Received: 25 June 2020 | Revised: 12 March 2021 | Accepted: 17 March 2021

DOI: 10.1111/hsc.13392

ORIGINAL ARTICLE

Health and Social Care in the community WILEY

Behavioural health outcomes in veterans compared to nonveterans by rural and urban areas in Alabama, 2015–2018

David L. Albright PhD[1] | Kari L. Fletcher PhD[2] | Kate H. Thomas PhD[3] | Justin T. McDaniel PhD[4] | Kirsten Laha-Walsh MSW[1] | Dawn Null PhD[4] | Sameer Vohra MD, JD, MA, FAAP[5]

[1]School of Social Work, The University of Alabama, Tuscaloosa, AL, USA

[2]School of Social Work, University of St. Thomas, St. Paul, MN, USA

[3]Department of Global and Community Health, George Mason University, Fairfax, VA, USA

[4]School of Human Sciences, Southern Illinois University, Carbondale, IL, USA

[5]Southern Illinois University School of Medicine, Southern Illinois University, Carbondale, IL, USA

Correspondence
David L. Albright, School of Social Work, The University of Alabama, Box 870314, Tuscaloosa, AL 35487, USA.
Email: dlalbright@ua.edu

Abstract

In the United States, tobacco use, alcohol consumption and substance use disorders are more prevalent among veterans when compared to nonveterans. This is also seen in Alabama, which led the researchers to review county level data to examine possible links between substance use, mental health and suicide by veteran status. This study sought to evaluate behavioural health outcomes and impacting factors for military veterans and nonveterans living in rural and urban areas of Alabama. In phase one, we developed Alabama-specific behavioural health outcomes at the state and county level for military veterans and nonveterans. In phase two, we examined county-level correlates of behavioural health outcomes among veterans and nonveterans. The data were retrieved from the 2015–2018 National Surveys on Drug Use and Health (NSDUH) and the United States Census Bureau. Regarding tobacco use rates at the county level, nonveteran rates ranged from 23.93% to 34.56% while veteran rates ranged from 24.47% to 38.56%. Nonveteran illicit drug use rates ranged from 9.40% to 13.15% while veteran illicit drug use rates ranged from 5.50% to 10.67%. Nonveteran heavy alcohol use rates ranged from 4.54% to 7.92% while veteran heavy alcohol use rates ranged from 4.59% to 8.41%. Lastly, nonveteran suicidal ideation rates ranged from 3.64% to 4.60% while veteran suicidal ideation rates ranged from 3.16% to 4.51%. Veterans have a significantly higher potential of having suicidal ideations. We showed that illicit drug use and suicidal ideation have increased in Alabama among veterans and nonveterans. Behavioural health programmes and policies aimed at eliminating disparities between veterans and nonveterans are needed in Alabama.

KEYWORDS

rural, substance use disorders, suicide, tobacco, veteran

1 | INTRODUCTION

Substance use is pervasive among United States military veterans. According to the 2018 National Survey on Drug Use and Health (NSDUH), 3.7 million military veterans were diagnosed with a substance use disorder (SUD), with 80.2% reporting alcohol misuse, 26.7% reporting illicit drug use and 7% reporting both illicit drug use and alcohol misuse (National Institute on Drug Abuse, 2020). Within a military context, substance use may increase within specific contexts, such as increased illicit drug use upon discharge from active duty military service (as use during service is not tolerated; Seal et al., 2011). In addition, prior research found that

an overwhelming percentage (between 82% and 93%) of veterans diagnosed with substance use disorders were also diagnosed with one or more co-morbid mental health disorders (Teeters et al., 2017).

Suicide is listed as the10th leading cause of death in the United States (Albright, McDaniel, Diehr, et al., 2020). Suicide completion rates among veterans are 1.5 times civilian adult rates, after adjusting for population differences in age and sex (Seal et al., 2011). Suicide is on the rise in veterans based on the 2019 National Veteran Suicide Prevention Annual Report: between 2008 and 2017 total suicides increased 6% despite an 18% decrease in the veteran population during that same time, with at least 60,000 taking their own lives (Douthit et al., 2015). Within the U.S. military, the Department of Defense (DoD) reported that 541 active and reserve component servicemembers completed suicide in 2018, which is approximately 24.8 individuals per 100,000 (Department of Defense [DoD], 2019). In comparison to the active and reserve population, in 2017, the Department of Veterans Affairs (VA) reported that an estimated 500,000 veterans completed suicide, with a daily average of 17 veterans per day (U.S. Department of Veterans Affairs [VA], 2020). The connection between substance use, mental health and suicide risk/completion among veterans has also been made. Young adult veterans, in particular, are experiencing increasing rates of serious mental illness, major depression and suicidality (National Institute on Drug Abuse, 2020). Substance use is often associated with suicidal ideation among veterans. In fact, alcohol or illicit drug use was involved in 30% of army suicides and at least 45% of attempts since 2003 (Britch, 2019). Although tobacco use, alcohol consumption and substance use disorders are all linked and may impact suicidal ideation, U.S. veterans report higher prevalence rates for all when compared to nonveterans (e.g., general or civilian population).

According to the Centers for Disease Control (CDC), tobacco use is nearly 10% higher among veterans compared to nonveterans (29.2% versus 19.7%). Reported rates of tobacco use were greatest among veterans who were ages 18 to 25 (56.8%). Reported rates of tobacco use by veterans were lowest among those who reported having health insurance (27.3%) and those who reported they were not experiencing/had not experienced serious psychological distress (28.5%) (Odani et al., 2018). Veterans who reported being dependent on tobacco were four times more likely to be dependent on alcohol (Grant et al., 2004). Similar findings can be seen in a 2019 study using the U.S. Alcohol Use Disorders Identification Test (U.S.-AUDIT) and the Drug Abuse Screening Test (DAST) where veterans demonstrated scores of higher alcohol usage if they were also tobacco users that were consistent with a higher level than their civilian counterparts (Albright, Holmes, Lawson, et al., 2020). Additionally, on the international platform, studies have shown that military involved individuals have a higher prevalence rate of tobacco usage than their nonmilitary counterparts (Abdullah et al., 2014; Selman et al., 2020; Tien et al., 2010).

Back in the United States, veterans are more likely to abuse alcohol than nonveterans (Center for Behavioral Health Statistics & Quality, 2019). Veterans ages 18 to 25 reported alcohol use disorder rates that fluctuated between 9.1% to 14.6% between the years of 2015 and 2018. Most veterans between 18 and 25 used alcohol (68% as compared to 55.1% among nonveterans) (Substance Abuse & Mental Health Services Administration [SAMSHA], 2019).

What is known?

- In the United States, 3.7 million military veterans have a substance use disorder (SUD).
- Additionally, 82%–93% of veterans diagnosed with SUD are diagnosed with a co-morbid mental health disorder.

What is added?

