The Relationship Between Substance Use, Suicidality, and Access to Care Among Women Veterans: A Secondary Analysis of the Substance Abuse and Mental Health Services Administration National Survey on Drug Use and Health

by

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University of Pittsburgh, 2024

Women military Veterans represent a growing population with unique healthcare needs. Women Veterans are at risk for adverse mental health outcomes, including the development of substance use disorders, and are also at risk for suicidal ideation, plans, and attempts. Further, women Veterans may face gender-specific barriers to mental health care. Utilizing data from the 2015-2019 and 2021 Substance Abuse and Mental Health Services Administration (SAMHSA) National Survey on Drug Use and Health, this dissertation examines rates of substance use, specifically opioid, cannabis, and stimulants, and explores the relationship between substance use, suicidality, and access to substance use and mental health treatment among women Veterans.

The first paper within this dissertation describes rates of opioid, cannabis, and stimulant use and use disorders among women Veterans, while drawing comparisons between women non-Veterans and men Veterans.

The second paper within this dissertation examines the association between suicidality, including suicidal ideation, attempts, or plans, and substance use. This paper also examines whether the relationship between suicidality and substance use is moderated by access to substance use treatment.

The third paper within this dissertation explores barriers to accessing substance use disorder treatment among women Veterans and explores how these barriers might differ compared to women non-Veterans and men Veterans.

The key findings of this dissertation include that women Veterans are more likely to use cannabis than both women non-Veterans and men Veterans, but less likely to develop a cannabis use disorder. Women Veterans were also more likely to be prescribed opioids and to use non-prescribed prescription opioids but were not at increased risk for the development of an opioid use disorder. Non-prescribed prescription opioid use increased the odds of suicidal ideation among women Veterans, while lifetime cannabis use increased the odds of suicide plans among women Veterans. Women Veterans were more likely to report stigma-related barriers to accessing mental health treatment compared to both women non-Veterans and men Veterans. These dissertation findings contribute to what is known about substance use, suicidality, and access to care among women Veterans, and will help to inform the development of future interventions geared towards improving care for women Veterans.

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Preface

I would like to thank my dissertation committee members, Drs. James Egan, Christina Mair, Ann Mitchell, Vishwajit Nimgaonkar, and John Blosnich for their support as I completed this dissertation work. Your feedback throughout this process greatly enhanced the quality of this dissertation research and was invaluable. I am also grateful for the faculty and staff in the Department of Behavioral and Community Health Sciences. The past four years have been a wonderful experience, and I appreciate the opportunities for growth and professional development that were offered through the department.

1.0 Introduction and Background

Women are the fastest-growing demographic of Veterans, with projections that women will comprise 18% of all Veterans by the year 2040, as compared to 4% in 2004 (U.S. Department of Veterans Affairs, 2020). Women Veterans have unique risk factors related to substance use and the development of substance use disorders (SUDs) and are thought to have comparable rates of substance use and SUDs as men Veterans and higher rates compared to women non-Veterans. Alcohol use, heavy alcohol use, and alcohol use disorders are estimated to impact between one-quarter and one-third of women Veterans, with approximately one in ten women Veterans estimated to have met the Diagnostic and Statistical Manual of Mental Disorders 5th edition (DSM-5) criteria for alcohol use disorder within the past twelve months (Fuehrlein et al., 2016; Hoggatt, Jamison, et al., 2015; Wilson et al., 2018).

Compared to alcohol use, there is less empirical data regarding trends of opioid, cannabis, and stimulant use among women Veterans. Regarding opioid use, approximately 1% of women Veterans meet DSM-5 criteria for opioid use disorder, although there is evidence to suggest that women Veterans experience premature opioid-related morbidity and mortality compared to men Veterans and women non-Veterans (Beckman et al., 2022). From 2010 to 2018, age-adjusted opioid overdose rates were higher for women Veterans than women non-Veterans, and between 2010 to 2019, overdose mortality rates increased faster among women Veterans without Veterans Health Administration (VHA) use than those with VHA use (Beckman et al., 2022; Begley et al., 2022). Rates of cannabis use are also high among women Veterans, with past-month estimates exceeding 10% (Browne et al., 2018). Less is known about stimulant use among women Veterans.

However, psychostimulant overdose mortality rates are higher in women Veterans compared to women non-Veterans (Begley et al., 2022).

A further problem related to substance use is suicide, and suicide remains a public health problem among Veterans. While women Veterans are less likely to die by suicide compared to men Veterans, women Veterans are more likely to attempt suicide (Kimbrel et al., 2016). Women Veterans are disproportionately impacted by suicidal ideation and attempts (Blosnich & Bosarte, 2017; Blosnich et al., 2021; Hoffmire et al., 2021; Adams et al., 2021). Furthermore, substance use is a risk factor for suicidality in this population. Data from the Women Veterans Cohort Study demonstrated that more than one-half of women who died by suicide had a co-occurring SUD, and among women Veterans with at least one episode of self-directed violence (i.e., suicide attempts, non-suicidal self-injurious behavior), more than two-thirds had a co-occurring SUD. Further, the presence of a SUD doubled the risk of self-directed violence in women Veterans (Ronzitti et al., 2019). As it relates to the type of substance, there is substantial evidence to support an association between alcohol or opioid use and suicidality among women Veterans (Allan et al., 2019; Mahoney et al., 2021), although less is known about the relationship between cannabis or stimulant use and suicidality. Despite the prevalence of both SUDs and suicidality among women Veterans, little is known about how this impacts access to substance use or mental health care in this population. There is conflicting data as to whether women Veterans are more or less likely to access mental health treatment than their male peers (Meffert et al., 2019; Nichter et al., 2020). Nonetheless, unmet mental health and substance use needs are associated with an increased risk of suicidality in Veterans (Becerra et al., 2016). Thus, this chapter aims to explore the literature surrounding substance use, suicidality, and access to care among women Veterans.

1.1 Theoretical Framework

This dissertation research was developed leveraging multiple theoretical frameworks that support the association between substance use, suicidality, and lack of access to mental health and substance use treatment, particularly among women Veterans. The Substance Abuse and Mental Health Services Administration (SAMHSA; 2016) has called for a public health approach to address the intersection of substance use and suicidality and has reported that nearly one in four deaths by suicide involves substance use or intoxication. The interpersonal-psychological theory of suicide posits that suicidal ideation or desire emerges when individuals experience feelings of perceived burdensomeness and thwarted belongingness, coupled with the acquired capability to act on suicidal thoughts (Chu et al., 2017; Van Orden et al., 2010). Recent work has examined the interpersonal theory of suicide (ITS) in women Veterans, specifically, highlighting that women Veterans may be predisposed to experiencing both thwarted belongingness, perceived burdensomeness, and acquired capability (Schuman et al., 2019). Exiting military service can result in individuals losing the high degree of comradery inherent with service, magnified in women who may be excluded from male-dominated post-military culture (i.e., the American Legion; Veterans of Foreign Wars (VFW) clubs), leading to feelings of invalidation, invisibility, and potentially thwarted belongingness. Women Veterans might also be at increased risk for experiencing perceived burdensomeness, particularly those who experienced military sexual trauma or who served in combat zones, and previous research has highlighted that perceived burdensomeness among women Veterans is associated with suicidal ideation (Monteith et al., 2017). Additionally, women Veterans with a history of military sexual or combat trauma are at increased risk for acquired capability due to desensitization of violent or high-risk encounters (Schuman et al., 2019). Further, the ITS has been examined within the context of substance use,

and substance use is related to perceived burdensomeness, thwarted belongingness, and acquired capability (Baer et al., 2022; see Figure 1).

