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## Race, ethnicity, and clinical features of alcohol use disorder among U.S. military veterans: Results from the National Health and Resilience in Veterans Study

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### Abstract

**Background and Objectives:** Alcohol use disorder (AUD) is highly prevalent in U.S. military veterans, though little is known about whether the psychiatric comorbidities and functional outcomes (i.e., clinical features) of AUD differ across race/ethnic groups. We aimed to identify differences in the clinical features of veterans with AUD by race/ethnicity.

**Methods:** In a sample of veterans with AUD (n=1212) from the nationally representative National Health and Resilience in Veterans Study, we compared the clinical features associated with AUD across racial/ethnic groups using analysis of covariance and logistic regression.

**Results:** Black veterans (n=60, 34.0%) were less likely to screen positive for lifetime AUD compared to White (n=1,099, 42.7%) and Hispanic (n=53, 41.5%) veterans. Among those with lifetime AUD, Hispanic veterans were more likely than White veterans to have lifetime and current mood or anxiety disorders (Adjusted Odds Ratio range (AORR)=2.21–2.52, *p*-values < .05). Black veterans were more likely than White veterans to have current mood and anxiety

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disorders (AORR=2.01–3.07,  $p$ -values < .05). Hispanic veterans reported poorer functioning and quality of life than White and Black veterans (Cohen's  $d$  range=0.12–0.37,  $p$ -values < .05).

**Discussion and Conclusions:** Black and Hispanic veterans with lifetime AUD may experience a higher disease burden relative to White veterans. Results underscore the importance of race/ethnicity-sensitive assessment, monitoring, and treatment of AUD for veterans.

**Scientific Significance:** This is the first known study to examine differences by race/ethnicity in the clinical features of Veterans with AUD in a nationally representative sample. Findings suggest higher disease burden for racial/ethnic minority veterans.

### Keywords

Alcohol use disorder; health disparities; comorbidity; dual diagnosis; epidemiology; military; mood disorder; veterans

## Introduction

Alcohol use disorder (AUD) and problematic drinking are associated with high rates of morbidity, loss of functioning, and mortality.<sup>1–4</sup> Recent epidemiologic data suggest increases in AUD between 2001–2002 and 2012–2013 are most notable among women, racial/ethnic minority groups, those who are socioeconomically disadvantaged, and those living in rural areas.<sup>5</sup> While AUD is more prevalent among White men, Black and Hispanic men report greater symptoms of dependence.<sup>6</sup> Additionally, available data indicates that patterns of comorbidity may differ between racial/ethnic groups, but significant conflicting evidence exists. For example, some evidence suggests differences between racial/ethnic groups in rates of comorbid depression and anxiety<sup>7–11</sup>, while other studies fail to find significant differences.<sup>8,12</sup> Finally, Cheref, Benoit, and Walker<sup>13</sup> found that AUDs were associated with suicide attempts in Black and White respondents, but not for other racial/ethnic groups, including Hispanic individuals. Data from the same study did not reveal racial/ethnic differences in suicidal ideation.<sup>13</sup> Overall, available data are limited and current evidence is largely conflicting.

In addition to potential differences in psychiatric comorbidity, most data suggest disparities with respect to functional outcomes, including social and medical outcomes. Some data suggest that Black and Hispanic individuals experience more functional impairment and social consequences from AUD as compared with White individuals. However, at higher levels of drinking, the differences between racial and ethnic groups become nonsignificant, indicating that the effect was driven in-part by higher levels of consumption by Black and Hispanic individuals.<sup>6</sup> National data also support an increased risk for liver disease among individuals who are Black and Hispanic.<sup>14</sup> Finally, alcohol use, psychiatric factors, and subjective health appear to interact and potentially exert different effects over time. Using data from the Fragile Families and Child Well-being Study, Assari<sup>15</sup> found that anxiety and problematic alcohol use universally predicted poorer baseline and future subjective health in White, Black, and Hispanic individuals. In contrast, the combined effect of anxiety and depression on baseline and future subjective health varied by racial group. These data support potential differences in functioning among individuals with AUD or problem

drinking across racial groups, including that their additive or multiplicative effects may be different across subgroups and over time.

In examining factors underlying racial/ethnic health disparities, a key variable appears to be exposure to traumatic and/or stressful events.<sup>16–18</sup> Black and American-born Hispanic individuals face significantly more stressful events, which is associated with poorer physical and mental health.<sup>18</sup> This finding has been extended to epidemiologic findings of the association of stressful events and drug use disorders<sup>19</sup> including among combat-exposed veterans,<sup>20</sup> though important research also shows greater resiliency in the face of trauma among these groups.<sup>21</sup>

While racial and ethnic minorities represent a potential priority population, veterans also represent an important group of interest<sup>22</sup>. The prevalence of lifetime AUD is higher among veterans (around 40%<sup>23</sup>) than in the general population (30%<sup>24</sup>). There are limited data describing comorbidities of AUD in veteran samples. When considering intersectional identities (i.e., veteran status and racial/ethnic minority), data suggest the existence of racial disparities among veterans with regard to specific medical and psychiatric conditions.<sup>25</sup> Furthermore, the large portion of health disparity research among veteran populations has focused on comparing White and Black veterans, with less emphasis on other groups, including Hispanic veterans.<sup>26</sup> Further research exploring disparities in AUD by race and ethnicity is imperative to improving race/ethnicity-sensitive assessment, monitoring, and treatment of AUD in U.S. military veterans.