- In Alabama, veterans and nonveterans use tobacco and illicit drugs, experience serious mental distress and complete suicides at higher rates than the national average.
- We used nationally representative data to examine substance use and mental health outcomes in Alabama.
- We show that tobacco use has declined; however, illicit drug use rates have increased, especially in urban areas in Alabama.

1.1 | Urban versus rural

Urban versus rural living environments vary greatly in terms of their access to support and services. For example, significant differences exist in access to health care between rural and urban areas for veterans. Overall, rural areas often experience insufficient services, cultural barriers such as providers who are not understanding of the military culture and financial limitations among residents, lack of trained medical providers, inadequate public transportation and poor internet services (Mohatt et al., 2018). As there is the concern that veterans who live in rural settings are less likely to seek behavioural health services, there are also greater risks towards individuals using multiple substances that could influence their mental and behavioural health (McDaniel et al., 2020). Particularly worrisome though is that veterans who live in rural communities have a 20% higher risk of dying by suicide than those veterans who live in urban communities (Albright et al., 2020).

Evidence-based programmes to support rural community-based suicide prevention programmes for veterans are limited (Monteith et al., 2020). While treatment rates for substance use disorders (SUDs) among veterans in urban and rural areas are comparable (e.g., Turvey et al., 2020), further similarities and differences are worth noting. Veterans' treatment admissions for opioid use, heroin use and injectable drug use disorders increased between 2011 and 2016 (Turvey et al., 2020). According to retrospective observational study using national administrative Veterans Health Administration (VHA) data, rural veterans are prescribed 30% more opioids than their urban counterparts (Lund et al., 2019). By comparison, rural veterans

(when compared to urban veterans) have less access to appropriate care (Young et al., 2017). VA providers in urban settings refer to specialty addiction treatment as standard practice and consider it collaborative care while rural providers report substantial barriers to referral and view specialty treatment as impractical (Young et al., 2018). Bensley et al., (2019) confirmed the finding that veterans in rural areas are less likely to receive specialty addiction treatment (Bensley et al., 2019). Specifically, in Alabama, there are gaps in available behavioural health resources that may cause challenges between veterans and obtaining necessary programming geared towards mental and behavioural health (Albright et al., 2018).

1.2 | Alabama

General context regarding Alabama's urban/rural, wealth and ethnic composition can be helpful. While the majority (95.64%) of Alabama's land area is considered rural, most of its population (59%) resides within urban settings (University of Alabama, 2012). In terms of its wealth, as of 2012, Alabama was the fifth poorest state in the nation, with approximately more than 800,000 residents (16.9%) living below the poverty line out of a state population of 4.9 million (Alabama Possible, 2020). Furthermore, 11 out of the 67 counties in Alabama have a poverty rate more than 25% (Alabama Possible, 2020). In terms of racial composition, most Alabama veterans identify as either White (72.9%) or Black/African American (23.3%) (Albright, McDaniel, Diehr, et al., 2020).

When compared to national prevalence rates, Alabama veterans and nonveterans alike have higher rates of tobacco use, serious mental health conditions, use of illicit pain relievers and suicides, but lower rates of alcohol use. When comparing Alabama to the nation, several nonveteran specific statistics regarding substance use and mental health are of relevance. With regard to tobacco use in 2016, nearly 20% of adults in Alabama smoked (19.2% versus. 16.1% national rate), making its adult smoking prevalence rate the 8th highest in the nation (Alabama Department of Mental Health, 2018; CDC, 2018; Dunlap & McCallum, 2019). Conversely, Alabama ranks lower in excessive drinking among adults in (13.8%) than the national rate (18.2%) (CDC, 2018), as do rates of marijuana use among Alabama adults (9.5%) in comparison to national rates (13.7%) (Alabama Department of Mental Health, 2018). With regard to illicit pain reliever use, rates are higher among Alabamians (5.1%) than Americans (4.5%), generally. Regarding mental health, nearly 4.5% of adults in Alabama live with serious mental health concerns (compared to 4.2% nationally) (SAMSHA, 2015).

Concerning suicide, veterans represent 9.8% of the Alabama adult population (National Center for Veterans Analysis & Statistics [NCVAS], 2017) and completed an average of 116 suicides a year between 2005 and 2017. Suicide rates are 10.9% higher among Alabama veterans (29.2%) than nonveterans (18.3%). Moreover, suicide rates among Alabama veterans and nonveterans are higher when compared nationally (U.S. veterans 27.7% versus U.S. nonveterans 16.1%) (VA, 2017).

For 400,000 veterans living in Alabama, almost 40% (142,000; 37.4%) live in rural areas where the closest access to VA facilities are 40 or greater miles away (National Center for Veterans Analysis & Statistics, 2017). Considering rurality and distance, also 80,000 veterans had completed a VA disability compensation process while 320,000 Alabama veterans had either not completed one or had been denied (LiveStories, 2020). Given veterans' tendencies toward higher prevalence rates of tobacco use, alcohol consumption, substance use disorders and suicidal ideations/suicide relative to nonveterans, veterans residing in Alabama are of concern for such risk behaviours given the large number who live in rural areas.

Veterans are particularly vulnerable to health and health care disparities and living in rural areas may compound issues. Identifying specific locations where at-risk veterans live and assessing access to care is an important step in developing an action plan to improve health outcomes. Moreover, addressing disparities will improve overall population health, reduce health care costs and work toward health equity. This study sought to evaluate behavioural health outcomes and impacting factors for military veterans and nonveterans living in Alabama. Two phases of analysis were developed and implemented to help determine Alabama-specific behavioural health outcomes (i.e., tobacco use, illicit drug use, heavy alcohol consumption, and suicidal ideation) and to evaluate who experiences those outcomes at a higher rate. Behavioural health outcomes that focus on mental health diagnoses and substance use are important within the military community (Harms et al., 2013). Small area estimation was used to evaluate the outcomes at a county and state level between veterans and nonveterans.

2 | METHODS

2.1 | Phase one analysis

This study includes two phases of analysis. In phase one, we will describe the development of Alabama-specific behavioural health outcomes (i.e., tobacco use, illicit drug use, heavy alcohol consumption and suicidal ideation) at the state and county level for military veterans and nonveterans separately. In phase two, using an ecological study design and the data developed during phase one, we examined county level correlates of county level behavioural health outcomes among veterans and nonveterans, specifically.

In phase one, we conducted small area estimation according to procedures outlined in Albright and et al., (2020) paper. Specifically, we obtained data from the 2015–2018 waves of the National Survey on Drug Use and Health (NSDUH) (SAMHSA, 2020). Data were collected through a state-stratified sampling approach, which garners approximately 67,500 responses each year. Participants were given $30 for completing the survey. The data were collected via in-person interviews and computer assisted surveys for sensitive questions. Response rates for the NSDUH ranged from 48.79% to 81.94% between 2015 and 2018. After merging the files and removing cases with missing data, the final analytic sample included 170,472

individuals. Military veteran status was determined with the following question: 'Are you currently on active duty in the United States Armed Forces, are you in a Reserve component, or are you now separated or retired from the military?' Response options for this question included the following: (a) in a Reserves component, (b) now separated/retired from Reserves/active duty, (c) legitimate skip due to having never served in the Armed Forces. We coded individuals responding with answer 'b' above as veterans (n = 9,631) and all others as nonveterans, including active duty service members (n = 160,841).