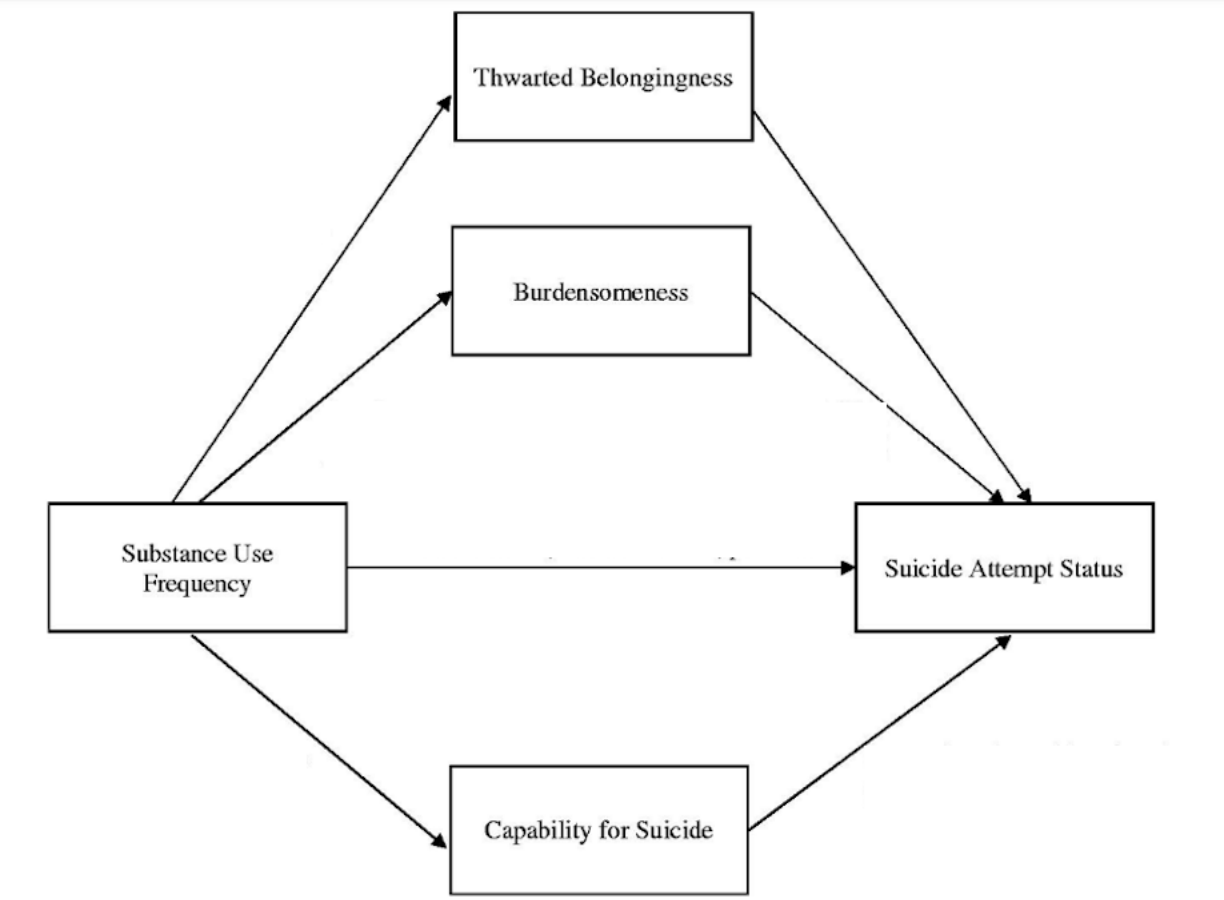

Figure 1 Association Between Susbtance Use Frequency, Suicide Attempts, and ITS Constructs

Evidence also suggests that women Veterans might be less likely to access substance use and mental health treatment compared to their peers (Klap et al., 2019), which is concerning because the majority of individuals with SUDs do not seek treatment (Paquette et al., 2022). Receipt of substance use and mental health treatment might be further limited by internalized and anticipated stigma, which can act as a barrier to receiving treatment (Earnshaw et al., 2013).

Furthermore, there are a limited number of gender-specific substance use and mental health treatment options within the VHA, and thus this may further serve as a deterrent for women Veterans in need of specialized treatment. Likely, poor access to treatment compounds substance use and mental health problems within this population, as Veterans with unmet substance use and mental health treatment needs are at increased risk for suicidal ideation (Carter et al., 2016).

1.2 Substance Use as a Public Health Problem Among Women Veterans

The growing number of women Veterans, coupled with the increasing rates of substance use on a national scale, has resulted in a public health issue as it relates to cannabis, opioid, and stimulant use among women Veterans.

1.2.1 Cannabis Use

There is only emerging evidence about the incidence and prevalence of cannabis use among women Veterans; thus, this is an area worthy of exploration. In the first decade that followed the wars in Iraq and Afghanistan, rates of cannabis use among Veterans of both sexes increased by more than 50% (Bonn-Miller et al., 2012). Regarding the prevalence of cannabis use among women Veterans, Browne et al. (2018) utilized an online, web-based survey (n = 636) to recruit a national sample of women Veterans. About 10% of women Veterans reported having used cannabis within the past month, with higher rates among lesbian or bisexual women at 20%. Additionally, women Veterans who reported heavy alcohol use or tobacco use were more likely to report having used cannabis within the past month than those who had not reported heavy alcohol

or tobacco use (Browne et al., 2018). Most women Veterans who endorse cannabis or other illicit substance use initiate use after military service exit (Evans et al., 2018).

1.2.2 Opioid Use

There is conflicting evidence as it relates to sex differences in at-risk opioid use or opioid use disorder (OUD) among military Veterans. However, emerging evidence suggests that a growing proportion of Veterans who engage in at-risk opioid use are women (Kroll-Desrosiers et al., 2016; Mosher et al., 2015). In a recent study utilizing VHA administrative data (n = 8,065,858), the overall prevalence of OUD was 1% across sexes, with about 0.8% of women Veterans with OUD (Beckman et al., 2022). Of the approximate 50,000 Veterans diagnosed with OUD annually, about 6% are women (Peltier et al., 2021). On a national scale, there are increasing rates of opioid-related mortality, primarily driven by opioid overdose in the context of the increased proliferation of fentanyl in the community.

Regarding overdose statistics in Veterans, Begley and colleagues (2022) utilized retrospective, cross-sectional data from VHA medical records, the VA/Department of Defense Mortality Data Repository, and CDC WONDER to assess drug overdose mortality by drug type and recent receipt of VHA services among Veterans while comparing rates between Veterans and civilians. This was a large, nationally representative sample with data triangulated from multiple sources. There was a 53% increase in age-adjusted overdose mortality rates among Veterans with a rate of 30.3 per 100,000 in 2019 among Veterans, primarily related to opioid overdose. From 2010 to 2018, age-adjusted overdose rates were higher for Veteran women than non-Veteran women and between 2010 to 2019, overdose mortality rates increased faster among women Veterans without VHA use than those with VHA use.

1.2.3 Stimulant Use

Over the last five years, psychostimulant use throughout the United States has risen considerably (CDC, 2021; NIDA, 2023). Nonetheless, there is scant data surrounding stimulant use among Veterans, and even fewer data available surrounding stimulant use among women Veterans, specifically. Between 2005 and 2019 there was an average increase in methamphetamine use of about 15% among Veterans (Warfield et al., 2022), and in 2019, about 0.62% of women Veterans receiving VHA care were diagnosed with a stimulant use disorder, an increase from about 0.22% in 2009 (Hoggatt et al., 2023). Furthermore, between 2009 and 2019, rates of stimulant use disorder among women Veterans increased more rapidly than other SUDs among Veterans receiving VHA care (Hoggatt et al., 2023). Between 2015 and 2019, there was a 15% increase in rates of stimulant use disorders among women Veterans utilizing VHA services.

1.3 Suicide Among Women Veterans

Evidence suggests that women Veterans are disproportionately impacted by suicidality, including suicidal ideation and suicide attempts. In a sample of 3,004 Veterans seeking primary care within the VHA, about one-quarter reported a history of suicidal ideation and 2% reported a history of suicide attempts (Ashrafioun et al., 2016). While this study included a small percentage of women Veterans (about 10%), results were not significantly different between sexes. There is evidence to suggest that women, in general, are less likely to die by suicide but more likely to attempt suicide compared to men (Bozzay et al., 2014). These findings are consistent among Veterans, with data suggesting that women Veterans are more likely to attempt suicide as

compared to men Veterans (Kimbrel et al., 2016). Other evidence has suggested that women Veterans are slightly less likely to report suicidal ideation as compared to men (Corson et al., 2013). Regarding temporal trends, there are differences between men and women Veterans. In the year following military separation, rates of death by suicide are estimated at 36.2 and 9.1 per 100,000 in men and women, respectively. However, rates of death by suicide in men decrease consistently over time, while rates among women Veterans remain variable and increase to a peak of 15 per 100,000 in the first five years following separation (Bullman et al., 2015).