In order to extend data on racial/ethnic health disparities associated with AUD, we aimed to conduct an exploratory study comparing comorbidity patterns and functional status among veterans with AUD by race/ethnicity. We compared the rates of lifetime and current psychiatric comorbidities, functioning, and quality of life among veterans with AUD who identify as Black, Hispanic, or White. We also investigate if these effects are best explained by exposure to more traumatic events, by controlling for these effects in the final models. We hypothesized that after controlling for demographic and military characteristics, Black and Hispanic veterans would have higher rates of major depressive disorder (MDD), lower rates of post-traumatic stress disorder (PTSD) and generalized anxiety disorder, and poorer functional outcomes, relative to White veterans. We hypothesized that suicide attempts would be more frequently reported by White and Black veterans than among Hispanic veterans with lifetime AUD, and we hypothesized differences in the odds of suicidal ideation across racial/ethnic groups. We did not propose *a priori* hypotheses for the remaining comorbid conditions (i.e., social anxiety disorder, drug use disorder), given the minimal existing literature. Finally, we hypothesized the strength of these associations would be reduced after controlling for traumatic events as confounding variable.

## Methods

### Sample

The current study used a sub-sample of the National Health and Resilience in Veterans Study (NHRVS; N=1212) who screened positive for a lifetime history of AUD on the Mini International Neuropsychiatric Interview (MINI). The subsample included veterans who

identified as White, Black, or Hispanic. Data summarizing sample recruitment, and the sociodemographic profile of veterans with AUD have been published elsewhere<sup>27</sup>. The NHRVS is a nationally representative sample of 3,157 US veterans aged 21 years and older. Participants received \$30 for completion of the survey. All participants provided informed consent, and the study was approved by the human subjects committee of the VA Connecticut Healthcare System.

## Measures

**Lifetime AUD**—The MINI<sup>28</sup> is a semi-structured interview and was modified for self-report administration to establish lifetime alcohol abuse or dependence. Any White, Black, or Hispanic veterans who met criteria for either alcohol abuse or dependence were included in the current analyses. The self-report version of the MINI for alcohol dependence has shown moderate-to-strong agreement with the Structured Clinical Interview for the Diagnostic and Statistical Manual ( $\kappa = .60$ )<sup>29</sup>, though the lifetime diagnosis using DSM-5 criteria has yet to be tested.

**Race/Ethnicity**—Race/ethnicity (non-Hispanic White, Black, Hispanic) were assessed via self-report.

### Outcome Variables

**AUD Severity and Lifetime Psychiatric Comorbid Conditions.** The self-report version of the MINI was also used to indicate AUD based on DSM-IV criteria. The percent of each racial/ethnic group that met criteria for alcohol dependence was utilized as an indicator of severity. Additionally, the MINI assessed MDD, social anxiety disorder, and drug use disorder.

**Current Psychiatric Comorbidities.** The Patient Health Questionnaire-4 (PHQ-4)<sup>30</sup> is a brief, self-report measure that assesses symptoms of MDD and generalized anxiety disorder in the past 2 weeks ( $\alpha = 0.90$  and  $\alpha = 0.89$  respectively). A score  $\geq 3$  on questions assessing MDD or generalized anxiety disorder is indicative of a positive screen for these disorders. Two additional items from the PHQ-9, were used to assess for suicidal ideation.<sup>31</sup> Suicidal ideation was defined as a positive endorsement of either passive or active suicidal ideation occurring at least several days. The Posttraumatic Stress Disorder Checklist (PCL)<sup>32</sup> was used to assess for current PTSD. The PCL is a 17-item screening instrument based on DSM-IV TR criteria for PTSD.<sup>33</sup> The Specific Stressor Version of the PCL, which asks about symptoms related to the worst stressful experience as assessed by the Trauma History Screen, was used to assess both lifetime and past-month timeframes ( $\alpha = 0.95$  and  $\alpha = 0.95$  respectively). Scores on the PCL range from 17 to 85. A cut-off score of  $\geq 50$  is indicative of a probable diagnosis of PTSD. A review of over 70 studies supports strong psychometric properties for the PCL, including among veteran populations, with good internal consistency, test-retest reliability, and convergent validity.<sup>34</sup> The Alcohol Use Disorders Identification Test- Consumption AUDIT-C;<sup>35</sup> is a brief AUD screening test that was used to assess past-year probable AUD on the basis of frequency of alcohol consumption. Scores on the AUDIT-C range from 0 to 12, and a cut-off score of  $\geq 5$  was used to identify probable

AUD.<sup>36,37</sup> Data demonstrate that the sensitivity and specificity of the AUDIT-C does not vary across White, Black, and Hispanic racial/ethnic groups.<sup>38</sup>

**Functioning and Quality of Life.:** The Medical Outcomes Study Short Form Health Survey – 8 Item Version (SF-8)<sup>39</sup> is an eight-item short form of the SF-36 that assesses physical and mental health functioning.<sup>40</sup> Items are weighted and summed to create T-scores (i.e.,  $M = 50$ ,  $SD = 10$ ) for physical and mental health functioning, based on norms from the US general adult population. The Medical Outcomes Study Cognitive Functioning Scale was also administered to assess day-to-day problems in six aspects of cognitive functioning, including reasoning, concentration and thinking, confusion, memory, attention and psychomotor speed.<sup>40</sup> The Quality of Life Enjoyment and Satisfaction – Short Form<sup>41</sup> is a 14-item measure that asks respondents about their satisfaction in the past week and with various aspects of their lives, such as their work and family lives. Respondents are asked to rate their satisfaction in these areas from 1 (“very poor”) to 5 (“very good”) and scores are summed for a total score that reflects overall quality of life ( $\alpha = 0.95$ ).