For each veteran and nonveteran, we retrieved information about their age (i.e., ages greater than 65 years and ages less than 64 years), gender (i.e., male or female) and race (i.e., White, Black or other). Variables were categorised as previously described in order to match pretabulated population count data at the county-level obtained from the United States Census Bureau (which we describe later). We also obtained information about the rurality of each participant's place of residence. Between 2015 and 2018, the NSDUH employed the 2013 Rural/Urban Continuum Codes (RUCC) from the United States Department of Agriculture. In this study, we coded respondents living in 'non-metro' counties as 'rural' and all others (i.e., small metro and large metro) as 'urban', similarly to McDaniel, Lee, et al., (2020). Large metros have a population of more than 1 million individuals and small metros have a population of less than 250,000 within the metropolitan statistical area (CDC, 2017).

Four behavioural health outcomes were retrieved from the NSDUH for this study. First, we obtained an NSDUH calculated variable for past month tobacco use (1 = yes, 0 = no), which included cigar use, cigarette use, pipe tobacco use or smokeless tobacco use. Second, we obtained an NSDUH calculated variable for past month illicit drug use (1 = yes, 0 = no), which included cocaine, hallucinogens, heroin, inhalants, methamphetamine, marijuana, sedatives, tranquilisers, stimulants or misused prescription pain relievers. Third, we obtained an NSDUH calculated variable for past month heavy alcohol consumption (1 = yes, 0 = no), defined as drinking five or more drinks on the same occasion for males or four or more drinks on the same occasion for females on each of 5 or more days in the past 30 days. Fourth, we obtained an NSDUH calculated variable for past year suicidal ideation (1 = yes, 0 = no), defined has seriously thinking about trying to kill one's self.

Using the data described above, we estimated four survey-weighted logistic regression models, where each behavioural health outcome was regressed on age (less than 64 years, or greater than 64 years), sex (male or female), race (White, Black or other), veteran status (yes or no), rurality and year of survey completion. Following estimation of the models, we obtained probabilities of the outcomes for each combination of independent variables. We then post-stratified these probabilities onto cross-tabulated population counts of veterans and nonveterans by age (less than 64 years, or greater than 64 years), sex (male or female), race (White, Black or other), and rurality, from the United States Census Bureau's 5-year American Community Survey (United States Census Bureau, 2020). We calculated rates (i.e., percentages) of four behavioural health outcomes for veterans and nonveterans, separately, for (a) the state of Alabama in 2015, 2016, 2017 and 2018, and (b) in each Alabama county, aggregated across the four study years. We visualise these rates in line graphs and county-boundary choropleth maps.

2.2 | Phase two analysis

In phase two, using the county level data (n = 67) that we generated via small area estimation in phase one, we conducted an ecological study of county level correlates of veteran and nonveteran-specific behavioural health outcomes. That is, veteran and nonveteran county level rates of tobacco use, illicit drug use, heavy alcohol consumption and suicidal ideation were regressed on a vector of county-level covariates. We used linear regression models to examine these relationships. In the next paragraph, we describe the sources of the county level covariates (i.e., independent variables), all of which could be described as social determinants of health (Office of Disease Prevention & Health Promotion, 2020).

Using data from the United States Census Bureau's 5-year American Community Survey, we generated the following county level summary variables of respondents for veterans and nonveterans separately: (a) median annual income, (b) percent with only a high school level education and (c) percent of individuals who are of labour force age who are unemployed. We also obtained the percent of occupied housing units in each Alabama county that was owned according to the United States Census Bureau's 5-year American Community Survey. Using 2016 data from the county level detailed arrest and offense data report of the Uniform Crime Reporting Program (Federal Bureau of Investigation, 2020), we developed violent crime rates for each Alabama county per 100,000 residents. We defined violent crimes as offenses that involve face-to-face confrontation between a perpetrator and victim, including homicide, robbery, rape or aggravated assault. Lastly, we coded each county in Alabama as rural or urban based on the 2013 RUCC's, where 'non-metro' counties were coded as rural and all other counties were coded as urban (United States Department of Agriculture, 2020).

3 | RESULTS

3.1 | Phase one analysis

The 2015–2018 NSDUH sample included 91,323 females (53.57%), a total of 14,793 individuals aged 65 years or more (8.68%), and 103,145 White individuals (60.51%). Results of the models used for small area estimation of behavioural health outcomes among veterans and nonveterans in Alabama is shown in Table 1. Survey-weighted logistic regression models showed that military veterans were more likely than nonveterans to use tobacco; however, nonveterans were

TABLE 1 Models used to predict behavioural health outcomes in Alabama (logistic regression)

	Tobacco	Illicit drugs	Alcohol	Suicidal ideation
Variable	b (SE)	b (SE)	b (SE)	b (SE)
Sex: Female	−0.64 (0.02)*	−0.51 (0.02)*	−0.77 (0.03)*	0.14 (0.03)*
Age: 65 years +	−1.19 (0.03)*	−1.68 (0.07)*	−1.30 (0.07)*	−1.10 (0.08)*
Race				
White	Ref	Ref	Ref	Ref
Black	−0.04 (0.02)	0.10 (0.03)*	−0.60 (0.05)*	−0.27 (0.05)*
Other	−0.56 (0.02)*	−0.39 (0.03)*	−0.66 (0.03)*	−0.28 (0.04)*
Veteran	0.12 (0.03)*	−0.25 (0.05)*	0.04 (0.05)	0.19 (0.07)
Rural	0.43 (0.02)*	−0.24 (0.03)*	−0.09 (0.03)	0.04 (0.04)
Year				
2015	Ref	Ref	Ref	Ref
2016	−0.02 (0.02)	0.06 (0.03)	−0.07 (0.04)	0.02 (0.04)
2017	−0.09 (0.02)*	0.13 (0.03)*	−0.05 (0.04)	0.11 (0.04)
2018	−0.13 (0.02)*	0.21 (0.03)*	−0.06 (0.03)	0.09 (0.04)
Intercept	−0.52 (0.02)*	−1.62 (0.03)*	−1.87 (0.03)*	−3.04 (0.04)*

*$p < .001$.

more likely to use illicit drugs. Differences between veterans and nonveterans in heavy alcohol use and suicidal ideation were not statistically significant.

