorder			
ICD-9 Codes		**ICD-10 Codes**	
305.00	Nondependent alcohol abuse, unspecified	F10.10	Alcohol abuse, uncomplicated
305.01	Nondependent alcohol abuse, continuous	F10.11	Alcohol abuse, in remission
305.02	Nondependent alcohol abuse, episodic	F10.120	Alcohol abuse with intoxication, uncomplicated
305.03	Nondependent alcohol abuse, in remission	F10.121	Alcohol abuse with intoxication, delirium
303.00	Acute alcoholic intoxication, unspecified	F10.129	Alcohol abuse with intoxication, unspecified
303.01	Acute alcoholic intoxication, continuous	F10.14	Alcohol abuse with alcohol-induced mood disorder
303.02	Acute alcoholic intoxication, episodic	F10.150	Alcohol abuse with alcohol-induced psychotic disorder with delusions
303.03	Acute alcoholic intoxication, in remission	F10.151	Alcohol abuse with alcohol-induced psychotic disorder with hallucinations
303.90	Other and unspecified alcohol dependence, unspecified	F10.159	Alcohol abuse with alcohol-induced psychotic disorder, unspecified
303.91	Other and unspecified alcohol dependence, continuous	F10.180	Alcohol abuse with alcohol-induced anxiety disorder
303.92	Other and unspecified alcohol dependence, episodic	F10.181	Alcohol abuse with alcohol-induced sexual dysfunction
303.93	Other and unspecified alcohol dependence, in remission	F10.182	Alcohol abuse with alcohol-induced sleep disorder
		F10.188	Alcohol abuse with other alcohol-induced disorder
		F10.19	Alcohol abuse with unspecified alcohol-induced disorder
		F10.20	Alcohol dependence, uncomplicated
		F10.21	Alcohol dependence, in remission
		F10.220	Alcohol dependence with intoxication, uncomplicated
		F10.221	Alcohol dependence with intoxication delirium
		F10.229	Alcohol dependence with intoxication, unspecified
		F10.230	Alcohol dependence with withdrawal, uncomplicated
		F10.231	Alcohol dependence with withdrawal delirium

		F10.232	Alcohol dependence with withdrawal with perceptual disturbance
		F10.239	Alcohol dependence with withdrawal, unspecified
		F10.24	Alcohol dependence with alcohol-induced mood disorder
		F10.250	Alcohol dependence with alcohol-induced psychotic disorder with delusions
		F10.251	Alcohol dependence with alcohol-induced psychotic disorder with hallucinations
		F10.259	Alcohol dependence with alcohol-induced psychotic disorder, unspecified
		F10.26	Alcohol dependence with alcohol-induced persisting amnestic disorder
		F10.27	Alcohol dependence with alcohol-induced persisting dementia
		F10.280	Alcohol dependence with alcohol-induced anxiety disorder
		F10.281	Alcohol dependence with alcohol-induced sexual dysfunction
		F10.282	Alcohol dependence with alcohol-induced sleep disorder
		F10.288	Alcohol dependence with other alcohol-induced disorder
		F10.29	Alcohol dependence with unspecified alcohol-induced disorder

Alcohol-Related Disorders

ICD-9 Codes		ICD-10 Codes	
571.2	Alcoholic cirrhosis of liver	K70.3	Alcoholic cirrhosis of liver
		K70.30	Alcoholic cirrhosis of liver without ascites
		K70.31	Alcoholic cirrhosis of liver with ascites
357.5	Alcoholic polyneuropathy	G62.1	Alcoholic polyneuropathy
425.5	Alcoholic cardiomyopathy	I42.6	Alcoholic cardiomyopathy
535.3	Alcoholic gastritis	K29.2	Alcoholic gastritis
535.30	Alcoholic gastritis without mention of hemorrhage	K29.20	Alcoholic gastritis without bleeding
535.31	Alcoholic gastritis with hemorrhage	K29.21	Alcoholic gastritis with bleeding

571.0	Alcoholic fatty liver	K70.0	Alcoholic fatty liver
571.1	Acute alcoholic hepatitis	K70.1	Alcoholic hepatitis
[redacted]		K70.10	Alcoholic hepatitis without ascites
		K70.11	Alcoholic hepatitis with ascites
571.3	Alcoholic liver damage, unspecified	K70.9	Alcoholic liver disease, unspecified

Drug Abuse or Dependence

ICD-9 Codes		ICD-10 Codes	
304	Drug dependence	F11.1	Opioid abuse
304.0	Opioid type dependence	F11.10	Opioid abuse, uncomplicated
304.00	Opioid type dependence, unspecified	F11.11	Opioid abuse, in remission
304.01	Opioid type dependence, continuous	F11.12	Opioid abuse with intoxication
304.02	Opioid type dependence, episodic	F11.120	Opioid abuse with intoxication, uncomplicated
304.03	Opioid type dependence, in remission	F11.121	Opioid abuse with intoxication, delirium
304.1	Sedative, hypnotic or anxiolytic dependence	F11.122	Opioid abuse with intoxication, with perceptual disturbance
304.10	Sedative, hypnotic or anxiolytic dependence, unspecified	F11.129	Opioid abuse with intoxication, unspecified
304.11	Sedative, hypnotic or anxiolytic dependence, continuous	F11.14	Opioid abuse with opioid-induced mood disorder
304.12	Sedative, hypnotic or anxiolytic dependence, episodic	F11.15	Opioid abuse with opioid-induced psychotic disorder
304.13	Sedative, hypnotic or anxiolytic dependence, in remission	F11.150	Opioid abuse with opioid-induced psychotic disorder with delusions
304.2	Cocaine dependence	F11.151	Opioid abuse with opioid-induced psychotic disorder with hallucinations
304.20	Cocaine dependence, unspecified	F11.159	Opioid abuse with opioid-induced psychotic disorder, unspecified
304.21	Cocaine dependence, continuous	F11.18	Opioid abuse with other opioid-induced disorder
304.22	Cocaine dependence, episodic	F11.181	Opioid abuse with opioid-induced sexual dysfunction
304.23	Cocaine dependence, in remission	F11.182	Opioid abuse with opioid-induced sleep disorder
304.3	Cannabis dependence	F11.188	Opioid abuse with other opioid-induced disorder
304.30	Cannabis dependence, unspecified	F11.19	Opioid abuse with unspecified opioid-induced disorder
304.31	Cannabis dependence, continuous	F11.2	Opioid dependence
304.32	Cannabis dependence, episodic	F11.20	Opioid dependence, uncomplicated