### Covariates

**Trauma Exposure.:** The Trauma History Screen (THS)<sup>42</sup> was used to assess for number of traumatic events. The THS is a self-report measure that assesses the occurrence of 24 traumatic life events. Traumas across the lifespan were assessed, including early life traumas such as physical or sexual assault during childhood, as well as traumas that more commonly occur in adulthood, such as motor vehicle accident, military combat, and unexpected loss of a loved one. An additional potentially traumatic event—life-threatening illness or injury—was added to the THS in the NHRVS. The THS was developed in racially and ethnically diverse samples (e.g., ~ 40% of study samples identifying as non-White). Test-retest reliability and convergent validity are strong for the THS.<sup>42</sup>

**Other Sociodemographic Variables.:** Sex (male, female), education (up to high school diploma, more than high school), employment (unemployed, employed), income (less than \$60,000, \$60,000 or more), marital status (unmarried, married/living with partner), military branch (army, other non-army branch), and combat status (non-combat, combat), number of years of military service (continuous), and age (continuous) were assessed.

### Statistical Analyses

With the exception of characterizing the overall prevalence rates of lifetime AUD by racial and ethnic groups, all subsequent analyses were restricted to the subsample of veterans who met criteria for lifetime AUD ( $n = 1,212$ ). Data analysis was completed using IBM SPSS Version 26. Data analyses proceeded in three steps.

First, differences in sex/gender (male, female), education (up to high school diploma, more than high school), employment (unemployed, employed), income (less than \$60,000, \$60,000 or more), marital status (unmarried, married/living with partner), military branch (army, other non-army branch), and combat status (non-combat, combat), number of years of military service (continuous), and age (continuous) by racial and ethnic groups were

compared using chi-square goodness-of-fit tests and analyses of variance as appropriate, based on data distributions.

Second, a series of 10 logistic regressions were conducted, using white, non-Hispanic race/ethnicity as the reference group; race/ethnicity as the independent variable; sex/gender, income, marital status, military branch, combat status, AUD dependence, number of lifetime traumas, and age as covariates; and lifetime and current psychiatric comorbidities as the dependent variables in each model. Results are reported using adjusted odds ratios and 95% confidence intervals (CIs).

Third, racial/ethnic differences in measures of functioning and quality of life were compared using analyses of covariance (ANCOVAs), where race/ethnicity was the independent variable; sex/gender, income, marital status, military branch, combat status, number of lifetime traumas, and age were covariates; and physical health functioning, mental health functioning, cognitive functioning, and quality of life were the dependent variables in each model. Effect sizes for pairwise comparisons were calculated using estimated marginal means and Cohen's  $d$ .<sup>43</sup> Due to the exploratory nature of the current study, alpha was set to 0.05 for all analyses.

## Results

Black veterans (34.0%,  $n = 60$ ) were significantly less likely to screen positive for AUD relative to White (42.7%,  $n = 1099$ ) and Hispanic (41.5%,  $n = 53$ ) veterans ( $\Phi = .05$ ,  $p = .02$ ). Table 1 compares demographic and military characteristics of veterans with lifetime AUD by racial and ethnic group. Black veterans were less likely to be male, have higher household income, be married, and be a member of a military branch other than Army, and they were younger relative to White veterans (all  $p < .05$ ). Hispanic veterans were more likely to have higher household incomes and to be combat veterans relative to White and Black veterans, and they were younger than White veterans (all  $p < .05$ ).

Hispanic veterans reported a greater number of lifetime traumas ( $M = 5.15$ ,  $SE = .30$ ) relative to White veterans ( $M = 4.00$ ,  $SE = .10$ ). There were no significant differences in the number of lifetime traumas reported by Black veterans ( $M = 4.62$ ,  $SE = .30$ ) as compared with White or Hispanic veterans. Due to known associations between trauma and AUD, number of lifetime traumas was entered into the model as a covariate in addition to controlling for sociodemographic differences.

The results of analyses testing associations between race/ethnicity and psychiatric comorbidity, controlling for relevant covariates, are presented in Table 2. Black veterans were more likely than White veterans to screen positive for current MDD, current PTSD, and current generalized anxiety disorder. Hispanic veterans were more likely than White veterans to screen positive for current MDD and PTSD. Hispanic veterans were less likely than White veterans to report a lifetime history of a suicide attempt and to screen positive for a lifetime drug use disorder. Hispanic veterans were significantly more likely than Black veterans to screen positive for lifetime MDD, and they were significantly less likely than

Black veterans to screen positive for a lifetime drug use disorder or report a lifetime history of a suicide attempt.

As shown in Table 3, Hispanic veterans reported poorer physical and cognitive functioning and quality of life as compared with both White and Black veterans. Hispanic veterans also reported poorer mental health than White veterans. Based on effect sizes, the differences between White and Hispanic veterans were generally small, while the differences between Black and Hispanic veterans were generally moderate.

## Discussion

The current study compared the prevalence of psychiatric comorbidity and functional outcomes associated with lifetime AUD among White, Black, and Hispanic U.S. military veterans. Black and Hispanic veterans with AUD demonstrated greater psychiatric comorbidity relative to White veterans. The results also demonstrated that Hispanic veterans with lifetime AUD reported significantly worse physical health, cognitive functioning, and quality of life. The results suggest that racial/ethnic minority veterans with lifetime AUD may have higher rates of psychopathology and poorer functional outcomes, thereby underscoring the need for race/ethnicity-sensitive approaches to the assessment, monitoring, and treatment of AUD in veterans.