1.3.1 Substance Use and Suicide Among Women Veterans

In the work of Denneson et al. (2016) who examined women Veterans who died by suicide, substance use was compounded by inadequate treatment, polypharmacy, and controlled substance prescriptions. While the sample size was small, most women Veterans were prescribed an antidepressant medication for greater than three months, were prescribed a benzodiazepine, had a depressive disorder, or had chronic pain, and about 70% of the sample had utilized mental health services within the six months before their death (Denneson et al., 2016). Ronzitti et al. (2019) aimed to examine gender-related differences in death by suicide and self-directed violence among Veterans diagnosed with PTSD with or without comorbid SUDs. The authors utilized data from the Women Veterans Cohort Study (n = 352,476), 10% of which were women. Women Veterans were more likely to be diagnosed with PTSD without a comorbid SUD and were more likely to have depression, anxiety disorders, or bipolar disorders as compared to men. Women Veterans were less likely to die by suicide, although were 13% more likely to have had at least one episode of self-directed violence. Among both men and women Veterans who died by suicide, more than one-half had a co-occurring SUD, and among those with at least one episode of self-directed

violence, more than two-thirds had a co-occurring SUD. While having a SUD did not increase the risk of death by suicide in women Veterans, the presence of SUD doubled the risk of self-directed violence in women Veterans (Ronzitti et al., 2019).

Ronzitti and colleagues' (2019) work diverges from that of Bohnert and colleagues (2017), who conducted a cross-sectional analysis of VHA administrative data (n = 4,460,447) to estimate overall and SUD-specific suicide rates and examine associations between SUDs and suicidality. Approximately 8% of the sample were women. There was an association between SUDs and the risk of death by suicide, and while men were more likely to die by suicide and were more likely to have a SUD, the strength of association was stronger among women Veterans. Suicide rates were highest among those with sedative use disorder, followed by opioid, amphetamine, alcohol, cocaine, and cannabis use disorders in women Veterans. When psychiatric diagnoses were accounted for, the differences between men and women as it relates to the association between SUDs and suicidality were still present but attenuated (Bohnert et al., 2017).

Ashrafioun and others (2016) found that drug use predicted suicide attempts but not suicidal ideation in a sample of Veterans seeking primary care within the VHA. Similarly, Ashrafioun et al. (2020) highlighted that OUD was associated with a two-fold increase in suicide attempts among Veterans receiving treatment for pain management, and that additive effects were seen in relation to suicide attempt risk when OUD co-occurred with either depression or AUD. In a sample of 130 Veterans deemed high-risk for suicide (i.e., reported suicidal ideation in the past 30 days and identified as high risk for suicide by the local VHA Suicide Prevention Coordinator), past-year opioid use, compared to other illicit substance or alcohol use in the past year, was associated with increased risk in a past-year suicide attempt (Chesin et al., 2019). Women comprised about 10% of the sample, and there were no significant differences between men and

women Veterans, although the small number of women makes it difficult to draw substantial gender-based conclusions.

Allan et al. (2019) examined the effects of PTSD symptoms and past 30-day alcohol, opioid, and cannabis use on suicidal thoughts and behaviors over twelve months in both military service members and post-9/11 Veterans who were not already engaged in behavioral health treatment. Participants (n = 545) were recruited through social media and print media advertisements to participate in a telephone-administered clinical trial related to decision-making about mental health treatment. Inclusion criteria included lifetime suicide attempts and/or passive suicidal ideation within the prior two weeks. Substance use was measured through the Addiction Severity Index (ASI). Suicidality, including ideation and behavior, was measured by the Columbia Suicide Severity Rating Scale (CSSRS), and PTSD symptoms were measured through the PTSD Checklist for the DSM-IV, Military Version (PCL-M). The ASI, CSSRS, and PCL-M have been well validated across multiple studies and diverse populations. In this study, neither alcohol use nor opioid use was associated with an increased risk of suicidal ideation or behavior, a divergence from multiple previous studies among both Veterans and civilians (Adams et al., 2021; Lynch et al., 2020; Ronzitti et al., 2019). Past 30-day cannabis use with comorbid PTSD was a strong predictor of future suicidal behavior (Allan et al., 2019). However, most participants in this study were men, and findings related to women Veterans, exclusively, were not reported.

There is emerging evidence as it relates to increasing numbers of cannabis use disorders among women Veterans and associated morbidity and mortality. To date, there is no published research exploring the association between cannabis use disorder and suicidality in women Veterans exclusively, although there is much evidence to support a positive association between cannabis use and suicide attempts, non-suicidal self-injurious behavior, and death by suicide in

Veterans of both sexes (Kimbrel et al., 2017; Kimbrel et al., 2018). Lifetime cannabis use disorder is associated with a nearly eight-fold increase in the odds of post-deployment suicide attempts, and there is evidence to suggest that this association is stronger in men Veterans as compared to women Veterans (Adkisson et al., 2019).

1.4 Substance Use and Mental Health Treatment Access Among Women Veterans

There is conflicting evidence about health care access among women Veterans. While most women Veterans seek care outside of the VHA (Washington et al., 2015), there is conflicting data as to whether women Veterans are more or less likely to access VHA care as compared to men (Meffert et al., 2019; Nichter et al., 2020). Some evidence suggests that women Veterans are more likely as compared to men to receive adequate mental health treatment; although notably, only 25% of Veterans across both sexes who could benefit from mental health treatment receive it (Hoerster et al., 2012). The consequences of health care access disparities in women Veterans can be grave as it relates to both substance use and self-injurious outcomes. Utilizing data from the 2008-2013 National Survey on Drug Use and Health (NSDUH), Becerra et al. (2016) examined the association between unmet healthcare needs and mental health outcomes in a sample of 2,015 Veterans, 14% of whom were women. Over 15% of respondents reported having unmet mental healthcare needs, and unmet needs were associated with a four-fold increase in odds of suicidal ideation. Furthermore, there is emerging, but still, limited evidence related to racial and ethnic health care disparities among women within the VHA, specifically (Carter et al., 2016)

In a sample of the National Post-Deployment Adjustment Survey (NPDAS), Elbogen et al. (2013), examined the use of treatment provided by VHA and non-VHA services in post-9/11

Veterans. About 7% of Veterans had been hospitalized for mental health treatment in their lifetime, 56% of whom had been hospitalized at a VHA facility. Of the 25% of Veterans who had previously sought outpatient mental health treatment, 62% had done so at a VHA facility. A larger proportion of women veterans as compared to men reported using exclusively non-VHA facilities for both inpatient and outpatient mental health treatment. Irrespective of the source of care, women Veterans were more likely than men to report having current mental health problems and were more willing to seek treatment (Elbogen et al., 2013). This finding supports the fact that while women with mental health problems, including mental health and substance use problems, may be more likely to seek treatment as compared to men, they may face perceived or tangible barriers in doing so through the VHA.

There remains a limited availability of gender-specific substance use treatment programs within the VHA. Heslin et al. (2015) sought to examine the availability of women's specialty substance use treatment programming within the VHA as compared to the civilian or private sector utilizing the 2012 National Survey of Substance Abuse Treatment Services. In the civilian or private sector, 31% of substance use treatment programs had services exclusively for women; however, of the 214 VHA substance use treatment programs, only 41 (19.1%) offered services exclusively for women. This percentage was lower than all other treatment program categories, including those facilitated by other federal agencies (Department of Defense and Indian Health Service), state, local, or tribal programs, and both private for-profit and non-profit programs (Heslin et al., 2015). Even more alarmingly, for residential substance use treatment programs, only 1 of 140 VHA facilities offered women-only residential substance use treatment (Timko et al., 2017). At present, it does not appear that there have been published program evaluations related to outcomes of gender-specific substance use treatment programs.

1.5 Discussion

Women Veteran differ from their peers (women non-Veterans and men veterans) as it relates to both substance use and mental health outcomes, in addition to access to treatment. Thus, additional research is needed to better characterize substance use and mental health outcomes, including suicidality and access to care, among women Veterans. This dissertation seeks to understand how women Veteran differ from women non-Veterans and men Veterans as it relates to substance use, suicidality, and access to care, as will be further described in Chapter 2.