304.33	Cannabis dependence, in remission	F11.21	Opioid dependence, in remission
304.4	Amphetamine and other psychostimulant dependence	F11.22	Opioid dependence with intoxication
304.40	Amphetamine and other psychostimulant dependence, unspecified	F11.220	Opioid dependence with intoxication, uncomplicated
304.41	Amphetamine and other psychostimulant dependence, continuous	F11.221	Opioid dependence with intoxication delirium
304.42	Amphetamine and other psychostimulant dependence, episodic	F11.222	Opioid dependence with intoxication with perceptual disturbance
304.43	Amphetamine and other psychostimulant dependence, in remission	F11.229	Opioid dependence with intoxication, unspecified
304.5	Hallucinogen dependence	F11.23	Opioid dependence with withdrawal
304.50	Hallucinogen dependence, unspecified	F11.24	Opioid dependence with opioid-induced mood disorder
304.51	Hallucinogen dependence, continuous	F11.25	Opioid dependence with opioid-induced psychotic disorder
304.52	Hallucinogen dependence, episodic	F11.250	Opioid dependence with opioid-induced psychotic disorder with delusions
304.53	Hallucinogen dependence, in remission	F11.251	Opioid dependence with opioid-induced psychotic disorder with hallucinations
304.6	Other specified drug dependence	F11.259	Opioid dependence with opioid-induced psychotic disorder, unspecified
304.60	Other specified drug dependence, unspecified	F11.28	Opioid dependence with other opioid-induced disorder
304.61	Other specified drug dependence, continuous	F11.281	Opioid dependence with opioid-induced sexual dysfunction
304.62	Other specified drug dependence, episodic	F11.282	Opioid dependence with opioid-induced sleep disorder
304.63	Other specified drug dependence, in remission	F11.288	Opioid dependence with other opioid-induced disorder
304.7	Combinations of opioid type drug with any other drug dependence	F11.29	Opioid dependence with unspecified opioid-induced disorder
304.70	Combinations of opioid type drug with any other drug dependence, unspecified	F12.1	Cannabis abuse
304.71	Combinations of opioid type drug with any other drug dependence, continuous	F12.10	Cannabis abuse, uncomplicated
304.72	Combinations of opioid type drug with any other drug dependence, episodic	F12.11	Cannabis abuse, in remission
304.73	Combinations of opioid type drug with any other drug dependence, in remission	F12.12	Cannabis abuse with intoxication
304.8	Combinations of drug dependence excluding opioid type drug	F12.120	Cannabis abuse with intoxication
304.80	Combinations of drug dependence excluding opioid type drug, unspecified	F12.121	Cannabis abuse with intoxication delirium
304.81	Combinations of drug dependence excluding opioid type drug, continuous	F12.122	Cannabis abuse with intoxication with perceptual disturbance
304.82	Combinations of drug dependence excluding opioid type drug, episodic	F12.129	Cannabis abuse with intoxication, unspecified
304.83	Combinations of drug dependence excluding opioid type drug, in remission	F12.15	Cannabis abuse with psychotic disorder
304.9	Unspecified drug dependence	F12.150	Cannabis abuse with psychotic disorder with delusions
304.90	Unspecified drug dependence, unspecified	F12.151	Cannabis abuse with psychotic disorder with hallucinations
304.91	Unspecified drug dependence, continuous	F12.159	Cannabis abuse with psychotic disorder, unspecified

304.92	Unspecified drug dependence, episodic	F12.18	Cannabis abuse with other cannabis-induced disorder
304.93	Unspecified drug dependence, in remission	F12.180	Cannabis abuse with cannabis-induced anxiety disorder
305.2	Nondependent cannabis abuse	F12.188	Cannabis abuse with other cannabis-induced disorder
305.20	Cannabis abuse, unspecified	F12.19	Cannabis abuse with unspecified cannabis-induced disorder
305.21	Cannabis abuse, continuous	F12.2	Cannabis dependence
305.22	Cannabis abuse, episodic	F12.20	Cannabis dependence, uncomplicated
305.23	Cannabis abuse, in remission	F12.21	Cannabis dependence, in remission
305.3	Nondependent hallucinogen abuse	F12.22	Cannabis dependence with intoxication
305.30	Hallucinogen abuse, unspecified	F12.220	Cannabis dependence with intoxication, uncomplicated
305.31	Hallucinogen abuse, continuous	F12.221	Cannabis dependence with intoxication delirium
305.32	Hallucinogen abuse, episodic	F12.222	Cannabis dependence with intoxication with perceptual disturbance
305.33	Hallucinogen abuse, in remission	F12.229	Cannabis dependence with intoxication, unspecified
305.4	Nondependent sedative, hypnotic or anxiolytic abuse	F12.23	Cannabis dependence with withdrawal
305.40	Sedative, hypnotic or anxiolytic abuse, unspecified	F12.25	Cannabis dependence with psychotic disorder
305.41	Sedative, hypnotic or anxiolytic abuse, continuous	F12.250	Cannabis dependence with psychotic disorder with delusions
305.42	Sedative, hypnotic or anxiolytic abuse, episodic	F12.251	Cannabis dependence with psychotic disorder with hallucinations
305.43	Sedative, hypnotic or anxiolytic abuse, in remission	F12.259	Cannabis dependence with psychotic disorder, unspecified
305.5	Nondependent opioid abuse	F12.28	Cannabis dependence with other cannabis-induced disorder
305.50	Opioid abuse, unspecified	F12.280	Cannabis dependence with cannabis-induced anxiety disorder
305.51	Opioid abuse, continuous	F12.288	Cannabis dependence with other cannabis-induced disorder
305.52	Opioid abuse, episodic	F12.29	Cannabis dependence with unspecified cannabis-induced disorder
305.53	Opioid abuse, in remission	F12.90	Cannabis use, uncomplicated
305.6	Nondependent cocaine abuse	F13.1	Sedative, hypnotic or anxiolytic-related abuse
305.60	Cocaine abuse, unspecified	F13.10	Sedative, hypnotic or anxiolytic abuse, uncomplicated
305.61	Cocaine abuse, continuous	F13.11	Sedative, hypnotic or anxiolytic abuse, in remission
305.62	Cocaine abuse, episodic	F13.12	Sedative, hypnotic or anxiolytic abuse with intoxication
305.63	Cocaine abuse, in remission	F13.120	Sedative, hypnotic or anxiolytic abuse with intoxication, uncomplicated
305.7	Nondependent amphetamine or related acting sympathomimetic abuse	F13.121	Sedative, hypnotic or anxiolytic abuse with intoxication delirium
305.70	Amphetamine or related acting sympathomimetic abuse, unspecified	F13.129	Sedative, hypnotic or anxiolytic abuse with intoxication, unspecified

305.71	Amphetamine or related acting sympathomimetic abuse, continuous	F13.14	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced mood disorder
305.72	Amphetamine or related acting sympathomimetic abuse, episodic	F13.15	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced psychotic disorder
305.73	Amphetamine or related acting sympathomimetic abuse, in remission	F13.150	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced psychotic disorder with delusions
305.8	Nondependent antidepressant type abuse	F13.151	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced psychotic disorder with hallucinations
305.80	Antidepressant type abuse, unspecified	F13.159	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced psychotic disorder, unspecified
305.81	Antidepressant type abuse, continuous	F13.18	Sedative, hypnotic or anxiolytic abuse with other sedative, hypnotic or anxiolytic-induced disorders
305.82	Antidepressant type abuse, episodic	F13.180	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced anxiety disorder
305.83	Antidepressant type abuse, in remission	F13.181	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced sexual dysfunction
305.9	Nondependent other mixed or unspecified drug abuse	F13.182	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced sleep disorder
305.90	Other, mixed, or unspecified drug abuse, unspecified	F13.188	Sedative, hypnotic or anxiolytic abuse with other sedative, hypnotic or anxiolytic-induced disorder
305.91	Other, mixed, or unspecified drug abuse, continuous	F13.19	Sedative, hypnotic or anxiolytic abuse with unspecified sedative, hypnotic or anxiolytic-induced disorder
305.92	Other, mixed, or unspecified drug abuse, episodic	F13.2	Sedative, hypnotic or anxiolytic-related dependence
305.93	Other, mixed, or unspecified drug abuse, in remission	F13.20	Sedative, hypnotic or anxiolytic dependence, uncomplicated
		F13.21	Sedative, hypnotic or anxiolytic dependence, in remission
		F13.22	Sedative, hypnotic or anxiolytic dependence with intoxication
		F13.220	Sedative, hypnotic or anxiolytic dependence with intoxication, uncomplicated
		F13.221	Sedative, hypnotic or anxiolytic dependence with intoxication delirium
		F13.229	Sedative, hypnotic or anxiolytic dependence with intoxication, unspecified
		F13.23	Sedative, hypnotic or anxiolytic dependence with withdrawal
		F13.230	Sedative, hypnotic or anxiolytic dependence with withdrawal, uncomplicated
		F13.231	Sedative, hypnotic or anxiolytic dependence with withdrawal delirium
		F13.232	Sedative, hypnotic or anxiolytic dependence with withdrawal with perceptual disturbance
		F13.239	Sedative, hypnotic or anxiolytic dependence with withdrawal, unspecified
		F13.24	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced mood disorder
		F13.25	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced psychotic disorder