Important sociodemographic differences emerged, which were controlled for in subsequent analyses. One unique characteristic of the current sample included that Hispanic veterans reported higher income as compared with White and Black veterans. While analyses controlled for income, it is plausible that the disparities might be even larger in situations in which income inequality is greater, as the effects of social disadvantage are far reaching and not fully captured by using a single observed variable such as income.<sup>44</sup>

Black and Hispanic Veterans with lifetime AUD were more likely to screen positive for current MDD. These data suggest the importance of assessing for depression among these groups, and while these data used standardized self-report measures, clinicians should consider potential variations in clinically depressed racial/ethnic minorities. Some specific symptoms (e.g., somatic) may be more prominent among racial and ethnic groups,<sup>45,46</sup> though conclusive evidence is lacking. Regarding a history of suicide attempts among veterans with AUD, White and Black individuals were more likely to report a suicide attempt as compared with Hispanic veterans. This broadly aligns with finding by Cheref et al.,<sup>13</sup> which found that alcohol abuse and dependence was significantly associated with lifetime suicide attempts in White and Black respondents, but not in Hispanic individuals. To our knowledge, these are the first epidemiologic data among veterans to suggest that Hispanic individuals with lifetime AUD were less likely to report a history of a suicide attempt relative to White and Black veterans. While these data need to be replicated due to very small unweighted sample sizes of racial/ethnic minority veterans with a history of suicide attempts, it may reflect cultural norms endorsed by Hispanic individuals, including the importance of survival and coping beliefs, responsibility to family, and moral objections to suicide.<sup>47</sup>

There were several findings that were inconsistent with study hypotheses, which overall may reflect the limited available literature. Relative to White veterans with lifetime AUD, Black veterans with lifetime AUD had greater odds of current generalized anxiety disorder and PTSD, and Hispanic veterans with lifetime AUD had greater odds of current PTSD. Other studies have failed to find a significant association between race, AUD, and anxiety disorders,<sup>8</sup> though PTSD was not included in these analyses. Given that some prior studies have observed increased rates of PTSD among Hispanic veterans and other studies have failed to replicate this association,<sup>48</sup> further research is needed to elucidate racial/ethnic differences in AUD-PTSD comorbidity.

Overall, the data demonstrated few significant differences between Black and Hispanic veterans, except for the aforementioned differential odds of a drug use disorder and suicide attempt history. Additionally, Hispanic veterans with lifetime AUD were more likely to screen positive for lifetime MDD relative to Black veterans. Overall, there were significant differences in comorbidity patterns with Black and Hispanic veterans being at increased risk for a range of psychiatric conditions. The reasons for this disparity are likely complex and multifaceted, though growing evidence suggests a link between racial oppression and poorer mental health outcomes<sup>49,50</sup> among other social determinants of health related to race and ethnicity (e.g., access to healthcare<sup>51</sup>).

These data also demonstrated that Hispanic veterans with lifetime AUD reported poorer physical health, cognitive functioning and quality of life relative to both White and Black veterans. Hispanic veterans also scored lower on a measure of mental health functioning and quality of life than White veterans. While the cross-sectional nature of this study prohibits a definitive explanation, some authors have emphasized the role of acculturative stress in the etiology and maintenance of psychosocial difficulties among Hispanic Americans.<sup>52</sup> Acculturative stress might be particularly salient among military and veteran populations due to the importance of assimilating within military culture.<sup>53</sup> Further research is needed to evaluate the potential role of acculturative stress in mediating the relationship between race/ethnicity and health and functional outcomes in veterans and other populations with AUD.

Study findings should be considered within the context of several limitations. The most significant limitation includes the homogenization of many unique racial and ethnic subgroups into larger encompassing categories. This could be addressed in future work by including a more nuanced and precise categorization related to race, ethnicity, nationality/immigration status and other factors. Moreover, other forms of health disparities and elements of diversity should be explored, including sex/gender, socioeconomic status, and the intersection of these factors. The data are also limited to self-report measures. The screening instruments, which emphasize sensitivity or specificity, may overestimate the rates of clinical disorders; however, this is unlikely to be the cause of observed differences in odds ratios between racial/ethnic groups. A final limitation includes instances of low raw frequencies for certain subgroups (e.g., a history of suicide attempts among Hispanic veterans). While this limitation is somewhat mitigated by the use of weighted sampling techniques, the results should be interpreted cautiously until they are independently replicated in larger samples. Replication is also necessary due the exploratory nature of the current study. Exploratory studies are important in contexts in which there is limited



available literature. However, future studies should consider more specific hypothesis testing along with increased precision mentioned above.

Despite the limitations, the current study is useful for understanding potential health disparities among veterans with AUD. This is a preliminary step towards the ultimate aim of addressing the underlying sociocultural factors (e.g., racism, poverty, and trauma) which are understood as robust social determinants of health. Assessment of these factors represents a crucial future direction.

The current data imply greater burden of psychiatric comorbidities and functional difficulties for racial and ethnic minority veterans with AUD, which highlight salient future directions. For example, initiatives should consider factors beyond patient characteristics that contribute to development of or poor treatment outcomes for SUDs, especially those known to specifically impact racial and ethnic minority individuals, including disproportionate rates of unemployment<sup>54</sup> and homelessness.<sup>55–57</sup> Future research should also aim to: determine if these findings generalize to non-veteran populations; further characterize and understand the disease burden of AUD across an inclusive range of racial and ethnic subgroups; evaluate race-specific risk factors including racially based oppression and characterize the potential role of discrimination in the development and maintenance of SUDs for racial/ethnic minorities; focus on resiliency in addition to disparity by considering and testing culturally specific protective factors; investigate potential mediating factors, including ongoing acculturative stress; and evaluate and test the effectiveness of prevention, assessment, and treatment approaches to addressing health disparities among veterans with AUD.