2.0 Specific Aims

The specific aims of this study were to:

1. Examine rates of opioid (defined as both heroin and non-prescribed prescription analgesic use), cannabis, and stimulant use and use disorders among women Veterans, and make comparisons between women non-Veterans and men Veterans.
2. Examine rates of suicidality among women Veterans and make comparisons between women non-Veterans and men Veterans.
3. Examine the relationships between opioid (defined as both heroin and non-prescribed prescription analgesic use), cannabis, and stimulant use and use disorders among women Veterans and suicidality.
4. Examine the relationship between substance use/SUDs and suicide and examine if this relationship is moderated by access to SUD treatment.
5. Examine reasons for not seeking substance use or mental health treatment among women Veterans with a SUD and make comparisons between women non-Veterans and men Veterans.

2.1 Approach

This study examined rates of substance use (specifically opioid, cannabis, and stimulants) among women Veterans, and explored the effects of suicidality on substance use and access to substance use and mental health treatment in this population. Data from the 2015 to 2019 and 2021

SAMHSA NSDUH were utilized, in an effort to fill a gap in the literature by including women Veterans who do not seek VHA care. These analyses allowed for a more comprehensive understanding of the relationship between substance use, suicidality, and access to care among women Veterans.

2.1.1 Setting and Population

This study focused on United States military Veterans who identify as women. Notably, active-duty military personnel were excluded from this analysis. The sampling frame NSDUH includes all non-institutionalized persons over the age of 12 years residing in the United States. The NSDUH employs a stratified multistage area probability sampling method to represent the entire United States as a whole, and for each of the fifty states included and the District of Columbia. When possible, interviews were conducted in person with the use of audio computer-assisted self-administered interviews for sensitive items (SAMHSA, 2021). Nonetheless, given the COVID-19 pandemic and associated restrictions, web-based interviews were utilized when pandemic restrictions did not permit in-person data collection. Thus, data from the 2015 to 2019 and 2021 NSDUH were unable to be combined, as the methodology changed in 2021 to allow for web-based interviews.

This dissertation research was written to include three standalone papers, which will be presented in Chapters 3 through 5. Paper 1 (Chapter 3) utilized data from the 2015 to 2019 NSDUH and the 2021 NSDUH. Women Veterans were compared to women non-Veterans and men Veterans on substance-related outcomes, including lifetime substance use, frequency of past 30-day substance use, and past-year SUDs for cannabis, opioids, and stimulants. Paper 2 (Chapter 4) utilized data from the 2015 to 2019 NSDUH to examine differences in past twelve-month suicidal

ideation, plans, and attempts between women Veterans, women non-Veterans, and men Veterans, while also examining substance-related predictors for suicidality among women Veterans, women non-Veterans, and men Veterans. Paper 3 (Chapter 5) examined past-year receipt of mental health treatment and past-year inability to access mental health treatment among women Veterans, women non-Veterans, and men Veterans with a past-year SUD utilizing data from the 2015 to 2019 NSDUH and examined predictors of past-year inability to access mental health treatment among the aforementioned groups.

2.2 Significance

While women Veterans are a growing population, they remain a vulnerable group for which there is limited research available, particularly as it relates to mental health and substance use-related outcomes. Furthermore, most of the literature, as outlined in Chapter 1, utilizes VHA administrative data to examine outcomes among women Veterans. Thus, women Veterans who do *not* use VHA services are excluded from the majority of research conducted, a major limitation within the current body of literature. Utilizing data from the NSDUH allows for the inclusion of women Veterans who do not seek VHA care, and thus not only fills a gap within the literature, but also may inform future work that is needed for outreach to women Veterans utilizing non-VHA services. The vast majority of work published to date relies on VHA administrative data utilizes electronic health record data rather than self-report, which may result in inaccuracies or discrepancies related to the nature of provider coding. While self-report data is also subject to potential biases, the NSDUH has been validated since its inception in 1971 and may better identify

individuals with SUDs who have not sought treatment and who otherwise would not be captured utilizing electronic health record data.

Improving care for women Veterans is a priority for the VHA. Since 2013, there has been an increase in funding for VHA research that focuses on women's health issues, resulting in an increase in the number of gender-specific services and programs offered through the VHA (U.S. Department of Veterans Affairs, 2014), yet additional research is still needed. This dissertation work will add to the body of literature surrounding mental health and substance use among women Veterans, and can be utilized to inform future, targeted interventions for this population.

3.0 Women Veterans and Risk of Illicit Substance Use and Use Disorders, 2015 – 2019 and 2021: A Secondary Analysis of the National Survey on Drug Use and Health

3.1 Introduction

Women military Veterans represent a growing population with unique healthcare needs. Women are the fastest-growing demographic of Veterans, with projections that women will comprise 18% of all Veterans by the year 2040, as compared to 4% in 2004 (U.S. Department of Veterans Affairs, 2020). Despite the increase in the number of women Veterans, this population continues to face health disparities compared to their peers, and gender-specific barriers related to mental health and substance use treatment access (Dyer et al., 2019; Klap et al., 2019). There have been longstanding calls to strengthen gender-specific treatment options within VHA facilities (American College of Obstetricians and Gynecologists, 2022; Congressional Research Service 2021), contributing to a 20% increase in the number of women Veterans accessing VHA care (Marshall et al., 2021). While there has been an increase in the number of women Veterans utilizing VHA services, evidence continues to suggest that the majority of women Veterans seek non-VHA care (Washington et al., 2015).

Substance use remains a public health problem throughout the United States. Between 1999 and 2021, drug overdose deaths related to opioids and psychostimulants have increased from about 20,000 to 106,000 opioid-related deaths per year and 4,000 to 53,000 stimulant-related deaths per year (National Institute on Drug Abuse [NIDA], 2023). Veterans are disproportionately impacted by substance use and associated sequelae. Between 2010 and 2019, there was a 53% increase in age-adjusted overdose mortality rates among Veterans with a rate of 30.3 per 100,000 in 2019

among Veterans, and a 93% increase in age-adjusted opioid overdose mortality rates. From 2010 to 2018, age-adjusted overdose rates were higher for women Veterans than women non-Veterans and between 2010 to 2019, overdose mortality rates increased faster among women Veterans without VHA use than those with VHA use (Begley et al., 2022). This and other emerging evidence suggest that a growing number of Veterans who engage in at-risk opioid use are women (Kroll-Desrosiers et al., 2016; Mosher et al., 2015). In a recent study utilizing VHA administrative data (n = 8,065,858), the overall prevalence of OUD was 1% across sexes, with about 0.8% of women Veterans with OUD (Beckman et al., 2022). Further, of the approximate 50,000 Veterans diagnosed with OUD annually, about 6% are women (Peltier et al., 2021).

While overdose deaths have been historically associated with opioid use, there has been a rise in psychostimulant-associated overdose throughout the United States, coupled with a rise in psychostimulant use (NIDA, 2023), and a three-fold increase in stimulant overdose deaths among Veterans between 2012 and 2018 (Coughlin et al., 2022). Between 2005 and 2019 there was an average increase in methamphetamine use of about 15% among Veterans (Warfield et al., 2022), and in 2019, about 0.62% of women Veterans receiving VHA care were diagnosed with a stimulant use disorder, an increase from about 0.22% in 2009 (Hoggatt et al., 2023). Furthermore, between 2009 and 2019, rates of stimulant and cannabis use disorder among women Veterans increased more rapidly than other SUDs among Veterans receiving VHA care (Hoggatt et al., 2023). Between 2015 and 2019. There was a 15% increase in rates of stimulant use disorders among women Veterans utilizing VHA services.

Cannabis use and use disorders are also on the rise among Veterans. In the first decade that followed the wars in Iraq and Afghanistan, rates of cannabis use among Veterans of both sexes increased by more than 50% (Bonn-Miller et al., 2012). Among women Veterans, about 10%

report having used cannabis within the past month (Browne et al., 2018), and the majority of women Veterans who used cannabis reported initiating use after military service exit (Evans et al., 2018). Among women Veterans who use VHA services, about 2% were diagnosed with a cannabis use disorder in 2019, an eight-fold increase from 2009 (Hoggatt et al., 2023).