Probabilities from the models shown in Table 1 were post-stratified onto population counts of veterans and nonveterans in Alabama in order to obtain data for Figure 1. As shown in Figure 1a, tobacco use rates in Alabama declined between 2015 and 2018, but veterans exhibited a higher rate in all 4 years than nonveterans. After a small decline in heavy alcohol use rates among veterans and nonveterans between 2015 and 2016 (Figure 1b), heavy alcohol use rates plateaued between 2016 and 2018, with veterans exhibiting slightly higher rates than nonveterans. Illicit drug rates rose steadily for both veterans and nonveterans between 2015 and 2018 (Figure 1c), although nonveterans had higher rates in all four years than veterans. Lastly, as shown in Figure 1d, veterans exhibited a significant increase in suicidal ideation during the four study years and exhibited slightly higher rates than nonveterans between 2016 and 2018.

Probabilities from the models shown in Table 1 were post-stratified onto county-specific population counts of veterans and nonveterans in Alabama in order to obtain data for Figure 2. Regarding tobacco use rates at the county level, nonveteran rates ranged from 23.93% to 34.56% (Bullock County) while veteran rates ranged from 24.47% to 38.56% (Sumter County). Nonveteran illicit drug use rates ranged from 9.40% to 13.15% (Tuscaloosa County) while veteran illicit drug use rates ranged from 5.50% to 10.67% (Russell County). Nonveteran heavy alcohol use rates ranged from 4.54% to 7.92% (Blount County) while veteran heavy alcohol use rates ranged from 4.59% to 8.41% (Limestone County). Lastly, nonveteran suicidal ideation rates ranged from 3.64% to 4.60% (Marshall County) while veteran suicidal ideation rates ranged from 3.16% to 4.51% (Coffee County).

3.2 | Phase two analysis

Using the county-level data generated via small area estimation in phase one of this paper, we conducted an ecological study of county level social determinants of behavioural health outcomes among veterans and nonveterans in Alabama. Results of eight linear regression models are shown in Table 2. After controlling for unemployment rates, educational attainment, home ownership, median income and crime rates, rural-urban status was a significant predictor of behavioural health outcomes in seven out of eight models. Specifically, while rural counties exhibited significantly higher tobacco use and suicidal ideation rates for veterans and nonveterans (except among veterans for suicidal ideation), urban counties exhibited significantly higher rates of illicit drugs and heavy alcohol use for veterans and nonveterans.

4 | DISCUSSION

The results of the two phases of analysis in this study suggest that tobacco rates, suicidal ideation, illicit drug use and heavy alcohol use are all behavioural health outcomes that need attention in Alabama. The phase one analysis found that while tobacco consumption rates decreased, illicit drug use rates increased. Illicit drug use rates rose for nonveterans, and rates for both populations increased from 2015 to 2018. The phase two analysis found that rural counties, when compared with urban counties, had higher rates of tobacco and suicidal ideation (except for suicidal ideation among veterans) for both nonveterans and veterans. Urban counties demonstrated higher rates of illicit drug use and heavy alcohol use.

With the knowledge that veterans use substances and experience suicidal ideation at higher rates than their nonveteran

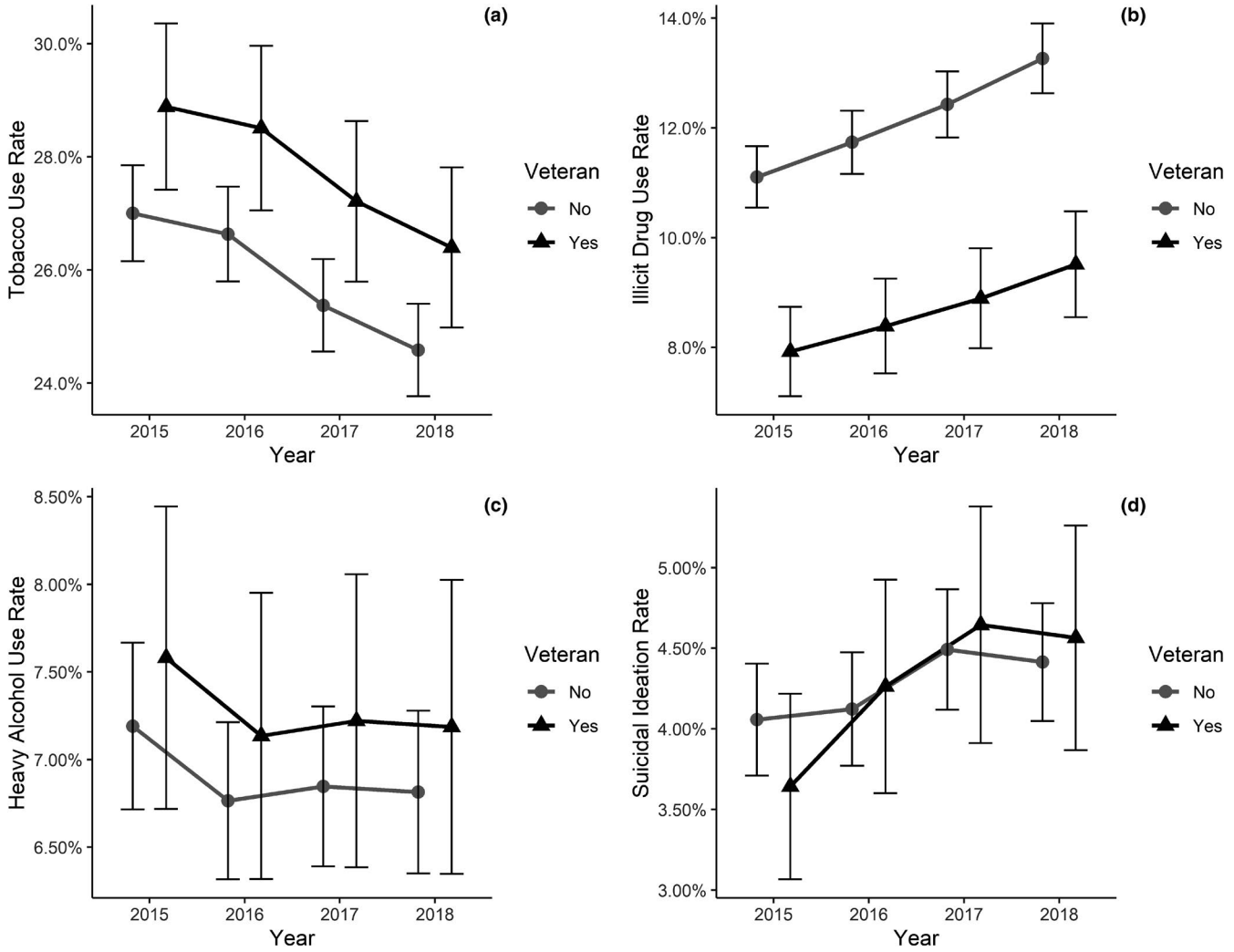

FIGURE 1 Small area estimates of (a) tobacco use, (b) heavy alcohol use, (c) illicit drug use and (d) suicidal ideation among veterans and nonveterans in Alabama, 2015–2018

counterparts, it is important to intervene early when risk factors are identified. Risk factors could potentially include preexisting mental health symptomology, chronic pain or social pressure. For the rural counties that showed significantly higher tobacco use and suicidal ideation, employment, lack of services or access to health care and social isolation may play a role. Additionally, for counties that demonstrated higher amounts of illicit drug use by nonveterans, rurality and lack of services may be important predictive factors.