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## References

1. Kendler KS, Ohlsson H, Sundquist J, Sundquist K. Alcohol Use Disorder and Mortality Across the Lifespan: A Longitudinal Cohort and Co-relative Analysis. *JAMA Psychiatry*. 2016;73(6):575–581. [PubMed: 27097014]
2. Rehm J, Dawson D, Frick U, et al. Burden of disease associated with alcohol use disorders in the United States. *Alcohol Clin Exp Res*. 2014;38(4):1068–1077. [PubMed: 24428196]
3. Rehm J, Gmel GE Sr., Gmel G, et al. The relationship between different dimensions of alcohol use and the burden of disease—an update. *Addiction*. 2017;112(6):968–1001. [PubMed: 28220587]
4. Roerecke M, Rehm J. Cause-specific mortality risk in alcohol use disorder treatment patients: a systematic review and meta-analysis. *Int J Epidemiol*. 2014;43(3):906–919. [PubMed: 24513684]
5. Grant BF, Chou SP, Saha TD, et al. Prevalence of 12-Month Alcohol Use, High-Risk Drinking, and DSM-IV Alcohol Use Disorder in the United States, 2001–2002 to 2012–2013: Results From the National Epidemiologic Survey on Alcohol and Related Conditions. *JAMA Psychiatry*. 2017;74(9):911–923. [PubMed: 28793133]
6. Mulia N, Ye Y, Greenfield TK, Zemore SE. Disparities in alcohol-related problems among white, black, and Hispanic Americans. *Alcoholism, clinical and experimental research*. 2009;33(4):654–662.

7. Bowie JV, Ensminger ME, Robertson JA. Alcohol-use problems in young black adults: effects of religiosity, social resources, and mental health. *J Stud Alcohol*. 2006;67(1):44–53. [PubMed: 16536128]
8. Huang B, Grant BF, Dawson DA, et al. Race-ethnicity and the prevalence and co-occurrence of Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, alcohol and drug use disorders and Axis I and II disorders: United States, 2001 to 2002. *Compr Psychiatry*. 2006;47(4):252–257. [PubMed: 16769298]
9. Jetelina KK, Reingle Gonzalez JM, Vaeth PAC, Mills BA, Caetano R. An Investigation of the Relationship Between Alcohol Use and Major Depressive Disorder Across Hispanic National Groups. *Alcoholism, clinical and experimental research*. 2016;40(3):536–542.
10. Kerridge BT, Chou SP, Pickering RP. Substance Use and Psychiatric Disorders Among Mexican Americans and Non-Hispanic Whites by Immigration Status. *Prim Care Companion CNS Disord*. 2019;21(1):18m02359.
11. Sartor CE, Jackson KM, McCutcheon VV, et al. Progression from First Drink, First Intoxication, and Regular Drinking to Alcohol Use Disorder: A Comparison of African American and European American Youth. *Alcohol Clin Exp Res*. 2016;40(7):1515–1523. [PubMed: 27256613]
12. Kilpatrick DG, Ruggiero KJ, Acierno R, Saunders BE, Resnick HS, Best CL. Violence and risk of PTSD, major depression, substance abuse/dependence, and comorbidity: results from the National Survey of Adolescents. *J Consult Clin Psychol*. 2003;71(4):692–700. [PubMed: 12924674]
13. Cheref S, Benoit JS, Walker RL. Refining Psychological, Substance Use, and Sociodemographic Predictors of Suicide Ideation and Attempts in a National Multiethnic Sample of Adults, 2008–2013. *The Journal of nervous and mental disease*. 2019;207(8):675–682. [PubMed: 31306289]
14. Flores YN, Yee HF Jr., Leng M, et al. Risk factors for chronic liver disease in Blacks, Mexican Americans, and Whites in the United States: results from NHANES IV, 1999–2004. *Am J Gastroenterol*. 2008;103(9):2231–2238. [PubMed: 18671818]
15. Separate Assari S. and Combined Effects of Anxiety, Depression and Problem Drinking on Subjective Health among Black, Hispanic and Non-Hispanic White Men. *Int J Prev Med*. 2014;5(3):269–279. [PubMed: 24829710]
16. Anda RF, Felitti VJ, Bremner JD, et al. The enduring effects of abuse and related adverse experiences in childhood. A convergence of evidence from neurobiology and epidemiology. *Eur Arch Psychiatry Clin Neurosci*. 2006;256(3):174–186. [PubMed: 16311898]
17. Hatch SL, Dohrenwend BP. Distribution of traumatic and other stressful life events by race/ethnicity, gender, SES and age: a review of the research. *Am J Community Psychol*. 2007;40(3–4):313–332. [PubMed: 17906927]
18. Sternthal MJ, Slopen N, Williams DR. RACIAL DISPARITIES IN HEALTH: How Much Does Stress Really Matter? *Du Bois Rev*. 2011;8(1):95–113. [PubMed: 29887911]
19. Myers B, McLaughlin KA, Wang S, Blanco C, Stein DJ. Associations between childhood adversity, adult stressful life events, and past-year drug use disorders in the National Epidemiological Study of Alcohol and Related Conditions (NESARC). *Psychol Addict Behav*. 2014;28(4):1117–1126. [PubMed: 25134042]
20. Dohrenwend BP, Turner JB, Turse NA, Lewis-Fernandez R, Yager TJ. War-related posttraumatic stress disorder in Black, Hispanic, and majority White Vietnam veterans: the roles of exposure and vulnerability. *J Trauma Stress*. 2008;21(2):133–141. [PubMed: 18404630]
21. Tummala-Narra PJJoa, maltreatment trauma. Conceptualizing trauma and resilience across diverse contexts: A multicultural perspective. *J Aggression, Maltreatment, & Trauma*. 2007;14(1–2):33–53.
22. Carroll TD, Currier JM, McCormick WH, Drescher KD. Adverse childhood experiences and risk for suicidal behavior in male Iraq and Afghanistan veterans seeking PTSD treatment. *Psychol Trauma*. 2017;9(5):583–586. [PubMed: 28080076]
23. Fuehrlein BS, Mota N, Arias AJ, et al. The burden of alcohol use disorders in US military veterans: results from the National Health and Resilience in Veterans Study. *Addiction*. 2016;111(10):1786–1794. [PubMed: 27061707]
24. Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National

- Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2007;64(7):830–842. [PubMed: 17606817]
25. Kondo K, Low A, Everson T, et al. Health Disparities in Veterans: A Map of the Evidence. *Med Care*. 2017;55 Suppl 9 Suppl 2:S9–S15. [PubMed: 28806361]
  26. Peterson K, Anderson J, Boundy E, Ferguson L, McCleery E, Waldrip K. Mortality Disparities in Racial/Ethnic Minority Groups in the Veterans Health Administration: An Evidence Review and Map. *Am J Public Health*. 2018;108(3):e1–e11.
  27. Pietrzak RH, Cook JM. Psychological resilience in older U.S. veterans: results from the national health and resilience in veterans study. *Depress Anxiety*. 2013;30(5):432–443. [PubMed: 23468170]
  28. Sheehan D, Lecrubier Y, Sheehan KH, et al. The validity of the Mini International Neuropsychiatric Interview (MINI) according to the SCID-P and its reliability. *Eur Psychiatry*. 1997;12(5):232–241.
  29. Sheehan DV, Lecrubier Y, Sheehan KH, et al. The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry*. 1998;59 Suppl 20:22–33;quiz 34–57.
  30. Kroenke K, Spitzer RL, Williams JB, Lowe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics*. 2009;50(6):613–621. [PubMed: 19996233]
  31. Thompson R, Henkel V, Coyne JC. Suicidal ideation in primary care: ask a vague question, get a confusing answer. *Psychosom Med*. 2004;66(3):455–456; author reply 456–457. [PubMed: 15184710]
  32. Weathers FW, Litz BT, Herman DS, Huska JA, Keane TM. The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility. Paper presented at: annual convention of the international society for traumatic stress studies, San Antonio, TX1993.
  33. Association AP. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*. Washington, DC: American Psychiatric Association; 2000.
  34. Wilkins KC, Lang AJ, Norman SB. Synthesis of the psychometric properties of the PTSD checklist (PCL) military, civilian, and specific versions. *Depress Anxiety*. 2011;28(7):596–606. [PubMed: 21681864]
  35. Wade D, Varker T, Forbes D, O'donnell M. The Alcohol Use Disorders Identification Test-Consumption (AUDIT-C) in the assessment of alcohol use disorders among acute injury patients. *Alcoholism: Clinical and Experimental Research*. 2014;38(1):294–299.
  36. Dawson DA, Grant BF, Stinson FS. The AUDIT-C: screening for alcohol use disorders and risk drinking in the presence of other psychiatric disorders. *Comprehensive psychiatry*. 2005;46(6):405–416. [PubMed: 16275207]
  37. Rumpf HJ, Hapke U, Meyer C, John U. Screening for alcohol use disorders and at-risk drinking in the general population: psychometric performance of three questionnaires. *Alcohol Alcohol*. 2002;37(3):261–268. [PubMed: 12003915]
  38. Frank D, DeBenedetti AF, Volk RJ, Williams EC, Kivlahan DR, Bradley KA. Effectiveness of the AUDIT-C as a screening test for alcohol misuse in three race/ethnic groups. *J Gen Intern Med*. 2008;23(6):781–787. [PubMed: 18421511]
  39. Ware J, Kosinski M, Dewey J, Gandek B. *How to score and interpret single-item health status measures: a manual for users of the SF-8 health survey*. Boston, MA: Quality Metric; 2001.
  40. Ware JE, Sherbourne CD, Davies AR. Developing and testing the MOS 20-item short-form health survey: A general population application In: *Measuring Functioning and Well-Being: the Medical Outcomes Study Approach* Durham, NC: Duke University Press; 1992:227–290.
  41. Endicott J, Nee J, Harrison W, Blumenthal R. Quality of Life Enjoyment and Satisfaction Questionnaire: a new measure. *Psychopharmacol Bull*. 1993;29(2):321–326. [PubMed: 8290681]
  42. Carlson EB, Smith SR, Palmieri PA, et al. Development and validation of a brief self-report measure of trauma exposure: the Trauma History Screen. *Psychol Assess*. 2011;23(2):463–477. [PubMed: 21517189]
  43. Wilson DB. Practical Meta-Analysis Effect Size Calculator. <https://campbellcollaboration.org/research-resources/effect-size-calculator.html>. Accessed.