	F13.250	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced psychotic disorder with delusions
	F13.251	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced psychotic disorder with hallucinations
	F13.259	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced psychotic disorder, unspecified
	F13.26	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced persisting amnestic disorder
	F13.27	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced persisting dementia
	F13.28	Sedative, hypnotic or anxiolytic dependence with other sedative, hypnotic or anxiolytic-induced disorders
	F13.280	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced anxiety disorder
	F13.281	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced sexual dysfunction
	F13.282	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced sleep disorder
	F13.288	Sedative, hypnotic or anxiolytic dependence with other sedative, hypnotic or anxiolytic-induced disorder
	F13.29	Sedative, hypnotic or anxiolytic dependence with unspecified sedative, hypnotic or anxiolytic-induced disorder
	F14.1	Cocaine abuse
	F14.10	Cocaine abuse, uncomplicated
	F14.11	Cocaine abuse, in remission
	F14.12	Cocaine abuse with intoxication
	F14.120	Cocaine abuse with intoxication, uncomplicated
	F14.121	Cocaine abuse with intoxication with delirium
	F14.122	Cocaine abuse with intoxication with perceptual disturbance
	F14.129	Cocaine abuse with intoxication, unspecified
	F14.14	Cocaine abuse with cocaine-induced mood disorder
	F14.15	Cocaine abuse with cocaine-induced psychotic disorder
	F14.150	Cocaine abuse with cocaine-induced psychotic disorder with delusions
	F14.151	Cocaine abuse with cocaine-induced psychotic disorder with hallucinations
	F14.159	Cocaine abuse with cocaine-induced psychotic disorder, unspecified
	F14.18	Cocaine abuse with other cocaine-induced disorder
	F14.180	Cocaine abuse with cocaine-induced anxiety disorder

[redacted]	F14.181	Cocaine abuse with cocaine-induced sexual dysfunction
	F14.182	Cocaine abuse with cocaine-induced sleep disorder
	F14.188	Cocaine abuse with other cocaine-induced disorder
	F14.19	Cocaine abuse with unspecified cocaine-induced disorder
	F14.2	Cocaine dependence
	F14.20	Cocaine dependence, uncomplicated
	F14.21	Cocaine dependence, in remission
	F14.22	Cocaine dependence with intoxication
	F14.220	Cocaine dependence with intoxication, uncomplicated
	F14.221	Cocaine dependence with intoxication delirium
	F14.222	Cocaine dependence with intoxication with perceptual disturbance
	F14.229	Cocaine dependence with intoxication, unspecified
	F14.23	Cocaine dependence with withdrawal
	F14.24	Cocaine dependence with cocaine-induced mood disorder
	F14.25	Cocaine dependence with cocaine-induced psychotic disorder
	F14.250	Cocaine dependence with cocaine-induced psychotic disorder with delusions
	F14.251	Cocaine dependence with cocaine-induced psychotic disorder with hallucinations
	F14.259	Cocaine dependence with cocaine-induced psychotic disorder, unspecified
	F14.28	Cocaine dependence with other cocaine-induced disorder
	F14.280	Cocaine dependence with cocaine-induced anxiety disorder
	F14.281	Cocaine dependence with cocaine-induced sexual dysfunction
	F14.282	Cocaine dependence with cocaine-induced sleep disorder
	F14.288	Cocaine dependence with other cocaine-induced disorder
	F14.29	Cocaine dependence with unspecified cocaine-induced disorder
	F15.1	Other stimulant abuse
	F15.10	Other stimulant abuse, uncomplicated
	F15.11	Other stimulant abuse, in remission
	F15.12	Other stimulant abuse with intoxication
	F15.120	Other stimulant abuse with intoxication, uncomplicated

[redacted]	F15.121	Other stimulant abuse with intoxication delirium
	F15.122	Other stimulant abuse with intoxication with perceptual disturbance
	F15.129	Other stimulant abuse with intoxication, unspecified
	F15.14	Other stimulant abuse with stimulant-induced mood disorder
	F15.15	Other stimulant abuse with stimulant-induced psychotic disorder
	F15.150	Other stimulant abuse with stimulant-induced psychotic disorder with delusions
	F15.151	Other stimulant abuse with stimulant-induced psychotic disorder with hallucinations
	F15.159	Other stimulant abuse with stimulant-induced psychotic disorder, unspecified
	F15.18	Other stimulant abuse with other stimulant-induced disorder
	F15.180	Other stimulant abuse with stimulant-induced anxiety disorder
	F15.181	Other stimulant abuse with stimulant-induced sexual dysfunction
	F15.182	Other stimulant abuse with stimulant-induced sleep disorder
	F15.188	Other stimulant abuse with other stimulant-induced disorder
	F15.19	Other stimulant abuse with unspecified stimulant-induced disorder
	F15.2	Other stimulant dependence
	F15.20	Other stimulant dependence, uncomplicated
	F15.21	Other stimulant dependence, in remission
	F15.22	Other stimulant dependence with intoxication
	F15.220	Other stimulant dependence with intoxication, uncomplicated
	F15.221	Other stimulant dependence with intoxication delirium
	F15.222	Other stimulant dependence with intoxication with perceptual disturbance
	F15.229	Other stimulant dependence with intoxication, unspecified
	F15.23	Other stimulant dependence with withdrawal
	F15.24	Other stimulant dependence with stimulant-induced mood disorder
	F15.25	Other stimulant dependence with stimulant-induced psychotic disorder
	F15.250	Other stimulant dependence with stimulant-induced psychotic disorder with delusions
	F15.251	Other stimulant dependence with stimulant-induced psychotic disorder with hallucinations
	F15.259	Other stimulant dependence with stimulant-induced psychotic disorder, unspecified
	F15.28	Other stimulant dependence with other stimulant-induced disorder

[redacted]	F15.280	Other stimulant dependence with stimulant-induced anxiety disorder
	F15.281	Other stimulant dependence with stimulant-induced sexual dysfunction
	F15.282	Other stimulant dependence with stimulant-induced sleep disorder
	F15.288	Other stimulant dependence with other stimulant-induced disorder
	F15.29	Other stimulant dependence with unspecified stimulant-induced disorder
	F16.1	Hallucinogen abuse
	F16.10	Hallucinogen abuse, uncomplicated
	F16.11	Hallucinogen abuse, in remission
	F16.12	Hallucinogen abuse with intoxication
	F16.120	Hallucinogen abuse with intoxication, uncomplicated
	F16.121	Hallucinogen abuse with intoxication with delirium
	F16.122	Hallucinogen abuse with intoxication with perceptual disturbance
	F16.129	Hallucinogen abuse with intoxication, unspecified
	F16.14	Hallucinogen abuse with hallucinogen-induced mood disorder
	F16.15	Hallucinogen abuse with hallucinogen-induced psychotic disorder
	F16.150	Hallucinogen abuse with hallucinogen-induced psychotic disorder with delusions
	F16.151	Hallucinogen abuse with hallucinogen-induced psychotic disorder with hallucinations
	F16.159	Hallucinogen abuse with hallucinogen-induced psychotic disorder, unspecified
	F16.18	Hallucinogen abuse with other hallucinogen-induced disorder
	F16.180	Hallucinogen abuse with hallucinogen-induced anxiety disorder
	F16.183	Hallucinogen abuse with hallucinogen persisting perception disorder (flashbacks)
	F16.188	Hallucinogen abuse with other hallucinogen-induced disorder
	F16.19	Hallucinogen abuse with unspecified hallucinogen-induced disorder
	F16.2	Hallucinogen dependence
	F16.20	Hallucinogen dependence, uncomplicated
	F16.21	Hallucinogen dependence, in remission
	F16.22	Hallucinogen dependence with intoxication
	F16.220	Hallucinogen dependence with intoxication, uncomplicated
	F16.221	Hallucinogen dependence with intoxication with delirium