It is important to understand the context within Alabama, specifically. For example, Tuscaloosa County is home to the University of Alabama, which had a total enrollment of 38,563 students in 2017 (University of Alabama, 2017), adding to the county population of 209,355 in 2018 (U.S. Census Bureau, 201). This could partially determine why the nonveteran rate for illicit drug use was higher (13.5%) when compared to the highest illicit drug use county for veterans (Russell County, 10.67%). Understanding the context in Alabama helps to clarify some of the reasons why certain substances or drugs may be more prevalent.

Given differences in behavioural health outcomes between rural and urban Alabama veterans, it would be beneficial for future studies to examine the role of region, both in terms of available services and culture. Small area estimation studies have been beneficial in reviewing the roles of rurality and substance use in Alabama (Albright, et al., 2020). In rural counties, there is a need for programming specifically designed to alleviate suicide risk issues within the military population. Tobacco cessation programmes in rural areas, such as the national Quit Now campaign, have been solidified in Alabama and offer virtual, telephonic, and other methods of connecting with patients (Mann et al., 2015). However, other complicating factors in rural areas, such as internet accessibility, need to be evaluated to maximise those efforts.

This study's findings may be nationally useful, especially in light of the rural/urban health disparities discovered. In particular, we found higher levels of tobacco use and suicidal ideation in veteran respondents in Alabama, particularly in rural counties which may be less likely to have robust programming for veterans. In addition to

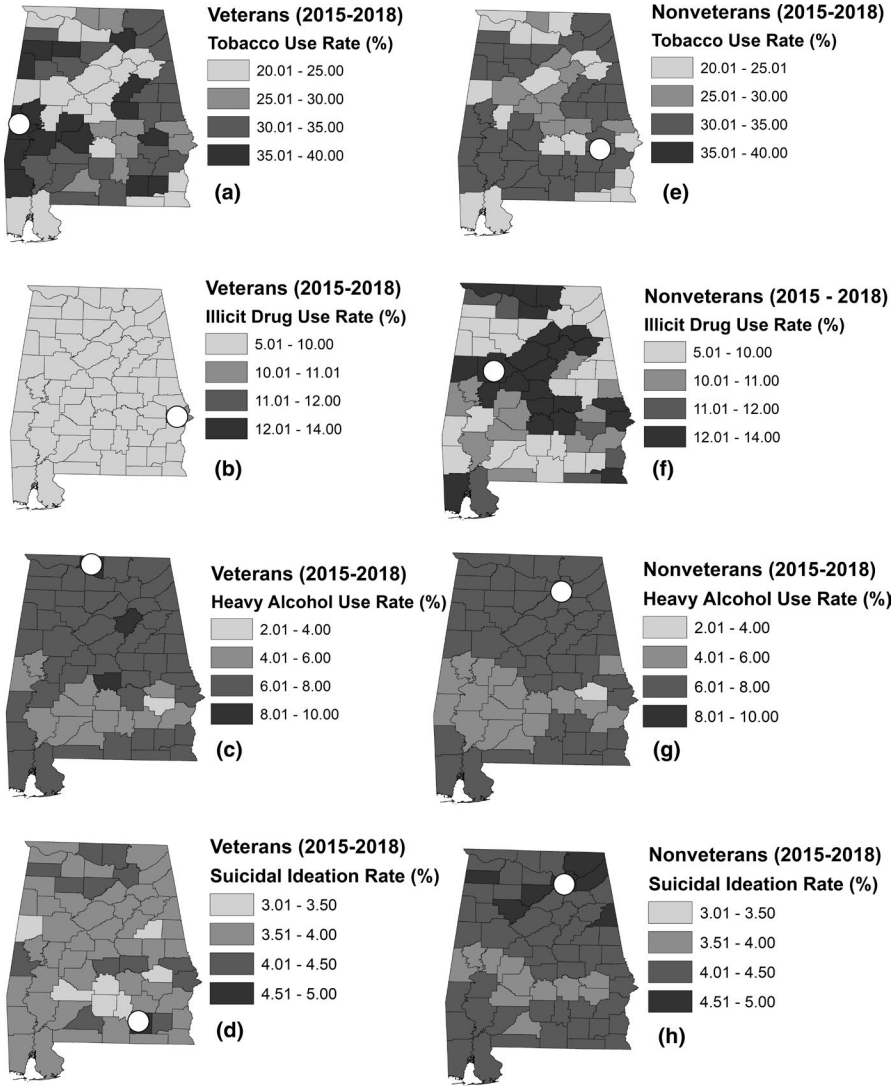

FIGURE 2 Small area estimates of (a–d) veteran tobacco use, illicit drug use, heavy alcohol use and suicidal ideation and (e–h) nonveteran tobacco use, illicit drug use, heavy alcohol use and suicidal ideation in Alabama counties, 2015–2018. White stars indicate the area with the highest prevalence of a measure (county names are provided in the text)

rurality, the socioeconomic status of an area should be considered (Albright, McDaniel, Diehr, et al., 2020).

This research may be generalizable to other rural regions of the United States, as tobacco usage and suicidal ideation have increased in both veterans and nonveterans. Various factors such as personal stress, political strain, financial struggles, and others have increased in the United States in the past ten years (Mak, 2019). Therefore, information that is impacting one rural area in the United States could impact other areas, including the Appalachian Region.

4.1 | Recommendations for practice

Cultural competence is vital when working with veterans (Thomas, 2016; Thomas et al., 2015), as many veterans believe that nonmilitary affiliated providers will not be able to understand their experiences (Armstrong et al., 2019). It is important for providers to gain an understanding of the cultural differences among their patients, which includes military experience (Sanghera, 2020). In many areas, coalitions of veteran supportive agencies have developed to assist with disparities and to address issues of stigma. These coalitions help to streamline the system through which veterans can receive support in numerous ways, including housing, finance, health care and employment, which could impact their overall behavioural health. There are multiple coalitions in Alabama, with the number of coalitions currently growing to accommodate the growing number of veterans (e.g., Central Alabama Veterans Collaborative).