44. Nuru-Jeter AM, Williams CT, LaVeist TA. Distinguishing the race-specific effects of income inequality and mortality in US metropolitan areas. *Int J Health Serv.* 2014;44(3):435–456. [PubMed: 25618984]
45. Ayalon L, Young MAJJoC CP. A comparison of depressive symptoms in African Americans and Caucasian Americans. *J Cross-Cult Psychol.* 2003;34(1):111–124.
46. Baker FM. Diagnosing depression in African Americans. *Community Ment Health J.* 2001;37(1):31–38. [PubMed: 11300665]
47. Oquendo MA, Dragatsi D, Harkavy-Friedman J, et al. Protective factors against suicidal behavior in Latinos. *J Nerv Ment Dis.* 2005;193(7):438–443. [PubMed: 15985837]
48. Lewis-Fernández R, Turner JB, Marshall R, Turse N, Neria Y, Dohrenwend BP. Elevated rates of current PTSD among Hispanic veterans in the NVVRS: true prevalence or methodological artifact? *J Trauma Stress.* 2008;21(2):123–132. [PubMed: 18404629]
49. Carter RTJTCP. Racism and psychological and emotional injury: Recognizing and assessing race-based traumatic stress. *The Counseling Psychologist.* 2007;35(1):13–105.
50. Pieterse AL, Todd NR, Neville HA, Carter RT. Perceived racism and mental health among Black American adults: a meta-analytic review. *J Couns Psychol.* 2012;59(1):1–9. [PubMed: 22059427]
51. Lurie N, Dubowitz T. Health disparities and access to health. *JAMA.* 2007;297(10):1118–1121. [PubMed: 17356034]
52. Ortega AN, Rosenheck R, Alegría M, Desai RA. Acculturation and the lifetime risk of psychiatric and substance use disorders among Hispanics. *The Journal of nervous and mental disease.* 2000;188(11):728–735. [PubMed: 11093374]
53. Shamir B, Zakay E, Brainin E, Popper MJJoASP. Leadership and Social Identification in Military Units: Direct and Indirect Relationships 1. *J App Soc Psychol.* 2000;30(3):612–640.
54. Western B, Pettit BJAJoS. Black-white wage inequality, employment rates, and incarceration. *American Journal of Sociology.* 2005;111(2):553–578.
55. Edens EL, Kaspro W, Tsai J, Rosenheck RA. Association of substance use and VA service-connected disability benefits with risk of homelessness among veterans. *Am J Addict.* 2011;20(5):412–419. [PubMed: 21838839]
56. Jones AL, Hanusa BH, Appelt CJ, Haas GL, Gordon AJ, Hausmann LRM. Racial Differences in Veterans' Satisfaction With Addiction Treatment Services. *J Addict Med.* 2015;9(5):383–390. [PubMed: 26335005]
57. Saloner B, Lê Cook B. Blacks and Hispanics are less likely than whites to complete addiction treatment, largely due to socioeconomic factors. *Health Aff (Millwood).* 2013;32(1):135–145. [PubMed: 23297281]

**Table 1**

Demographic Characteristics of U.S. Veterans with a Lifetime History of Alcohol Use Disorder by Race/  
Ethnicity

Variable	White	Black	Hispanic	Statistic	p-value	Effect size	Post-Hoc <sup>a</sup>
	n = 1099	n = 60	n = 53				
	Raw Frequency (%) weighted)	Raw Frequency (%) weighted)	Raw Frequency (%) weighted)				
Male sex/gender	1046 (95.8)	49 (85.4)	45 (92.6)	$\chi^2(2, N = 1,237) = 20.943$	< .001	Phi = .130	W > B
Education level ( some college)	920 (64.0)	44 (60.8)	43 (63.6)	$\chi^2(2, N = 1,236) = .409$	.815	Phi = .018	
Currently employed	440 (40.0)	30 (47.6)	26 (46.3)	$\chi^2(2, N = 1,237) = 3.535$	.171	Phi = .053	
Household income (Less than or equal to 60,000)	506 (55.8)	38 (72.5)	22 (43.5)	$\chi^2(2, N = 1,236) = 18.195$	< .001	Phi = .121	B > W > H
Married or living with partner	868 (76.5)	35 (60.2)	42 (72.2)	$\chi^2(2, N = 1,238) = 13.674$	.001	Phi = .105	W > B
Military branch (Army versus other)	427 (36.0)	30 (52.0)	23 (42.6)	$\chi^2(2, N = 1,236) = 11.214$	.004	Phi = .095	B > W
Combat Veteran	420 (35.3)	18 (25.2)	25 (47.2)	$\chi^2(2, N = 1,237) = 11.237$	.004	Phi = .095	H > W, B
Military enlistment (% drafted)	130 (10.7)	6 (13.7)	6 (9.3)	$\chi^2(2, N = 1,235) = 1.169$	.557	Phi = .031	
AUD severity	338 (33.7)	28 (39.8)	19 (35.2)	$\chi^2(2, N = 1,237) = 1.572$	.456	Phi = .036	
Trauma exposure	4.00 (.10)	4.62 (.30)	5.15 (.30)	$F(2, 1181) = 8.094$	< .001	eta = .014	H > W
Number of years of service <i>M</i> (SE)	6.71(.23)	7.87 (.70)	8.08 (.70)	$F(2, 1183) = 2.665$	.070	eta = .004	
Age <i>M</i> (SE)	60.38 (.44)	55.77 (1.34)	52.30 (1.34)	$F(2, 1183) = 20.12$	< .001	eta = .033	W > B, H

Notes. AUD severity = alcohol use disorder severity measured by percent dependent; W: white; B: black; H: Hispanic.