[redacted]	F16.229	Hallucinogen dependence with intoxication, unspecified
	F16.24	Hallucinogen dependence with hallucinogen-induced mood disorder
	F16.25	Hallucinogen dependence with hallucinogen-induced psychotic disorder
	F16.250	Hallucinogen dependence with hallucinogen-induced psychotic disorder with delusions
	F16.251	Hallucinogen dependence with hallucinogen-induced psychotic disorder with hallucinations
	F16.259	Hallucinogen dependence with hallucinogen-induced psychotic disorder, unspecified
	F16.28	Hallucinogen dependence with other hallucinogen-induced disorder
	F16.280	Hallucinogen dependence with hallucinogen-induced anxiety disorder
	F16.283	Hallucinogen dependence with hallucinogen persisting perception disorder (flashbacks)
	F16.288	Hallucinogen dependence with other hallucinogen-induced disorder
	F16.29	Hallucinogen dependence with unspecified hallucinogen-induced disorder
	F18.1	Inhalant abuse
	F18.10	Inhalant abuse, uncomplicated
	F18.11	Inhalant abuse, in remission
	F18.12	Inhalant abuse with intoxication
	F18.120	Inhalant abuse with intoxication, uncomplicated
	F18.121	Inhalant abuse with intoxication delirium
	F18.129	Inhalant abuse with intoxication, unspecified
	F18.14	Inhalant abuse with inhalant-induced mood disorder
	F18.15	Inhalant abuse with inhalant-induced psychotic disorder
	F18.150	Inhalant abuse with inhalant-induced psychotic disorder with delusions
	F18.151	Inhalant abuse with inhalant-induced psychotic disorder with hallucinations
	F18.159	Inhalant abuse with inhalant-induced psychotic disorder, unspecified
	F18.17	Inhalant abuse with inhalant-induced dementia
	F18.18	Inhalant abuse with other inhalant-induced disorders
	F18.180	Inhalant abuse with inhalant-induced anxiety disorder
	F18.188	Inhalant abuse with other inhalant-induced disorder
	F18.19	Inhalant abuse with unspecified inhalant-induced disorder
	F18.2	Inhalant dependence

[redacted]	F18.20	Inhalant dependence, uncomplicated
	F18.21	Inhalant dependence, in remission
	F18.22	Inhalant dependence with intoxication
	F18.220	Inhalant dependence with intoxication, uncomplicated
	F18.221	Inhalant dependence with intoxication delirium
	F18.229	Inhalant dependence with intoxication, unspecified
	F18.24	Inhalant dependence with inhalant-induced mood disorder
	F18.25	Inhalant dependence with inhalant-induced psychotic disorder
	F18.250	Inhalant dependence with inhalant-induced psychotic disorder with delusions
	F18.251	Inhalant dependence with inhalant-induced psychotic disorder with hallucinations
	F18.259	Inhalant dependence with inhalant-induced psychotic disorder, unspecified
	F18.27	Inhalant dependence with inhalant-induced dementia
	F18.28	Inhalant dependence with other inhalant-induced disorders
	F18.280	Inhalant dependence with inhalant-induced anxiety disorder
	F18.288	Inhalant dependence with other inhalant-induced disorder
	F18.29	Inhalant dependence with unspecified inhalant-induced disorder
	F19.1	Other psychoactive substance abuse
	F19.10	Other psychoactive substance abuse, uncomplicated
	F19.11	Other psychoactive substance abuse, in remission
	F19.12	Other psychoactive substance abuse with intoxication
	F19.120	Other psychoactive substance abuse with intoxication, uncomplicated
	F19.121	Other psychoactive substance abuse with intoxication delirium
	F19.122	Other psychoactive substance abuse with intoxication with perceptual disturbances
	F19.129	Other psychoactive substance abuse with intoxication, unspecified
	F19.14	Other psychoactive substance abuse with psychoactive substance-induced mood disorder
	F19.15	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder
	F19.150	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder with delusions
	F19.151	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder with hallucinations

[redacted]	F19.159	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder, unspecified
	F19.16	Other psychoactive substance abuse with psychoactive substance-induced persisting amnestic disorder
	F19.17	Other psychoactive substance abuse with psychoactive substance-induced persisting dementia
	F19.18	Other psychoactive substance abuse with other psychoactive substance-induced disorders
	F19.180	Other psychoactive substance abuse with psychoactive substance-induced anxiety disorder
	F19.181	Other psychoactive substance abuse with psychoactive substance-induced sexual dysfunction
	F19.182	Other psychoactive substance abuse with psychoactive substance-induced sleep disorder
	F19.188	Other psychoactive substance abuse with other psychoactive substance-induced disorder
	F19.19	Other psychoactive substance abuse with unspecified psychoactive substance-induced disorder
	F19.2	Other psychoactive substance dependence
	F19.20	Other psychoactive substance dependence, uncomplicated
	F19.21	Other psychoactive substance dependence, in remission
	F19.22	Other psychoactive substance dependence with intoxication
	F19.220	Other psychoactive substance dependence with intoxication, uncomplicated
	F19.221	Other psychoactive substance dependence with intoxication delirium
	F19.222	Other psychoactive substance dependence with intoxication with perceptual disturbance
	F19.229	Other psychoactive substance dependence with intoxication, unspecified
	F19.23	Other psychoactive substance dependence with withdrawal
	F19.230	Other psychoactive substance dependence with withdrawal, uncomplicated
	F19.231	Other psychoactive substance dependence with withdrawal delirium
	F19.232	Other psychoactive substance dependence with withdrawal with perceptual disturbance
	F19.239	Other psychoactive substance dependence with withdrawal, unspecified
	F19.24	Other psychoactive substance dependence with psychoactive substance-induced mood disorder
	F19.25	Other psychoactive substance dependence with psychoactive substance-induced psychotic disorder
	F19.250	Other psychoactive substance dependence with psychoactive substance-induced psychotic disorder with delusions

[redacted]	F19.251	Other psychoactive substance dependence with psychoactive substance-induced psychotic disorder with hallucinations
	F19.259	Other psychoactive substance dependence with psychoactive substance-induced psychotic disorder, unspecified
	F19.26	Other psychoactive substance dependence with psychoactive substance-induced persisting amnestic disorder
	F19.27	Other psychoactive substance dependence with psychoactive substance-induced persisting dementia
	F19.28	Other psychoactive substance dependence with other psychoactive substance-induced disorders
	F19.280	Other psychoactive substance dependence with psychoactive substance-induced anxiety disorder
	F19.281	Other psychoactive substance dependence with psychoactive substance-induced sexual dysfunction
	F19.282	Other psychoactive substance dependence with psychoactive substance-induced sleep disorder
	F19.288	Other psychoactive substance dependence with other psychoactive substance-induced disorder
	F19.29	Other psychoactive substance dependence with unspecified psychoactive substance-induced disorder

Mental Disorders

ICD-9 Codes		ICD-10 Codes	
295.0	Simple type schizophrenia	F20	Schizophrenia
295.00	Simple type schizophrenia, unspecified	F20.0	Paranoid schizophrenia
295.01	Simple type schizophrenia, subchronic	F20.1	Disorganized schizophrenia
295.02	Simple type schizophrenia, chronic	F20.2	Catatonic schizophrenia
295.03	Simple type schizophrenia, subchronic with acute exacerbation	F20.3	Undifferentiated schizophrenia
295.04	Simple type schizophrenia, chronic with acute exacerbation	F20.5	Residual schizophrenia
295.05	Simple type schizophrenia, in remission	F20.8	Other schizophrenia
295.1	Disorganized type schizophrenia	F20.81	Schizophreniform disorder
295.10	Disorganized type schizophrenia, unspecified	F20.89	Other schizophrenia
295.11	Disorganized type schizophrenia, subchronic	F20.9	Schizophrenia, unspecified
295.12	Disorganized type schizophrenia, chronic	F25	Schizoaffective disorders
295.13	Disorganized type schizophrenia, subchronic with acute exacerbation	F25.0	Schizoaffective disorder, bipolar type
295.14	Disorganized type schizophrenia, chronic with acute exacerbation	F25.1	Schizoaffective disorder, depressive type
295.15	Disorganized type schizophrenia, in remission	F25.8	Other schizoaffective disorders