Cannabis, opioid, and stimulant use is on the rise among women Veterans, highlighting the need for gender-focused evidence-based screening and treatment interventions in this population. There is a paucity of population-based research examining substance use among women Veterans, and the majority of research to date has sampled women who are utilizing VHA services, whether through VHA electronic health record review or through surveys of VHA users, thus not capturing all women Veterans regardless of care source (Washington et al., 2015). Thus, the purpose of this study is to examine rates of substance use and SUDs (cannabis, opioid, and stimulant) among a nationally representative sample that includes both Veterans and non-Veterans, drawing comparisons between women Veterans and their women non-Veteran and men Veteran peers.

3.2 Methods

3.2.1 Setting and Population

Participants for this secondary data analysis included individuals over the age of eighteen years who completed the SAMHSA NSDUH from 2015 to 2019 (n = 214,505) and 2021 (n = 47,291). Surveys from 2015 to 2019 were combined as methodology during these years was unchanged; data from 2021 was analyzed separately as changes in methodology, largely related to the COVID-19 pandemic and a decrease in face-to-face interviews, did not allow for post-COVID

data to be combined with pre-pandemic data as per SAMHSA. Women Veterans were compared to their peers, including women non-Veterans and men Veterans. The NSDUH employs a stratified multistage area probability sampling method to represent the entire United States as a whole and for each of the fifty states included and the District of Columbia. When possible, interviews are conducted in person with the use of audio computer-assisted self-administered interviews for sensitive items. Nonetheless, given the COVID-19 pandemic and associated restrictions, web-based interviews were utilized when pandemic restrictions did not permit in-person data collection. Thus, pre-pandemic data from 2015 to 2019 was analyzed separately from 2021 data due to these methodological changes. Data from the 2020 NSDUH was not included in the analysis due to the relatively small sample size, and due to changes in data collection methodology that occurred midway through the data collection period.

3.2.2 Variables and Measures

Outcome variables included lifetime use, past-year use disorder, and frequency of use over the past month for the following substances: cannabis, opioids (heroin, prescription opioid, and non-prescribed prescription opioids), and stimulants (cocaine, crack-cocaine, methamphetamine, and non-prescribed prescription stimulants). Lifetime cannabis, opioid, and stimulant use, in addition to past-year cannabis, opioid, and stimulant use disorders, were assessed dichotomously (yes/no). The frequency of cannabis, opioid, and stimulant use over the past month was assessed continuously, ranging from 0 to 30 days. Based on responses to items related to gender and past military service, respondents were grouped by age and Veteran status, including women Veterans, women non-Veterans, and men Veterans, for the purpose of between-group comparisons. Veteran status was assessed by the following questions: “Have you ever been in the United States Armed

Forces?" and "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?" Sexual orientation was reported as heterosexual, lesbian/gay or bisexual. Race/ethnicity was reported as non-Hispanic White, Non-Hispanic Black, Non-Hispanic Native American or Alaska Native, Non-Hispanic Native Hawaiian, Non-Hispanic Asian, Non-Hispanic Multiracial, and Hispanic. Age was reported in the following groups: 21 – 23 years, 24 – 25 years, 26 – 29 years, 30 – 34 years, 35 – 49 years, 50 – 64 years, and 65 years and older.

3.2.3 Data Analysis

All analyses were conducted utilizing IBM SPSS Statistics Version 29.0.1.0, and significance was set at alpha < 0.05. Prevalence estimates of lifetime substance use, past-year SUD, and past-month frequency of substance use were examined across groups. Univariate analyses of variance (ANOVAs) were conducted to compare average past-month cannabis, opioid, and stimulant frequency across groups. Omnibus $\chi 2$ tests were utilized to examine differences in lifetime cannabis, opioid, and stimulant use, in addition to past-year cannabis, opioid, and stimulant use disorders, between women Veterans, women non-Veterans, men Veterans, and the entire sample, with posthoc Wald tests also conducted.

Bivariate analyses, including $\chi 2$ tests, were utilized to calculate odds ratios. Binary logistic regression analyses were utilized to calculate adjusted odds ratios for various substance use variables (i.e., lifetime substance use, and past-year SUDs), controlling for age, race/ethnicity, sexual orientation, and past-year major depressive episodes. Sex and Veteran status were included as a variable in each model, and the sample size for these models included the entire population of adults over the age of 18 years. Separate analyses were conducted with the aforementioned

covariates and each individual substance use variable. Due to the relatively small number of Veterans who reported lifetime substance use and past-year substance use disorders, it was not possible to include all of the substance use variables in the same model.

3.3 Results

The total sample consisted of 261,796 adults over the age of 18 years. A total of 214,505 individuals were included from the combined 2015 – 2019 dataset and a total of 47,291 individuals were included from the 2021 dataset. Between 2015 and 2019, women Veterans comprised approximately 0.8% of the sample (n = 1,655), and in 2021, women Veterans comprised approximately 0.9% of the sample (n = 436). From 2015 to 2019 and in 2021, the majority of women Veterans, women non-Veterans, and men Veterans were non-Hispanic and White. During both time periods, Veterans in both groups were less likely to self-identify as Hispanic than women non-Veterans and the total sample. Women Veterans were more likely to identify as gay or bisexual compared to both women non-Veterans, men Veterans, and the total sample. Women non-Veterans tended to be younger than both women Veterans and men Veterans. See Table 1 for more details on demographic data.

3.3.1 Cannabis Use

3.3.1.1 Lifetime Cannabis Use

From 2015 to 2019 and in 2021, women Veterans were more likely than both women non-Veterans and men Veterans to have ever used cannabis ($p < 0.001$). Approximately 58% and 55%

of women Veterans reported having used cannabis in their lifetime from 2015 to 2019 and in 2021, respectively. From 2015 to 2019, women Veterans were about 53% more likely to have used cannabis in their lifetime compared to their non-Veteran counterparts (OR = 1.53 [1.38 – 1.68], $p < 0.001$), and about 24% more likely to have used cannabis in their lifetime compared to men Veterans (OR = 1.24, [1.11 – 1.37], $p < 0.001$). In 2021, women Veterans were about 28% more likely to have used cannabis in their lifetime compared to their non-Veteran counterparts (OR = 1.28 [1.06 – 1.55], $p = 0.005$). Lifetime cannabis use between women and men Veterans did not significantly differ. When controlling for past-year depression and demographic characteristics, women Veterans had increased odds of lifetime cannabis use between 2015 and 2019 (aOR = 1.17 [1.06 – 1.29, $p = 0.002$) compared to the general population, but not in 2021. See Tables 2 and 5 for details.

3.3.1.2 Past-Year Cannabis Use Disorder

From 2015 to 2019, women Veterans were less likely than their non-Veteran counterparts to have been diagnosed with a cannabis use disorder within the past year ($p < 0.001$). In 2021, women Veterans were less likely than women non-Veterans, but were more likely than men Veterans, to have been diagnosed with a cannabis use disorder within the last year ($p < 0.001$). Approximately 1% and 5.3% of women Veterans were diagnosed with a cannabis use disorder from 2015 to 2019 and in 2021, respectively. From 2015 to 2019, women Veterans were about 45% less likely to have experienced a cannabis use disorder within the past year compared to women non-Veterans (OR = 0.55 [0.34 – 0.89], $p = 0.007$). Women Veterans did not differ from men Veterans regarding past-year cannabis use disorder. Between 2015 and 2019, the adjusted odds ratio for past-year cannabis use disorder among women Veterans was 0.52 [0.32 – 0.85] ($p =$

0.008), but in 2021, the odds of past-year cannabis use disorder among women Veterans was not significant.

3.3.1.3 Past-Month Frequency of Cannabis Use

Amongst all three groups, between 2015 and 2019, the average number of days in which cannabis was used was 1.55, and this increased to 2.20 days in 2021. Among women Veterans, specifically, the average number of days in which cannabis was used between 2015 to 2019 was 1.23, increasing to 2.34 days in 2021. Between 2015 and 2019, the average number of days in which cannabis was used was lower among women Veterans compared to both women non-Veterans and men Veterans ($p = 0.048$), although in 2021, there were not significant differences between groups.