The phase two analysis of this study points to specific considerations within Alabama localities. Directed behavioural health programming is indicated as follows: veteran tobacco cessation programmes in Sumter County (a rural county; Office of Rural Health Policy, 2018); illicit drug treatment and prevention programmes in Tuscaloosa County (an urban county; Office of Rural Health Policy, 2018); alcohol use and misuse education and alcohol treatment programmes in Limestone County (an urban county; Office of Rural Health Policy, 2018); and suicide prevention/mental health promotion programmes in Limestone County. These results may provide important validation for counties seeking to develop and fund veteran-specific health programming. A potential

TABLE 2 County-level social risk factors for behavioural health outcomes among Alabama veterans and nonveterans (linear regression)

	Tobacco		Illicit drugs		Alcohol		Suicidal ideation	
	Veteran	Nonveteran	Veteran	Nonveteran	Veteran	Nonveteran	Veteran	Nonveteran
Variable	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)	b (SE)
Intercept	−1.13 (0.09)*	−1.19 (0.03)*	0.84 (0.13)*	1.14 (0.05)*	0.47 (0.15)	0.32 (0.11)	−0.17 (0.20)	−0.41 (0.13)
Unemployed	−0.04 (0.05)	−0.04 (0.02)	−0.04 (0.07)	0.07 (0.04)	−0.01 (0.09)	−0.51 (0.08)*	−0.04 (0.12)	−0.64 (0.10)*
HS education only	0.06 (0.08)	0.05 (0.03)	0.02 (0.11)	−0.01 (0.05)	0.07 (0.14)	0.27 (0.11)	−0.15 (0.18)	0.18 (0.13)
County home ownership	−0.09 (0.06)	−0.05 (0.03)	−0.21 (0.08)	−0.10 (0.04)	0.22 (0.10)	−0.02 (0.08)	0.02 (0.13)	−0.15 (0.10)
Average income	0.18 (0.08)	0.07 (0.03)	0.15 (0.12)	0.01 (0.05)	0.48 (0.14)	0.46 (0.11)*	0.43 (0.18)	0.53 (0.13)*
Crime rate	−0.02	−0.01 (0.02)	−0.02 (0.08)	0.01 (0.03)	−0.07 (0.10)	−0.12 (0.08)	−0.12 (0.13)	−0.16 (0.09)
Rural county	1.94 (0.13)*	2.04 (0.04)*	−1.45 (0.18)*	−1.96 (0.08)*	−0.80 (0.22)*	−0.56 (0.16)*	0.30 (0.28)	0.70 (0.19)*

*$p < .001$.

site for intervention may be local college campuses, particularly in Limestone County.

By building community services such as facilities on local college campuses and regional coalitions, Alabama may be able to help to expand services into more rural and remote areas. Focusing specifically on the Alabama Community College System, there are currently over 24 main campuses with 130 satellite campuses (Alabama Community College System, 2020). A partnership or supportive relationship with the Community College System would provide opportunities to access hard to reach remote rural areas. This would also support engaging with veterans who potentially are not active within the VA system within Alabama, which hosts 4 VA Medical Centers (VA MCs), 2 Outpatient Clinics, 14 Community Based Outpatient Clinics (CBOCs) and 4 Vet Centers throughout the state. While community colleges often advertise mental health services, those in rural communities may experience challenges with staffing, causing them to rely on unpaid interns. However, this has caused some rural campuses to look towards shifting towards support groups and group therapy opportunities to provide mental health services (Waters-Bailey et al., 2019). This may be particularly attractive to student veterans who wish to engage with other veterans and may encourage more open disclosure. Another approach may include opening veteran support groups to the community so that veterans who are actively enrolled as students could potentially engage with veterans in the community.

Other community resources that may be beneficial in rural communities would be churches or places of worship. Religious facilities in rural areas may be worthwhile hubs serving as entities for behavioural and mental health resources (Kirchner et al., 2011). Innovative partnerships such as those previously mentioned could provide a benefit, as well as agencies that can provide telehealth services. Telehealth and telemedicine services have had a large increase in implementation from 2014 and 2017 within VA facilities. Additionally, virtual relationships with both agencies locally and nationally can provide additional services and support to benefit mental health and substance use, especially urgent situations.

The challenges of tobacco use and suicidal ideation among veterans are well known by the Department of Defense and the VA. Active duty and retired service members can access cessation counseling, cessation medicine, quit lines and other services through their TRICARE coverage and other DOD programmes (CDC, 2020). Similarly, the VA offers several programmes and resources for veterans to prevent suicide. The VA recently launched the S.A.V.E. online suicide prevention training video in collaboration with PsychArmor Institute, a national nonprofit providing online education and support (VA, 2020).

However, the high levels of tobacco use and suicidal ideation seen in Alabama's rural veterans may also necessitate a targeted, local policy response, incorporating new health care delivery, education, and funding mechanisms. Alabama's Department of Public Health hosts 11 tobacco cessation programmes, which are mostly limited to the larger populated areas within the state (Alabama

Department of Public Health, 2020). However, the state does offer a free telephonic and virtual cessation programme, which has the potential to reach more individuals. There is not a veteran or military affiliated specific cessation programme offered through the state, but the VA does offer such programming. More attention needs to be paid to veterans, their families, and their providers by both informing them of available programmes and addressing the barriers that prevent their use. Additionally, new creative strategies and investment need to emerge to better understand and incorporate the needs and behaviours of Alabama's veteran population. A more targeted, county-level public surveillance approach informing existing services provided by the DOD and VA could lead to improvements for Alabama's veterans.

Veterans who adopt healthier behaviours as a result of health education and treatment programmes reduce their risk of developing disabling and life threatening diseases, associated costs, as well as improve their quality of life. According to Smoking Cessation: A Report of the Surgeon General, smoking cessation will improve overall health status, enhance quality of life, and reduce risk for adverse health effects including cardiovascular diseases, chronic obstructive pulmonary disease, and cancer. Additionally, smoking cessation will result in substantial cost savings for the smoker and add as many as 10 years life expectancy. (1) Furthermore, alcohol and illicit drug use often precede military suicides and high-risk behaviour resulting in deaths. (2, 3) Subsequently, prevention and treatment programmes for alcohol, illicit drug use, and mental health are imperative for better health outcomes including reduction in suicidal ideations and/or attempts as well as enhanced quality of life.

4.2 | Limitations

When considering the findings of this exploratory report, several limitations must be acknowledged. The sample was delimited to veteran and nonveteran respondents who completed the National Survey on Drug Use and Health survey. For veterans, the sample was likely comprised of veterans who were not in institutions or who were not homeless. Data were self-reported, which could be problematic due to respondent recall or reluctance to truthfully answer sensitive, personal questions. Response categories were limited in the dataset, including nonveteran status, gender as a binary variable and age. In order to hone the focus of this analysis and because of limitations in survey questions, exploration of preservice adverse experiences was not considered. Adverse childhood experiences may have contributed to tobacco, alcohol, illicit drug and suicidal ideation risks discovered in the sample populations.

Regarding small area estimation methods employed in this analysis, additional limitations apply. Specifically, representation of behavioural health outcomes relied on county boundaries. Smaller units of analysis (e.g., specific neighborhoods) would permit more targeted recommendations.

5 | CONCLUSION

To conclude, this study showed that illicit drug use and suicidal ideation have increased in Alabama among veterans and nonveterans in recent years. Furthermore, while tobacco use was higher in rural rather than urban counties, illicit drug use was higher in urban rather than rural counties. Behavioural health programmes and policies aimed at eliminating disparities and improving health outcomes between veterans and nonveterans, as well as between rural and urban areas, are needed in Alabama.