<sup>a</sup>Comparison of nominal/ordinal variable by race/ethnicity compared column proportions using z-test with Bonferroni correction and group differences for interval variables used One-Way ANOVA, with Tukey's post-hoc testing and Bonferroni correction for multiple comparisons.

Table 2

U.S. Veterans with a Lifetime History of Alcohol Use Disorder: Bivariate and Multivariate Associations of Race/Ethnicity and Psychiatric Comorbidity

	White	Black	Hispanic	Black vs White <sup>a</sup>	Hispanic vs White <sup>a</sup>	Hispanic v Black <sup>a</sup>
	(n = 1099) Raw Frequency (% weighted)	(n = 60) Raw Frequency (% weighted)	(n = 53) Raw Frequency (% weighted)	AOR, (95% CI)	AOR, (95% CI)	AOR, (95% CI)
<i>Lifetime Psychiatric Comorbidity</i>						
Major depressive disorder	257 (24.4)	18 (27.2)	24 (41.7)	0.61 (0.35–1.07)	1.36 (0.83–2.25)	<b>2.24 (1.10–4.56)</b>
Social phobia	129 (12.4)	10 (18.4)	10 (25.2)	1.02 (0.56–1.87)	1.60 (0.94–2.72)	1.57 (0.74–3.32)
Posttraumatic stress disorder	102 (10.5)	9 (17.6)	10 (23.1)	1.13 (0.55–2.31)	1.78 (0.93–3.46)	1.58 (0.64–3.88)
Drug use disorder	262 (25.1)	25 (40.2)	15 (25.0)	1.56 (0.97–2.49)	<b>0.50 (0.29–0.85)</b>	<b>0.32 (0.16–0.63)</b>
Suicide attempt	86 (10.7)	8 (18.6)	4 (7.4)	1.10 (0.59–2.05)	<b>0.32 (0.14–0.74)</b>	<b>0.30 (0.11–0.78)</b>
<i>Current Psychiatric Comorbidity</i>						
Major depressive disorder	93 (8.2)	8 (19.6)	10 (23.1)	<b>2.18 (1.17–4.08)</b>	<b>2.21 (1.22–4.01)</b>	1.01 (0.46–2.24)
Posttraumatic stress disorder	50 (6.2)	7 (19.6)	7 (19.4)	<b>3.07 (1.53–6.16)</b>	<b>2.52 (1.27–5.01)</b>	0.82 (0.34–2.01)
Generalized anxiety disorder	88 (9.1)	8 (20.0)	7 (20.4)	<b>2.01 (1.08–3.75)</b>	1.61 (0.87–2.99)	0.80 (0.36–1.80)
Alcohol use disorder	250(23.3)	13 (28.2)	13 (23.1)	1.23 (0.77–1.98)	0.79 (0.48–1.31)	0.65 (0.34–1.24)
Suicidal ideation	108 (11.4)	6 (15.7)	11 (17.6)	0.94 (0.50–1.76)	0.91 (0.49–1.69)	0.97 (0.43–2.22)

Note. AOR: adjusted odds ratios, CI: confidence interval.

<sup>a</sup> Adjusted odds ratios, controlling for sex, income (< 60,000 versus ≥ 60,000), marital status (married versus non-married), military branch (army versus other), combat status, age, number of lifetime trauma exposures, and AUD abuse vs. dependence status.

**Table 3**

Functioning and Quality of Life Variables in U.S. Military Veterans with a Lifetime History of Alcohol Use Disorder by Race/Ethnicity

	White ( <i>n</i> = 1027)		Black ( <i>n</i> = 60)		Hispanic ( <i>n</i> = 53)		<i>p</i> -value	Sig. Group Differences <sup>b</sup>
	Weighted Est. Marginal <i>M</i> ( <i>SE</i> )	Weighted Est. Marginal <i>M</i> ( <i>SE</i> )	Weighted Est. Marginal <i>M</i> ( <i>SE</i> )	Weighted Est. Marginal <i>M</i> ( <i>SE</i> )	Statistic <sup>d</sup>			
Physical health functioning	46.48 (0.72)	48.07 (1.09)	43.84 (1.15)	F (2, 1173) = 5.10	0.006	W > H, <i>d</i> = 0.12 B > H, <i>d</i> = 0.37		
Mental health functioning	49.270 (0.64)	49.37 (0.98)	46.99 (1.03)	F (2, 1173) = 3.19	0.042	W > H <i>d</i> = 0.12		
Cognitive functioning	83.99 (1.15)	85.88 (1.74)	79.41 (1.84)	F (2, 1173) = 5.06	0.007	W > H, <i>d</i> = 0.13 B > H, <i>d</i> = 0.36		
Quality of life	49.93 (0.72)	51.20 (1.10)	47.06 (1.16)	F (2, 1170) = 5.12	0.006	W > H, <i>d</i> = 0.13 B > H, <i>d</i> = 0.36		

Note. Est. Marginal Means are mean values controlling for gender, income ( 60,000 versus 60,000), marital status (married versus non-married), military branch (army versus other), combat status, age, and AUD abuse vs. dependence status

<sup>a</sup> ANCOVA analyses controlled for gender, income ( 60,000 versus 60,000), marital status (married versus non-married), military branch (army versus other), combat status, age, number of lifetime trauma exposures, and AUD abuse vs. dependence status.

<sup>b</sup> Pairwise comparisons using estimated marginal means were Bonferroni adjusted due to multiple comparisons.