3.3.2 Opioid Use

3.3.2.1 Lifetime Opioid Use

Approximately 1.8% of women Veterans reported lifetime heroin use from 2015 to 2019 and in 2021. From 2015 to 2019, women Veterans were more likely than women non-Veterans ($p < 0.001$), but less likely than men Veterans, to have used heroin in their lifetime, while in 2021, women Veterans were less likely than both groups to have used heroin in their lifetime ($p = 0.029$), as outlined in Table 2. Between 2015 and 2019, women Veterans were approximately 40% less likely than men Veterans to have used heroin in their lifetime (OR = 0.59 [0.40 – 0.87], $p = 0.003$). Regarding lifetime prescription opioid use, approximately 80% and 70% of women Veterans had used prescription opioids in their lifetime from 2015 to 2019 and 2021, respectively, with women Veterans more likely than both women non-Veterans and men Veterans to have used prescription

opioids across both timeframes ($p < 0.001$). Between 2015 and 2019, women Veterans were about 250% and 80% more likely to have used prescription opioids compared to women non-Veterans (OR = 2.49 [2.20 – 2.82] and men Veterans (OR = 1.81 [1.59 – 2.06], respectively ($p < 0.001$). When controlling for past-year depression and demographic characteristics, women Veterans had increased odds of lifetime prescription opioid use between 2015 and 2019 (aOR = 2.16 [1.90 – 2.46], $p <0.001$), and in 2021 (aOR = 1.39 [1.12 – 1.73], $p = 0.003$), and although had a decreased odds of lifetime heroin use between 2015 and 2019 and in 2021 compared to the general population. See Table 5 for details. Regarding non-prescribed prescription opioid use, approximately 12.3% of women Veterans report a lifetime history of non-prescribed prescription opioid use, compared to 10.6% (OR = 1.19, [1.02 – 1.37], $p = 0.012$), and 9.8% (OR = 1.29, [1.10 – 1.52], $p = 0.005$) of women non-Veterans and men Veterans, respectively. In 2021, there were no significant between-group differences related to lifetime non-prescribed prescription opioid use, as outlined in Table 2.

3.3.3 Past-Year Opioid Use Disorder

Approximately 0.8% and 0.5% of women Veterans had been diagnosed with an opioid use disorder related to prescription opioids within the last year from 2015 to 2019 and 2021, respectively. There were no significant differences in past-year prescription opioid use disorder between groups in either timeframe; however, women Veterans experienced lower odds of past-year heroin use disorder (aOR = 0.47 [0.88 – 0.94], $p <0.001$) between 2015 and 2019 when compared to the general population. See Table 6 for details.

3.3.4 Past-Month Frequency of Opioid Use

From 2015 to 2019 and in 2021, there were no significant between-group differences in past-month frequency of heroin or prescription opioid use. Across all groups, the mean number of days for both past-month heroin and prescription opioid use was less than 1, as outlined in Table 4.

3.3.5 Stimulant Use

3.3.6 Lifetime Stimulant Use

Approximately 18% and 17.6% of women Veterans reported a history of any stimulant use (cocaine, crack-cocaine, and methamphetamine) during their lifetime from 2015 to 2019 and 2021, and during both timeframes were more likely than both women non-Veterans and men Veterans to have used a stimulant ($p < 0.001$). Between 2015 and 2019, women Veterans were about 33% and 60% more likely to have reported lifetime stimulant use than their non-Veteran women peers (OR = 1.33 [1.17 – 1.51] and Veteran men (OR = 1.60 [1.39 – 1.83], respectively ($p < 0.001$). After adjusting for demographic characteristics and past-year depression, between 2015 and 2019, women Veterans were at increased odds of having used non-prescribed prescription stimulants during their lifetime (aOR = 1.20 [1.06 – 1.37], $p = 0.005$], but at decreased odds of having used cocaine (aOR = 0.86 [0.75 – 0.99], $p = 0.029$). In 2021, women Veterans were approximately 32% more likely than women non-Veterans to report a lifetime history of stimulant use (OR = 1.32 [1.03 – 1.70], $p = .014$), and 77% more likely than men Veterans to report a lifetime history of stimulant use (OR = 1.77 [1.34 – 2.34], $p < 0.001$). Between 2015 and 2019, there were significant between-group differences for lifetime cocaine and methamphetamine use ($p = .006$ and .010,

respectively), but not crack cocaine use. In 2021, there were significant between-group differences for lifetime cocaine, crack-cocaine, and methamphetamine use ($p < 0.001$).

3.3.7 Past-Year Stimulant Use Disorder

Between 2015 and 2019, there were no significant between-group differences for past-year crack-cocaine, or methamphetamine use disorder, although there were significant between-group differences for non-prescribed prescription stimulant ($p = 0.002$) and cocaine use disorders ($p = .003$), with women Veterans more likely than men Veterans, but less likely than women non-Veterans to have been diagnosed with a past-year non-prescribed prescription stimulant use disorder. In 2021, women Veterans were less likely than women non-Veterans to have been diagnosed with a past-year stimulant use disorder ($p = 0.008$), although there were no between-group differences for cocaine or methamphetamine use disorder.

3.3.8 Past-Month Frequency of Stimulant Use

There were significant between-group differences in the frequency of past-month non-prescribed prescription stimulant use between 2015 and 2019 ($p < 0.001$), although not in the frequency of past-month cocaine, crack cocaine, or methamphetamine use, although notably across all groups, the mean number of days for past-month non-prescribed prescription opioid use was less than 1, as outlined in Table 4. In 2021, there were significant between-group differences in the frequency of past-month crack-cocaine use ($p = 0.042$), although not in the frequency of past-month cocaine, methamphetamine, or non-prescribed prescription stimulant use.

3.4 Discussion

Women Veterans differ from men Veterans and their non-Veteran peers in substance use indicators and SUDs from 2015 to 2019 and in 2021. Women Veterans were similar to men Veterans and women non-Veterans in past-year SUD, with the exception of past-year cannabis use disorder and stimulant use disorder in both 2015 to 2019 and 2021, and heroin use disorder between 2015 and 2019. Women Veterans were less likely than women non-Veterans, but more likely than men Veterans, to have been diagnosed with a cannabis use disorder in the past year, despite being more likely than both groups to have used cannabis in their lifetime during both timeframes and despite having a higher mean frequency of past-month cannabis use than both groups in 2021. This suggests that either women Veterans are less likely to develop a cannabis use disorder despite using at higher rates than their counterparts, or alternatively may be less likely to be accurately identified as having a cannabis use disorder, potentially due to health care access issues. Notably, though, recent rates of cannabis use disorder among women Veterans may be higher in this study (5.3%) compared to recent VHA averages of 2% (Hasin et al., 2022; Hoggatt et al., 2023) and Veteran-specific survey data of 3.6% (Hill et al., 2021), highlighting the potential that women Veterans who use VHA services are at lower risk for cannabis use disorder. The increases in rates of cannabis use disorder and past-month frequency of cannabis use may be related to more widespread acceptability of cannabis use, coupled with increased access to cannabis use, specifically medical cannabis, although notably, only 1.5% of women Veterans report having received medical cannabis certification (Hill et al., 2021). Rates of cannabis use disorder amongst all groups were higher in 2021 compared to between 2015 and 2019, the latter of which was 1% and comparable to other population surveys during that time frame, such as the

National Epidemiologic Survey on Alcohol and Related Conditions–III (NESARC-III) (Browne et al., 2022).

Rates of non-prescribed prescription stimulant use disorder also differed by group between 2015 and 2019, and in 2021, although notably very few Veterans regardless of gender met the criteria for non-prescribed prescription stimulant use disorder in 2021. Between 2015 and 2019, women Veterans were more likely to have a non-prescribed prescription stimulant use disorder compared to men Veterans, although were less likely than women non-Veterans. However, women Veterans during the same timeframe were more likely to report a lifetime history of any stimulant use compared to their peers and were more likely to report a lifetime history of cocaine, crack cocaine, and methamphetamine use compared to women non-Veterans. The prevalence of past-year stimulant use disorders in this study is in line with data from previous population surveys, including the NESARC-III (Boden & Hoggatt, 2018), although lower than VHA data (Hoggatt et al., 2023), suggesting that women utilizing VHA services might be at higher risk for stimulant use disorders.