CONFLICT OF INTEREST

There is no conflict of interest to disclose.

AUTHOR CONTRIBUTIONS

All authors have contributed equally to the development of this manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available at https://nsduhweb.rti.org/respweb/homepage.cfm. These data were derived from the following resources available in the public domain: https://nsduhweb.rti.org/respweb/homepage.cfm

ORCID

David L. Albright https://orcid.org/0000-0002-5901-9393
Kirsten Laha-Walsh https://orcid.org/0000-0001-9871-7728

REFERENCES

Abdullah, A. S., Stillman, F. A., Yang, L., Luo, H., Zhang, Z., & Samet, J. M. (2014). Tobacco use and smoking cessation practices among physicians in developing countries: A literature review (1987–2010). *International Journal of Environmental Research and Public Health*, *11*(1), 429–455. https://doi.org/10.3390/ijerph110100429

Alabama Department of Mental Health (2018). *Alabama epidemiological profile: Alcohol, tobacco, other drug usage and abuse 2018*. Retrieved from https://mh.alabama.gov/wp-content/uploads/2019/07/Epi_Profile_2018_Final.pdf

Alabama Department of Public Health (2020). *Local cessation programs*. Retrieved from http://alabamapublichealth.gov/tobacco/local-cessation-programs.html

Albright, D. L., Holmes, L., Lawson, M., McDaniel, J. T., Laha-Walsh, K., & McIntosh, S. (2020). Veteran-nonveteran differences in alcohol and drug misuse by tobacco use status in Alabama SBIRT. *Journal of Social Work Practice in the Addictions*, *20*(1), 46–58. https://doi.org/10.1080/1533256X.2020.1705109

Albright, D. L., McCormick, W. H., Carroll, T. D., Currier, J. M., Thomas, K. H., Hamner, K., Slagel, B. A., Womack, B., Sims, B. M., & Deiss, J. (2018). Barriers and resources for veterans' post-military transitioning in South Alabama: A qualitative analysis. *Traumatology*, *24*(3), 236–245. https://doi.org/10.1037/trm0000147

Albright, D. L., McDaniel, J. T., Diehr, A. J., Paxton, J., Bresett, J., & Moss, A. (2020). Small area estimation of opioid abuse and co-morbid psychological distress among females living in the thirteen Appalachian region states. *Traumatology*, *26*(1), 61–67. https://doi.org/10.1037/trm0000202

Albright, D. L., McDaniel, J., Kertesz, S., Seal, D., Prather, K., English, T., & Laha-Walsh, K. (2019). Small area estimation and hotspot

identification of opioid use disorder among military veterans living in the southern United States. *Substance Abuse*, *42*(1), 116–122. https://doi.org/10.1080/08897077.2019.1703066

Albright, D. L., McDaniel, J. T., Laha-Walsh, K., Morrison, B., & McIntosh, S. (2020). Polysubstance abuse associated with more frequent opioid use among patients in rural primary care settings. *Journal of Opioid Management*, *16*(4), 283–289. https://doi.org/10.5055/jom.2020.0582

American Foundation for Suicide Prevention (2020). *Suicide statistics*. Retrieved from https://afsp.org/suicide-statistics/

Armstrong, C. M., Ortigo, K. M., Avery-Leaf, S. N., & Hoyt, T. V. (2019). Cultural considerations in using mobile health in clinical care with military and veteran populations. *Psychological Services*, *16*(2), 276. https://doi.org/10.1037/ser0000252

Bensley, K. M., Fortney, J., Chan, G., Dombrowski, J. C., Ornelas, I., Rubinsky, A. D., Lapham, G. T., Glass, J. E., & Williams, E. C. (2019). Differences in receipt of alcohol-related care across rurality among VA patients living with HIV with unhealthy alcohol use. *Journal of Rural Health*, *35*(3), 341–353. https://doi.org/10.1111/jrh.12345

Britch, R. (2019). *VA releases the 2019 national veteran suicide prevention annual report: US department of veterans affairs office of mental health and suicide prevention*. Retrieved from https://iava.org/blogs/2019-national-veteran-suicide-prevention-annual-report/

Center for Behavioral Health Statistics and Quality. (2019). *Key substance use and mental health indicators in the United States: Results from the 2018 national survey on drug use and health*. HHS Publication No. PEP19-5068, NSDUH Series H-54.

Centers for Disease Control and Prevention (2017). *NCHS Urban-Rural classification scheme for counties*. Retrieved from https://www.cdc.gov/nchs/data_access/urban_rural.htm

Centers for Disease Control and Prevention. (2018). *BRFSS prevalence and trends data: 2018*. Retrieved from https://www.cdc.gov/brfss/brfssprevalence/

Centers for Disease Control and Prevention. (2020). *Tips from former smokers, military service members and veterans*. Retrieved from https://www.cdc.gov/tobacco/campaign/tips/groups/military.html

Department of Defense (2019). *DOD releases report on suicide among troops, military family members*. Retrieved from https://www.defense.gov/Explore/News/Article/Article/1972793/dod-releases-report-on-suicide-among-troops-military-family-members/

Douthit, N., Kiv, S., Dwolatzky, T., & Biswas, S. (2015). Exposing some important barriers to health care access in the rural USA. *Public Health*, *129*(6), 611–620. https://doi.org/10.1016/j.puhe.2015.04.001

Dunlap, S. T., & McCallum, D. M. (2019). *Updated: The burden of tobacco in Alabama. Institute for Social Science Research, University of Alabama*. Retrieved from http://www.alabamapublichealth.gov/tobacco/assets/tobaccoburdenreport2019.pdf

Federal Bureau of Investigation (2020). *Uniform crime reporting program*. Retrieved from https://www.fbi.gov/services/cjis/ucr

Grant, B. F., Hasin, D. S., Chou, S. P., Stinson, F. S., & Dawson, D. A. (2004). Nicotine dependence and psychiatric disorders in the United States: Results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry*, *61*, 1107–1115. https://doi.org/10.1001/archpsyc.61.11.1107

Harms, P. D., Herian, M., Krasikova, D. V., Vanhove, A. J., & Lester, P. B. (2013). The comprehensive soldier and family fitness program evaluation. Report# 4: Evaluation of Resilience Training and Mental and Behavioral Health Outcomes. https://digitalcommons.unl.edu/pdharms/10/

Kirchner, J. E., Farmer, M. S., Shue, V. M., Blevins, D., & Sullivan, G. (2011). Partnering with communities to address the mental health needs of rural veterans. *Journal of Rural Health*, *27*(4), 416–424. https://doi.org/10.1111/j.1748-0361.2011.00362.x

LiveStories. (2020). *Alabama eteran demographics and statistics*. Retrieved from https://www.livestories.com/statistics/alabama/veteran-demographics

Lund, B. C., Ohl, M. E., Hadlandsmyth, K., & Mosher, H. J. (2019). Regional and rural-urban variation in opioid prescribing in the veterans health administration. *Military Medicine*, *184*(11–12), 894–900. https://doi.org/10.1093/milmed/usz104

Mak, L. A. (2019). A song of angry men: Affective polarization in the United States as a symptom of a democratic deficit.