295.2	Catatonic type schizophrenia	F25.9	Schizoaffective disorder, unspecified
295.20	Catatonic type schizophrenia, unspecified	F31	Bipolar disorder
295.21	Catatonic type schizophrenia, subchronic	F31.0	Bipolar disorder, current episode hypomanic
295.22	Catatonic type schizophrenia, chronic	F31.1	Bipolar disorder, current episode manic without psychotic features
295.23	Catatonic type schizophrenia, subchronic with acute exacerbation	F31.10	Bipolar disorder, current episode manic without psychotic features, unspecified
295.24	Catatonic type schizophrenia, chronic with acute exacerbation	F31.11	Bipolar disorder, current episode manic without psychotic features, mild
295.25	Catatonic type schizophrenia, in remission	F31.12	Bipolar disorder, current episode manic without psychotic features, moderate
295.3	Paranoid type schizophrenia	F31.13	Bipolar disorder, current episode manic without psychotic features, severe
295.30	Paranoid type schizophrenia, unspecified	F31.2	Bipolar disorder, current episode manic severe with psychotic features
295.31	Paranoid type schizophrenia, subchronic	F31.3	Bipolar disorder, current episode depressed, mild or moderate severity
295.32	Paranoid type schizophrenia, chronic	F31.30	Bipolar disorder, current episode depressed, mild or moderate severity, unspecified
295.33	Paranoid type schizophrenia, subchronic with acute exacerbation	F31.31	Bipolar disorder, current episode depressed, mild
295.34	Paranoid type schizophrenia, chronic with acute exacerbation	F31.32	Bipolar disorder, current episode depressed, moderate
295.35	Paranoid type schizophrenia, in remission	F31.4	Bipolar disorder, current episode depressed, severe, without psychotic features
295.4	Schizophreniform disorder	F31.5	Bipolar disorder, current episode depressed, severe, with psychotic features
295.40	Schizophreniform disorder, unspecified	F31.6	Bipolar disorder, current episode mixed
295.41	Schizophreniform disorder, subchronic	F31.60	Bipolar disorder, current episode mixed, unspecified
295.42	Schizophreniform disorder, chronic	F31.61	Bipolar disorder, current episode mixed, mild
295.43	Schizophreniform disorder, subchronic with acute exacerbation	F31.62	Bipolar disorder, current episode mixed, moderate
295.44	Schizophreniform disorder, chronic with acute exacerbation	F31.63	Bipolar disorder, current episode mixed, severe, without psychotic features
295.45	Schizophreniform disorder, in remission	F31.64	Bipolar disorder, current episode mixed, severe, with psychotic features
295.5	Latent schizophrenia	F31.7	Bipolar disorder, currently in remission
295.50	Latent schizophrenia, unspecified	F31.70	Bipolar disorder, currently in remission, most recent episode unspecified
295.51	Latent schizophrenia, subchronic	F31.71	Bipolar disorder, in partial remission, most recent episode hypomanic
295.52	Latent schizophrenia, chronic	F31.72	Bipolar disorder, in full remission, most recent episode hypomanic
295.53	Latent schizophrenia, subchronic with acute exacerbation	F31.73	Bipolar disorder, in partial remission, most recent episode manic
295.54	Latent schizophrenia, chronic with acute exacerbation	F31.74	Bipolar disorder, in full remission, most recent episode manic
295.55	Latent schizophrenia, in remission	F31.75	Bipolar disorder, in partial remission, most recent episode depressed
295.6	Schizophrenic disorder, residual type	F31.76	Bipolar disorder, in full remission, most recent episode depressed

295.60	Schizophrenic disorders, residual type, unspecified	F31.77	Bipolar disorder, in partial remission, most recent episode mixed
295.61	Schizophrenic disorders, residual type, subchronic	F31.78	Bipolar disorder, in full remission, most recent episode mixed
295.62	Schizophrenic disorders, residual type, chronic	F31.8	Other bipolar disorders
295.63	Schizophrenic disorders, residual type, subchronic with acute exacerbation	F31.81	Bipolar II disorder
295.64	Schizophrenic disorders, residual type, chronic with acute exacerbation	F31.89	Other bipolar disorder
295.65	Schizophrenic disorders, residual type, in remission	F31.9	Bipolar disorder, unspecified
295.8	Other specified types of schizophrenia	F30.10	Manic episode without psychotic symptoms, unspecified
295.80	Other specified types of schizophrenia, unspecified	F30.11	Manic episode without psychotic symptoms, mild
295.81	Other specified types of schizophrenia, subchronic	F30.12	Manic episode without psychotic symptoms, moderate
295.82	Other specified types of schizophrenia, chronic	F30.13	Manic episode, severe, without psychotic symptoms
295.83	Other specified types of schizophrenia, subchronic with acute exacerbation	F30.2	Manic episode, severe with psychotic symptoms
295.84	Other specified types of schizophrenia, chronic with acute exacerbation	F30.3	Manic episode in partial remission
295.85	Other specified types of schizophrenia, in remission	F30.4	Manic episode in full remission
295.9	Unspecified schizophrenia	F30.8	Other manic episodes
295.90	Unspecified schizophrenia, unspecified	F32.89	Other specified depressive episodes
295.91	Unspecified schizophrenia, subchronic	F39	Unspecified mood [affective] disorder
295.92	Unspecified schizophrenia, chronic	F34.81	Disruptive mood dysregulation disorder
295.93	Unspecified schizophrenia, subchronic with acute exacerbation	F34.89	Other specified persistent mood disorders
295.94	Unspecified schizophrenia, chronic with acute exacerbation	F32.9	Major depressive disorder, single episode, unspecified
295.95	Unspecified schizophrenia, in remission	F32.0	Major depressive disorder, single episode, mild
V11.0	Schizoaffective disorder	F32.1	Major depressive disorder, single episode, moderate
295.7	Schizoaffective disorder	F32.2	Major depressive disorder, single episode, severe without psychotic features
295.70	Schizoaffective disorder, unspecified	F32.3	Major depressive disorder, single episode, severe with psychotic features
295.71	Schizoaffective disorder, subchronic	F32.4	Major depressive disorder, single episode, in partial remission
295.72	Schizoaffective disorder, chronic	F32.5	Major depressive disorder, single episode, in full remission
295.73	Schizoaffective disorder, subchronic with acute exacerbation	F33.0	Major depressive disorder, recurrent, mild
295.74	Schizoaffective disorder, chronic with acute exacerbation	F33.1	Major depressive disorder, recurrent, moderate
295.75	Schizoaffective disorder, in remission	F33.2	Major depressive disorder, recurrent severe without psychotic features
296.0	Bipolar I disorder, single manic episode	F33.3	Major depressive disorder, recurrent, severe with psychotic symptoms