Paradoxically, women Veterans during both timeframes were more likely to report a lifetime history of prescription opioid use, with about 80% and 70% of women from 2015 to 2019 and in 2021 reporting a history of prescription opioid use, which was notably higher compared to women non-Veterans and men Veterans. Similarly, rates of lifetime non-prescribed prescription opioid use were also higher among women Veterans compared to women non-Veterans and men Veterans. Despite this, rates of past year opioid use disorder, including prescription opioid use and heroin use disorders, were very low (less than 1%), and not significantly different than women non-Veterans and men Veterans. There are a variety of reasons why women Veterans might have a lifetime history of prescription opioid use, including the fact that women Veterans are at higher

risk for chronic pain than women non-Veterans (Peltier et al., 2021). Further, the relatively low number of women Veterans with opioid use disorder, compared to the high rate of those who have used prescription opioids, suggests that women Veterans might exhibit intrinsic protective factors that mitigate the likelihood of progressing from opioid use to the development of an opioid use disorder. These protective factors, as well as the trajectory of women Veterans who develop an opioid use disorder, should be explored in future research. Protective factors such as resiliency, community connectedness, secondary education, and financial stability among women Veterans should be explored, and could be investigated through survey methods or through VHA electronic health record data. Alternatively, women Veterans may be less likely to access treatment and may be less likely to be accurately screened for and identified as having an opioid use disorder, and thus may be diagnosed with opioid use disorder at lower rates than their peers.

3.4.1 Limitations

This study utilized a large dataset that included women Veterans who utilize VHA and non-VHA services. Nonetheless, the NSDUH recruits housed individuals, and thus individuals residing in long-term care facilities or who are experiencing homelessness are excluded. Given that as many as 15% of women Veterans experience homelessness during their lifetime (Holliday et al., 2021), the exclusion of individuals experiencing homelessness acts as a limitation to this study, potentially limiting generalizability to this population. Given the voluntary nature of interview participation, data is also limited by selection bias. For example, interview response rates for the 2019 and 2021 NSDUH were approximately 65% and 47% among adults, respectively (SAMHSA 2021; 2022), which is comparable to response rates for other population surveys (Volkow et al., 2019). Given the sensitive nature of survey items related to mental health and

substance use, response bias is also a limitation of this study. Nonetheless, there is evidence to suggest that population surveys might be more sensitive in capturing SUDs compared to electronic health record data among Veterans, specifically (Williams et al., 2022). Another limitation is the relatively small sample size of women Veterans, particularly in 2021, which may have limited statistical power.

3.4.2 Conclusions

Women Veterans differ from women non-Veterans and men Veterans in substance use patterns. Furthermore, women Veterans have unique healthcare needs, and face unique barriers to healthcare access both within the VHA and in non-VHA settings. Previous data suggests that the majority of women Veterans seek non-VHA care (Washington et al., 2015), although data from this study in comparison with VHA data suggests that engagement in VHA care might serve as a protective factor for women Veterans for specific substance use metrics. Therefore, additional research is needed to explore the relationship between substance use and access to care among women Veterans. These current findings inform our understanding of substance use patterns among women Veterans nationally, however, additional research is needed to further explore precipitants to these gender-based differences in substance use patterns. Lifetime rates of substance use tended to be higher among women Veterans compared to both women non-Veterans and men Veterans, although women Veterans were similar to both groups as it relates to past-year SUDs. Further exploration as to what may prevent women Veterans from progressing from lifetime substance use to a SUD is needed, particularly as they may share similar risk factors to men Veterans, including lifetime trauma exposure. Regarding differences between women Veterans and their non-Veteran peers, it is not clear how access to treatment moderates the relationship

between lifetime substance use and SUDs, and thus this is an area for future exploration. Continued attention should be paid to women Veterans and their mental health and substance use treatment needs. Ongoing work can aid in the development of targeted, gender-focused substance use interventions for women Veterans that can be implemented within VHA to ultimately improve the quality of care for women Veterans with SUDs.

3.5 Tables

Table 1 Demographic Results, National Survey on Drug Use and Health

2015-2019

	Women Veterans	Women Non-Veterans	Men Veterans	Total Sample (adults over 18 years)
Race/Ethnicity	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Non-Hispanic White	1,040 (62.8%)	70,172 (59.2%)	8,395 (75.7%)	128,924 (60.1%)
Non-Hispanic Black	285 (17.2%)	15,725 (13.3%)	1,200 (10.8%)	27,081 (12.6%)
Non-Hispanic Native American/Alaska Native	17 (1.0%)	1,664 (1.4%)	141 (1.3%)	3,075 (1.4%)
Non-Hispanic Native Hawaiian	4 (0.2%)	580 (0.5%)	31 (0.3%)	1,094 (0.5%)
Non-Hispanic Asian	21 (1.3%)	5,555 (4.7%)	168 (1.5%)	10,275 (4.8%)
Non-Hispanic Multiracial	85 (5.1%)	3,929 (3.3%)	400 (3.6%)	7,041 (3.3%)
Hispanic	203 (12.3%)	20,981 (17.7%)	748 (6.7%)	37,015 (17.3%)
Age	**n (%)**	**n (%)**	**n (%)**	**n (%)**
18 – 25 years	245(15.0%)	35,911 (31.8%)	879 (7.9%)	69,916 (32.6%)
26-29 years	167 (10.1%)	10,498 (9.3%)	544 (4.9%)	19,793 (9.2%)
30-34 years	254 (15.4%)	12,863 (11.4%)	815 (7.4%)	24,223 (11.3%)
35-49 years	574 (34.7%)	30,241 (26.8%)	2,731 (24.6%)	56,566 (26.4%)
50-64 years	303 (18.3%)	13,296 (11.8%)	2,013 (18.2%)	25,213 (11.8%)
65 years and older	109 (6.6%)	10,207 (9.0%)	4,098 (37.0%)	18,794 (8.8%)
Sexual Orientation	**n (%)**	**n (%)**	**n (%)**	**n (%)**

Heterosexual	1,428 (86.9%)	100,393 (90.9%)	10,719 (97.5%)	195,385 (91.1%)
Lesbian/gay	79 (4.8%)	2,210 (2.0%)	107 (1.0%)	4,640 (2.2%)
Bisexual	136 (8.3%)	7,876 (7.1%)	169 (1.5%)	10,367 (4.8%)
Education Level	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Some high school	21 (1.3%)	13,587 (12.1%)	645 (5.9%)	27,855 (13%)
High school diploma/GED	250 (15.1%)	27,641 (24.5%)	3,190 (28.8%)	57,058 (26.6%)
Some college	531 (32.1%)	28,505 (25.2%)	3,068 (27.7%)	52,121 (24.3%)
Associate's degree	326 (19.7%)	11,493 (10.2%)	1,266 (11.4%)	19,860 (9.3%
College graduate or higher	524 (31.7%)	31,790 (28.1%)	2,911 (26.3%)	57,611 (26.9%)
Past-Year Major Depressive Episode	**n (%)**	**n (%)**	**n (%)**	**n (%)**
	252 (15.3%)	12,745 (11.3%)	659 (5.9%)	19,530 (9.1%)

2021

	Women Veterans	Women Non-Veterans	Men Veterans	Total Sample (adults over 18 years)
Race/Ethnicity	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Non-Hispanic White	265 (60.8%)	16,370 (61.2%)	1,704 (75.3%)	29,349 (62.1%)
Non-Hispanic Black	80 (18.3%)	3,065 (11.5%)	248 (11.0%)	5,244 (11.1%)
Non-Hispanic Native American/Alaska Native	10 (2.3%)	260 (1.0%)	12 (0.5%)	457 (1.0%)
Non-Hispanic Native Hawaiian	2 (0.5%)	88 (0.3%)	10 (0.4%)	185 (0.4%)
Non-Hispanic Asian	7 (1.6%)	1,502 (5.6%)	49 (2.2%)	2,736 (5.8%)