Mann, N., Malarcher, A., Zhang, L., Shaikh, A., Thompson, J., & Chapman, L. (2020). National trends and state-level variation in the duration of incoming quitline calls to 1–800-QUIT-NOW during 2012–2015. *Journal of Smoking Cessation*, *1*, 8. https://doi.org/10.1017/jsc.2020.9

McDaniel, J. T., Lee, M., Albright, D. L., Lee, H. Y., & Maddock, J. (2020). Small area estimation of mental distress among United States military veterans in Illinois. *Community Mental Health Journal*, *56*, 298–302. https://doi.org/10.1007/s10597-019-00488-4

Monteith, L. L., Wendleton, L., Bahraini, N. H., Matarazzo, B. B., Brimner, G., & Mohatt, N. V. (2020). Together with veterans: VA national strategy alignment and lessons learned from community-based suicide prevention for rural veterans. *Suicide and Life Threatening Behavior*, *50*(3), 588–600. https://doi.org/10.1111/sltb.12613

National Center for Veterans Analysis and Statistics. (2017). *VA veteran population projection model, VA geographic distribution of expenditures, and VA annual benefits report*. Retrieved from https://www.va.gov/vetdata

National Institute on Drug Abuse (2020). *Substance use and military life*. Retrieved from https://www.drugabuse.gov/publications/drugfacts/substance-use-military-life

Odani, S., Agaku, I. T., Graffunder, C. M., Tynan, M. A., & Armour, B. S. (2018). Tobacco product use among military veterans – United States, 2010–2015. *MMWR Morbidity and Mortality Weekly Report*, *67*(1), 7–12. https://doi.org/10.15585/mmwr.mm6701a2

Office of Disease Prevention and Health Promotion. *Health people 2020: Social determinants of health*. Retrieved from https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Office of Rural Health Policy (2018). *List of rural counties and designated eligible census tracts in metropolitan counties*. Retrieved from https://www.hrsa.gov/sites/default/files/hrsa/ruralhealth/resources/forhpeligibleareas.pdf

Possible, A. (2020). *Poverty data sheet- 2020*. Retrieved from https://alabamapossible.org/programs/povertydatasheet/

Sanghera, N. (2020). Developing military cultural competency to better serve those who have served us. *Optometric Education*, *45*(2), 2019.

Seal, K. H., Cohen, G., Waldrop, A., Cohen, B. E., Maguen, S., & Ren, L. I. (2011). Substance use disorders in Iraq and Afghanistan veterans in VA healthcare, 2001–2010: Implications for screening, diagnosis and treatment. *Drug and Alcohol Dependence*, *116*(1–3), 93–101. https://doi.org/10.1016/j.drugalcdep.2010.11.027

Selman, J., Rogers, R., & Molloy, S. (2020). Negative alcohol and tobacco consumption behaviors in an Australian Army combat brigade. *Military Medicine*, *185*(5–6), e686–e693. https://doi.org/10.1093/milmed/usz406

Substance Abuse and Mental Health Services Administration. (2015). *Behavioral health barometer: Alabama, 2015*. HHS Publication No. SMA–16–Baro–2015–AL. Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration. (2019). *Substance use and mental health indicators in the United States: Results from the 2018 National Survey on Drug Use and Health (HHS Publication No. PEP19-5068, NSDUH Series H-54)*. Substance Abuse and Mental Health Services Administration. Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration (2020). *Substance abuse and mental health data archives*. Retrieved from https://datafiles.samhsa.gov/info/browse-studies-nid3454

System, A. C. C. (2020). *Find your campus*. https://www.accs.edu/community-college/find-college/

Teeters, J. B., Lancaster, C. L., Brown, D. G., & Back, S. E. (2017). Substance use disorders in military veterans: Prevalence and treatment challenges. *Substance Abuse and Rehabilitation*, *8*, 69–77. https://doi.org/10.2147/SAR.S116720

Thomas, K. H. (2016). Warrior culture. *O Dark Thirty*, *4*(2), 47–61.

Thomas, K. H., Taylor, S. P., Hamner, K., Glazer, J., & Kaufman, E. (2015). Multi-site programming offered to promote resilience in military veterans: A process evaluation of the Just Roll With It Bootcamps. *California Journal of Health Promotion*, *13*(2), 15–24. https://doi.org/10.32398/cjhp.v13i2.1820

Tien, H. C., Acharya, S., & Redelmeier, D. A. (2010). Preventing deaths in the Canadian military. *American Journal of Preventive Mmedicine*, *38*(3), 331–339. https://doi.org/10.1016/j.amepre.2009.12.012

Turvey, C. L., Lund, B. C., Jones, D., & Arndt, S. (2020). Community treatment for opioid use disorders in urban and rural veterans. *Journal of Rural Health*, *36*(2), 167–176. https://doi.org/10.1111/jrh.12406

United States Census Bureau (2020). *Advanced search*. Retrieved from https://data.census.gov/cedsci/advanced

United States Department of Agriculture (2020). *Rural-urban continuum codes*. Retrieved from https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx

United States Department of Veterans Affairs (2020). *Mental health*. Retrieved from https://www.mentalhealth.va.gov/suicide_prevention/

University of Alabama (2012). *Alabama: Rural or urban? 'It depends', according to UA analyst. Culverhouse College of Business: Alabama State Data Center*. Retrieved from https://www.ua.edu/news/2012/04/alabama-rural-or-urban-it-depends-according-to-ua-analyst/

University of Alabama (2017). *Quick facts*. https://www.ua.edu/about/quickfacts

Waters-Bailey, S., McGraw, M. S., & Barr, J. (2019) Serving the whole student: Addressing nonacademic barriers facing rural community college students. *New Directions for Community Colleges*, *2019*(187), 83–93. https://doi.org/10.1002/cc.20372

Young, J. P., Achtmeyer, C. E., Bensley, K. M., Hawkins, E. J., & Williams, E. C. (2018). Differences in perceptions of and practices regarding treatment of alcohol use disorders among VA primary care providers in urban and rural clinics. *Journal of Rural Health*, *34*(4), 359–368. https://doi.org/10.1111/jrh.12293

Young, L. B., Timko, C., Tyler, K. A., & Grant, K. M. (2017). Trauma in veterans with substance use disorder: Similar treatment need Among Urban and Rural Residents. *Journal of Rural Health*, *33*(3), 314–322. https://doi.org/10.1111/jrh.12199

How to cite this article: Albright DL, Fletcher KL, Thomas KH, et al. Behavioural health outcomes in veterans compared to nonveterans by rural and urban areas in Alabama, 2015–2018. *Health Soc Care Community*. 2022;30:e636–e646. https://doi.org/10.1111/hsc.13392