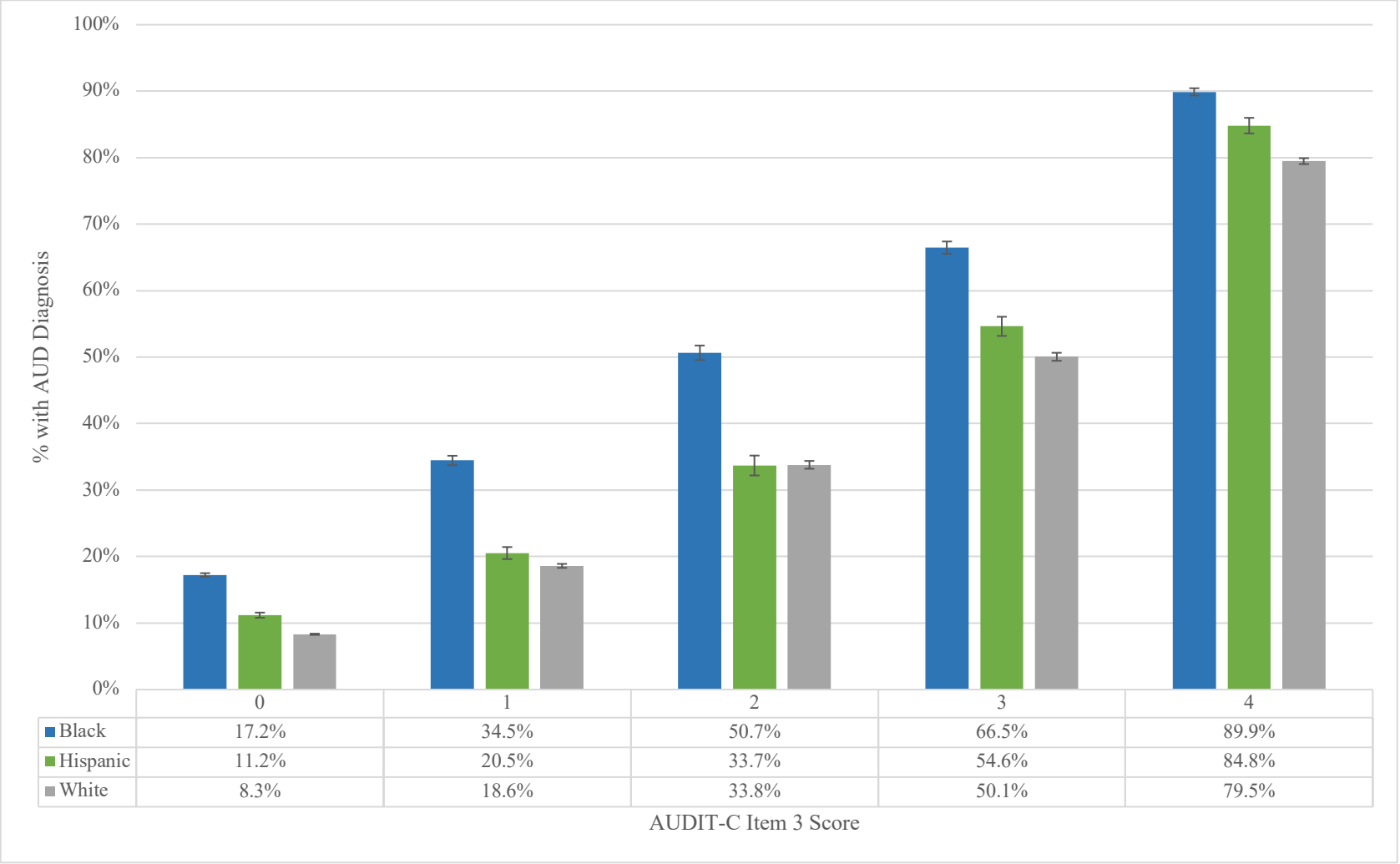
296.00	Bipolar I disorder, single manic episode, unspecified	F33.4	Major depressive disorder, recurrent, in remission
296.01	Bipolar I disorder, single manic episode, mild	F33.40	Major depressive disorder, recurrent, in remission, unspecified
296.02	Bipolar I disorder, single manic episode, moderate	F33.41	Major depressive disorder, recurrent, in partial remission
296.03	Bipolar I disorder, single manic episode, severe, without mention of psychotic behavior	F33.42	Major depressive disorder, recurrent, in full remission
296.04	Bipolar I disorder, single manic episode, severe, specified as with psychotic behavior	F33.9	Major depressive disorder, recurrent, unspecified
296.05	Bipolar I disorder, single manic episode, in partial or unspecified remission	F41	Other anxiety disorders
296.06	Bipolar I disorder, single manic episode, in full remission	F41.0	Panic disorder [episodic paroxysmal anxiety]
296.1	Manic disorder recurrent episode	F41.1	Generalized anxiety disorder
296.10	Manic affective disorder, recurrent episode, unspecified	F41.3	Other mixed anxiety disorders
296.11	Manic affective disorder, recurrent episode, mild	F41.8	Other specified anxiety disorders
296.12	Manic affective disorder, recurrent episode, moderate	F41.9	Anxiety disorder, unspecified
296.13	Manic affective disorder, recurrent episode, severe, without mention of psychotic behavior	F43.1	Post-traumatic stress disorder (PTSD)
296.14	Manic affective disorder, recurrent episode, severe, specified as with psychotic behavior	F43.10	Post-traumatic stress disorder, unspecified
296.15	Manic affective disorder, recurrent episode, in partial or unspecified remission	F43.11	Post-traumatic stress disorder, acute
296.16	Manic affective disorder, recurrent episode, in full remission	F43.12	Post-traumatic stress disorder, chronic
296.4	Bipolar I disorder, most recent episode (or current) manic		
296.40	Bipolar I disorder, most recent episode (or current) manic, unspecified		
296.41	Bipolar I disorder, most recent episode (or current) manic, mild		
296.42	Bipolar I disorder, most recent episode (or current) manic, moderate		
296.43	Bipolar I disorder, most recent episode (or current) manic, severe, without mention of psychotic behavior		
296.44	Bipolar I disorder, most recent episode (or current) manic, severe, specified as with psychotic behavior		
296.45	Bipolar I disorder, most recent episode (or current) manic, in partial or unspecified remission		
296.46	Bipolar I disorder, most recent episode (or current) manic, in full remission		
296.5	Bipolar I disorder, most recent episode (or current) depressed		
296.50	Bipolar I disorder, most recent episode (or current) depressed, unspecified		
296.51	Bipolar I disorder, most recent episode (or current) depressed, mild		
296.52	Bipolar I disorder, most recent episode (or current) depressed, moderate		
296.53	Bipolar I disorder, most recent episode (or current) depressed, severe, without mention of psychotic behavior		
296.54	Bipolar I disorder, most recent episode (or current) depressed, severe, specified as with psychotic behavior		

296.55	Bipolar I disorder, most recent episode (or current) depressed, in partial or unspecified remission	[redacted]
296.56	Bipolar I disorder, most recent episode (or current) depressed, in full remission	
296.6	Bipolar I disorder, most recent episode (or current) mixed	
296.60	Bipolar I disorder, most recent episode (or current) mixed, unspecified	
296.61	Bipolar I disorder, most recent episode (or current) mixed, mild	
296.62	Bipolar I disorder, most recent episode (or current) mixed, moderate	
296.63	Bipolar I disorder, most recent episode (or current) mixed, severe, without mention of psychotic behavior	
296.64	Bipolar I disorder, most recent episode (or current) mixed, severe, specified as with psychotic behavior	
296.65	Bipolar I disorder, most recent episode (or current) mixed, in partial or unspecified remission	
296.66	Bipolar I disorder, most recent episode (or current) mixed, in full remission	
296.7	Bipolar I disorder, most recent episode (or current) unspecified	
296.8	Other and unspecified bipolar disorders	
296.80	Bipolar disorder, unspecified	
296.81	Atypical manic disorder	
296.82	Atypical depressive disorder	
296.89	Other bipolar disorders	
296.9	Other and unspecified episodic mood disorder	
296.90	Unspecified episodic mood disorder	
296.99	Other specified episodic mood disorder	
V11.1	Personal history of affective disorders	
296.20	Major depressive affective disorder, single episode, unspecified	
296.21	Major depressive affective disorder, single episode, mild	
296.22	Major depressive affective disorder, single episode, moderate	
296.23	Major depressive affective disorder, single episode, severe, without mention of psychotic behavior	
296.24	Major depressive affective disorder, single episode, severe, specified as with psychotic behavior	
296.25	Major depressive affective disorder, single episode, in partial or unspecified remission	
296.26	Major depressive affective disorder, single episode, in full remission	
296.3	Major depressive disorder recurrent episode	
296.30	Major depressive affective disorder, recurrent episode, unspecified	

296.31	Major depressive affective disorder, recurrent episode, mild	[redacted]
296.32	Major depressive affective disorder, recurrent episode, moderate	
296.33	Major depressive affective disorder, recurrent episode, severe, without mention of psychotic behavior	
296.34	Major depressive affective disorder, recurrent episode, severe, specified as with psychotic behavior	
296.35	Major depressive affective disorder, recurrent episode, in partial or unspecified remission	
296.36	Major depressive affective disorder, recurrent episode, in full remission	
300.00	Anxiety state, unspecified	
300.01	Panic disorder without agoraphobia	
300.02	Generalized anxiety disorder	
300.09	Other anxiety states	
799.2	Nervousness	
309.81	Posttraumatic stress disorder	

Note: If the codes were given in the outpatient setting, two codes were required for a diagnosis. If the codes were given in the inpatient setting, only one code was required for a diagnosis.

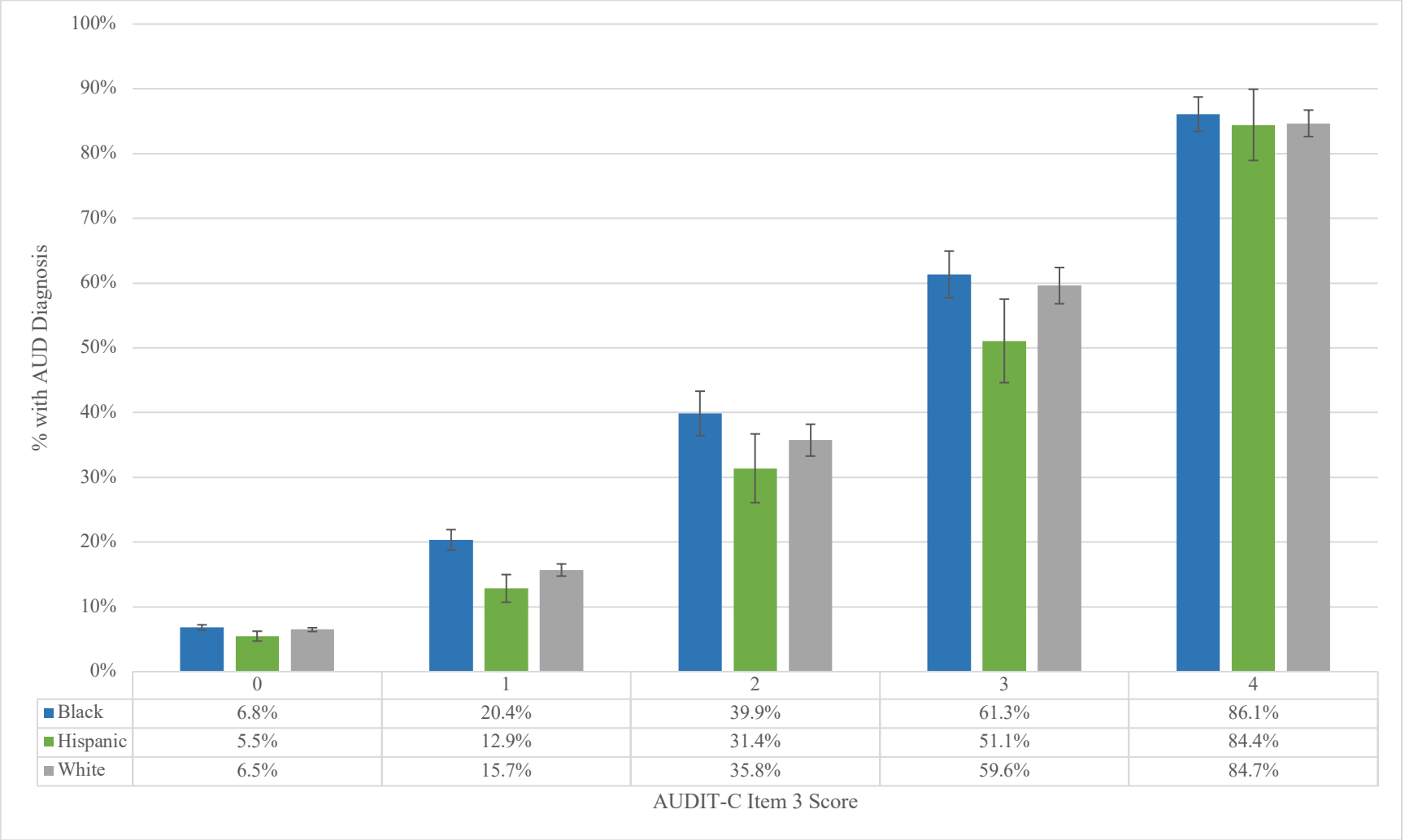
Figure S3a. Percentage of men with an AUD diagnosis by maximum binge drinking frequency, stratified by race/ethnicity (n=638,165).



	0	1	2	3	4
Black	17.2%	34.5%	50.7%	66.5%	89.9%
Hispanic	11.2%	20.5%	33.7%	54.6%	84.8%
White	8.3%	18.6%	33.8%	50.1%	79.5%

AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption.
Note: Binge drinking frequency is measured by the 3rd item of the AUDIT-C where 0=never, 1=less than monthly, 2=monthly, 3=weekly, and 4=daily or almost daily.

Figure S3b. Percentage of women with an AUD diagnosis by maximum binge drinking frequency, stratified by race/ethnicity (n=61,805).



	0	1	2	3	4
Black	6.8%	20.4%	39.9%	61.3%	86.1%
Hispanic	5.5%	12.9%	31.4%	51.1%	84.4%
White	6.5%	15.7%	35.8%	59.6%	84.7%

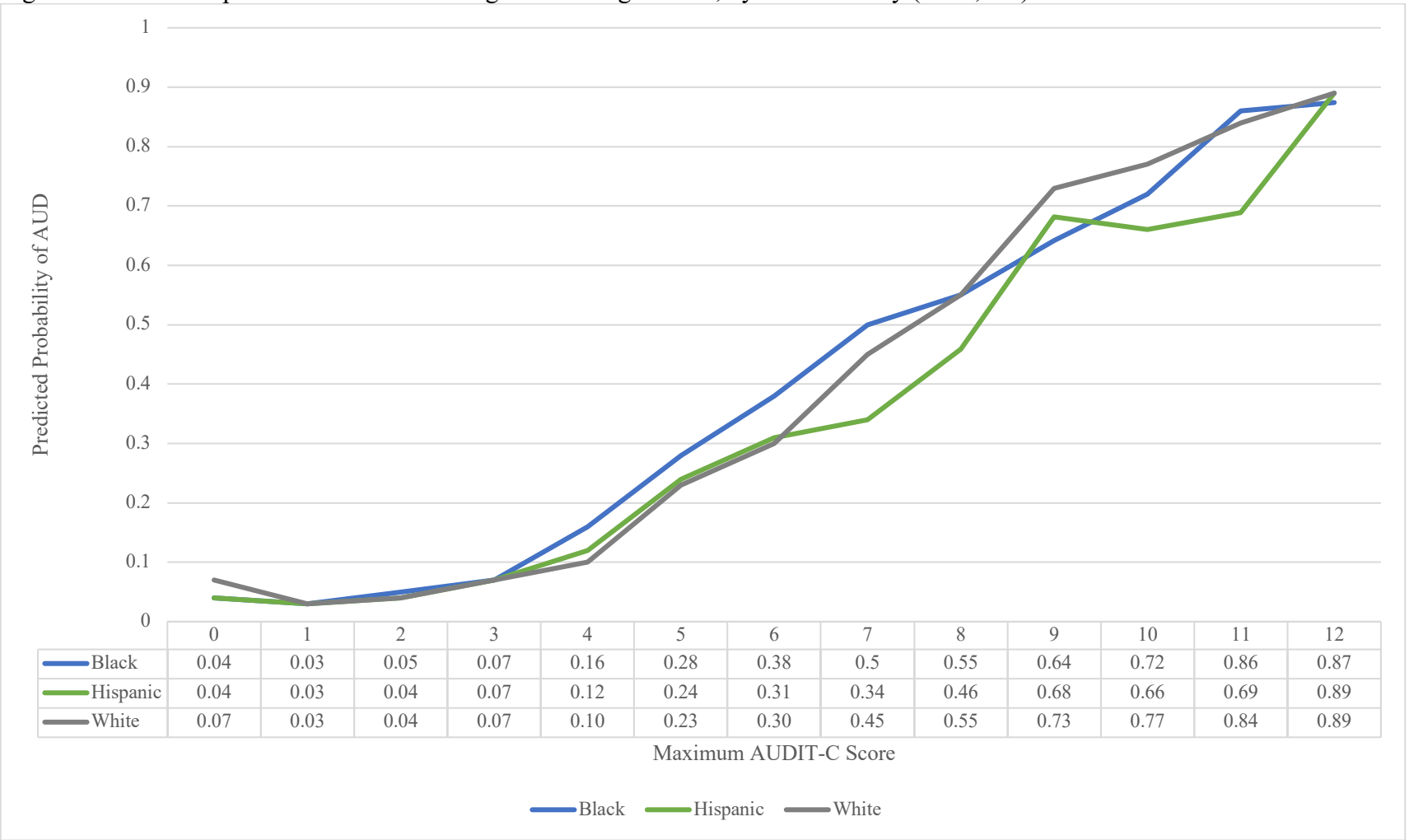
AUD=alcohol use disorder; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption.
Note: Binge drinking frequency is measured by the 3rd item of the AUDIT-C where 0=never, 1=less than monthly, 2=monthly, 3=weekly, and 4=daily or almost daily.

Table S3. Adjusted association between sex and AUD diagnosis, stratified by race and ethnicity.

	Black (n=137,054)*		Hispanic (n=50,413)*		White (n=512,485)*	
Variables	aOR (95% CI)	*P*	aOR (95% CI)	*P*	aOR (95% CI)	*P*
Highest AUDIT-C score	1.47 (1.46, 1.48)	<0.001	1.46 (1.45, 1.48)	<0.001	1.48 (1.47, 1.48)	<0.001
Women (ref=men)	0.57 (0.54, 0.61)	<0.001	0.70 (0.62, 0.78)	<0.001	0.68 (0.65, 0.71)	<0.001
Age (10-yr increments)	1.13 (1.12, 1.15)	<0.001	1.12 (1.10, 1.14)	<0.001	1.03 (1.02, 1.04)	<0.001
Alcohol-Related Characteristics						
Cirrhosis‡	14.20 (11.64, 17.31)	<0.001	22.73 (18.01, 28.69)	<0.001	18.31 (16.78, 19.98)	<0.001
Neuropathy‡	16.37 (8.93, 30.01)	<0.001	8.27 (2.01, 34.04)	0.003	15.69 (12.35, 19.93)	<0.001
Cardiomyopathy‡	20.13 (13.01, 31.16)	<0.001	26.41 (9.88, 70.64)	<0.001	15.77 (12.15, 20.48)	<0.001
Gastritis‡	35.87 (14.93, 86.13)	<0.001	10.38 (2.59, 41.72)	0.001	36.98 (21.49, 63.70)	<0.001
Fatty liver disease‡	3.93 (2.95, 5.23)	<0.001	3.79 (2.67, 5.39)	<0.001	5.01 (4.38, 5.74)	<0.001
Hepatitis‡	14.07 (8.99, 22.02)	<0.001	20.95 (9.61, 45.68)	<0.001	16.55 (12.42, 22.05)	<0.001
Liver damage‡	8.94 (5.80, 13.79)	<0.001	5.20 (2.90, 9.31)	<0.001	9.95 (7.74, 12.79)	<0.001
Other Clinical ICD-9/10 Diagnoses						
Drug abuse/dependence	16.73 (16.13, 17.35)	<0.001	12.80 (11.93, 13.72)	<0.001	11.19 (10.91, 11.48)	<0.001
Mental disorder	2.68 (2.58, 2.78)	<0.001	3.19 (2.98, 3.42)	<0.001	3.47 (3.39, 3.54)	<0.001
C-statistic	0.92		0.90		0.89	

aOR=adjusted odds ratio; 95% CI =95% confidence interval; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; AUD=alcohol use disorder. *Number of observations with missing age: Black men (n=5); Black women (n=1); Hispanic men (n=8); Hispanic women (n=1); White men (n=42); White women (n=3). ‡Alcohol-specific diagnosis.

Figure S4. Predicted probabilities of AUD diagnosis among women, by race/ethnicity (n=61,803).



	0	1	2	3	4	5	6	7	8	9	10	11	12
Black	0.04	0.03	0.05	0.07	0.16	0.28	0.38	0.5	0.55	0.64	0.72	0.86	0.87
Hispanic	0.04	0.03	0.04	0.07	0.12	0.24	0.31	0.34	0.46	0.68	0.66	0.69	0.89
White	0.07	0.03	0.04	0.07	0.10	0.23	0.30	0.45	0.55	0.73	0.77	0.84	0.89

AUD=alcohol use disorder; AUDIT-C= Alcohol Use Disorders Identification Test – Consumption.
Note: These estimates come from the multivariable logistic regression model of factors associated with AUD diagnosis (Table 2). Age was set at 51 years (mean age for women), mental disorder=1, all other covariates=0. The connecting lines are for visualization purposes only since the interaction was accounted for by a composite variable of race/ethnicity and maximum AUDIT-C score, and should not be interpreted as continuous.

Table S4. Sensitivity analysis of factors associated with AUD diagnosis using age-adjusted mean AUDIT-C score as the measure of alcohol consumption, overall and stratified by sex.

	Overall (n=699,952)*		Men (n=638,149)*		Women (n=61,803)*	
Variables	aOR (95% CI)	*P*	aOR (95% CI)	*P*	aOR (95% CI)	*P*
Race/ethnicity x age-adjusted mean AUDIT-C score†						
Black (ref=White)	2.13 (2.03, 2.24)	<0.001	2.13 (2.03, 2.25)	<0.001	1.66 (1.44, 1.90)	<0.001
Hispanic (ref=White)	1.22 (1.14, 1.32)	<0.001	1.21 (1.12, 1.30)	<0.001	1.28 (1.03, 1.60)	0.028
Women (ref=men)	0.59 (0.57, 0.61)	<0.001	-	-	-	-
Age (10-yr increments)	1.01 (1.01, 1.02)	<0.001	1.01 (1.00, 1.02)	0.002	1.04 (1.01, 1.06)	0.004
Alcohol-Related Characteristics						
Cirrhosis‡	21.13 (19.67, 22.71)	<0.001	20.81 (18.36, 22.38)	<0.001	27.50 (16.70, 45.28)	<0.001
Neuropathy‡	21.17 (17.16, 26.12)	<0.001	20.15 (16.32, 24.88)	<0.001	314.45 (35.15, >999.99)	<0.001
Cardiomyopathy‡	21.83 (17.70, 26.93)	<0.001	21.49 (17.41, 26.53)	<0.001	41.43 (6.14, 279.36)	<0.001
Gastritis‡	45.49 (29.94, 69.13)	<0.001	46.82 (30.38, 72.15)	<0.001	22.61 (4.50, 113.63)	<0.001
Fatty liver disease‡	5.63 (5.03, 6.29)	<0.001	5.65 (5.05, 6.33)	<0.001	5.33 (2.97, 9.56)	<0.001
Hepatitis‡	21.61 (17.31, 26.98)	<0.001	22.65 (18.02, 28.45)	<0.001	6.68 (2.65, 16.82)	<0.001
Liver damage‡	10.54 (8.60, 12.90)	<0.001	10.12 (8.24, 12.44)	<0.001	28.51 (9.43, 86.21)	<0.001
Other Clinical ICD-9/10 Diagnoses						
Drug abuse/dependence	14.72 (14.45, 15.00)	<0.001	14.55 (14.26, 14.84)	<0.001	15.75 (14.75, 16.82)	<0.001
Mental disorder	3.98 (3.91, 4.05)	<0.001	3.89 (3.82, 3.97)	<0.001	6.97 (6.23, 7.81)	<0.001
C-statistic	0.88		0.88		0.88	

aOR=adjusted odds ratio; 95% CI =95% confidence interval; AUDIT-C=Alcohol Use Disorders Identification Test – Consumption; AUD=alcohol use disorder. *Number of observations with missing age: Black men (n=5); Hispanic men (n=8); White men (n=42); Black women (n=1); Hispanic women (n=1); White women(n=3). †Odds ratios displayed at age-adjusted mean AUDIT-C scores equal to those in the primary analysis (mean=3, 3, 2 for overall, men, and women, respectively). ‡Alcohol-specific diagnosis.