Non-Hispanic Multiracial	23 (5.3%)	1,057 (4.0%)	79 (3.5%)	1,859 (3.9%)
Hispanic	49 (11.2%)	4,415 (16.5%)	161 (7.1%)	7,451 (15.8%)
Age	**n (%)**	**n (%)**	**n (%)**	**n (%)**
18-25 years	43 (9.9%)	7,529 (29.0%)	152 (6.7%)	13,979 (29.6%)
26-29 years	36 (8.3%)	2,316 (8.9%)	82 (3.6%)	4,065 (8.6%)
30-34 years	57 (13.1%)	3,068 (11.8%)	185 (8.2%)	5,523 (11.7%)
35-49 years	150 (34.4%)	7,025 (27.1%)	468 (20.7%)	12,561 (26.6%)
50-64 years	102 (23.5%)	3,146 (12.1%)	413 (18.3%)	5,725 (12.1%)
65 years and older	48 (11.0%)	2,856 (11.0%)	963 (42.6%)	5,438 (11.5%)
Sexual Orientation	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Heterosexual	337 (77.3%)	21,032 (78.6%)	2,094 (92.5%)	39,751 (84.1%)
Lesbian/gay	19 (4.4%)	642 (2.4%)	35 (1.5%)	1,334 (2.8%)
Bisexual	63 (14.4%)	2,863 (10.7%)	48 (2.1%)	3,792 (8.0%)
Education Level	**n (%)**	**n (%)**	**n (%)**	**n (%)**
Some high school	10 (2.2%)	2,277 (8.8%)	75 (3.4%)	4,473 (9.4%)
High school diploma/GED	59 (13.5%)	5,647 (21.8%)	530 (23.4%)	11,189 (23.7%)
Some college	106 (24.3%)	5,544 (21.4%)	542 (24.0%)	9,935 (21.0%)
Associate's degree	69 (15.8%)	2,577 (9.9%)	282 (12.5%)	4,316 (9.1%)
College graduate or higher	192 (44.0%)	9,896 (38.1%)	834 (36.9%)	17,378 (36.7%)
Past-Year Major Depressive Episode	**n (%)**	**n (%)**	**n (%)**	**n (%)**
	74 (17.0%)	3,608 (13.9%)	171 (7.6%)	5,424 (11.5%)

Table 2 Lifetime Substance Use, National Survey on Drug Use and Health

2015 – 2019

	Women Veterans	Women Non-Veterans	Men Veterans	Total Sample (adults over 18 years)	
	n (%)	n (%)	n (%)	n (%)	
Cannabis	955 (57.7%)	56,003 (47.2%)	5,814 (52.5%)	110,117 (51.3%)	$p < 0.001$
Opioids					
Heroin	29 (1.8%)	1,907 (1.6%)	324 (2.9%)	4,789 (2.2%)	$p < 0.001$
Prescription Opioids	1,342 (81.2%)	74,946 (63.4%)	7,780 (70.5%)	132,321 (61.7%)	$p < 0.001$
Non-Prescribed Prescription Opioid Use	204 (12.4%)	12,541 (10.6%)	1,084 (9.8%)	25,564 (11.9%)	$p < 0.001$
Stimulants					
Cocaine	261 (15.8%)	13,940 (11.8%)	2,027 (18.3%)	32,768 (15.3%)	$p < 0.001$
Crack Cocaine	74 (4.5%)	2,937 (2.5%)	538 (4.9%)	7,508 (3.5%)	$p < 0.001$
Methamphetamine	108 (6.5%)	5,548 (4.7%)	906 (8.2%)	12,513 (5.8%)	$p < 0.001$
Any stimulants	298 (18%)	16,788 (14.2%)	1,336 (12.1%)	31,965 (14.9%)	$p < 0.001$

2021

	Women Veterans	Women Non-Veterans	Men Veterans	Total Sample (adults over 18 years)	

	n (%)	n (%)	n (%)	n (%)	
Cannabis	241 (55.3%)	13,121 (49.1%)	1,181 (52.2%)	24,114 (51.0%)	p < 0.001
Opioids					
Heroin	8 (1.8%)	526 (2.0%)	63 (2.8%)	1,122 (2.4%)	p = 0.028
Prescription Opioids	305 (70.1%)	15,202 (57%)	1,505 (66.7%)	25,987 (55.0%)	p < 0.001
Non-Prescribed Prescription Opioid Use	47 (10.9%)	2,442 (9.2%)	184 (8.2%)	4,530 (9.6%)	p < 0.001
Stimulants					
Cocaine	59 (13.5%)	3,264 (12.2%)	387 (17.1%)	6,751 (14.3%)	p < 0.001
Crack Cocaine	16 (3.7%)	739 (2.8%)	119 (5.3%)	1,589 (3.4%)	p < 0.001
Methamphetamine	30 (6.9%)	1,294 (4.8%)	175 (7.7%)	2,640 (5.6%)	p < 0.001
Any stimulants	76 (17.6%)	3,690 (13.9%)	242 (10.7%)	6,566 (13.9%)	p < 0.001

Table 3 Past-Year Substance Use Disorder, National Survey on Drug Use and Health

2015 – 2019

	Women Veterans	Women Non-Veterans	Men Veterans	Total Sample (adults over 18 years)	
	n (%)	n (%)	n (%)	n (%)	
Cannabis	17 (1%)	2,183 (1.8%)	110 (1%)	5,305 (2.5%)	p < 0.001
Opioids					
Heroin	3 (0.2%)	298 (0.3%)	14 (0.1%)	712 (0.3%)	p = 0.030
Non-Prescribed Prescription Opioids	15 (0.9%)	839 (0.7%)	64 (0.6%)	1,752 (0.8%)	p = 0.059
Stimulants					
Cocaine	5 (0.3%)	407 (0.3%)	28 (0.3%)	1,017 (0.5%)	p = 0.003
Methamphetamine	3 (0.2%)	443 (0.4%)	35 (0.3%)	1,020 (0.5%)	p = 0.329
Non-Prescribed Prescription Stimulants	3 (0.2%)	338 (0.3%)	12 (0.1%)	642 (0.3%)	p = 0.003

2021

	Women Veterans	Women Non-Veterans	Men Veterans	Total Sample (adults over 18 years)	
	n (%)	n (%)	n (%)	n (%)	
Cannabis	23 (5.3%)	1,817 (6.8%)	83 (3.7%)	3,751 (7.9%)	p < 0.001
Opioids					
Heroin	1 (0.2%)	92 (0.3%)	5 (0.2%)	174 (0.4%)	p = 0.405

Non-Prescribed Prescription Opioids	2 (0.5%)	201 (0.8%)	12 (0.5%)	448 (0.9%)	p = 0.567
Stimulants					
Cocaine	1 (0.2%)	122 (0.5%)	13 (0.6%)	262 (0.6%)	p = 0.758
Methamphetamine	2 (0.5%)	155 (0.6%)	18 (0.8%)	317 (07.%)	p = 0.350
Non-Prescribed Prescription Stimulants	0 (0%)	116 (0.4%)	1 (0%)	176 (0.4%)	p = 0.008

*Crack cocaine use disorder combined with cocaine use disorder by the NSDUH.

Table 4 Past Month Frequency of Substance Use, National Survey on Drug Use and Health

2015 – 2019

	Women Veterans	Women Non-Veterans	Men Veterans	
	Mean Days (SD) Range	Mean Days (SD) Range	Mean Days (SD) Range	
Cannabis	1.23 (5.26) 0 – 30	1.56 (5.83) 0 – 30	1.50 (5.85) 0 – 30	p = 0.048 0 – 30
Opioids				
Heroin	0.02 (0.74) 0 – 30	0.02 (0.77) 0 – 30	0.02 (0.56) 0 – 30	p = 0.497
Non-Prescribed Prescription Opioids	0.12 (1.50) 0 – 30	0.09 (1.22) 0 – 30	0.08 (1.18) 0 – 30	p = 0.443 0 – 30
Stimulants				
Cocaine	0.04 (0.72) 0 – 20	0.03 (0.69) 0 – 30	0.03 (0.63) 0 – 28	p = 0.802 0 – 28
Crack Cocaine	0.01 (0.30) 0 – 12	0.01 (0.44) 0 – 30	0.01 (0.28) 0 – 15	p = 0.872 0 – 15
Methamphetamine	0.07 (1.46) 0 – 30	0.04 (1.00) 0 – 30	0.05 (1.08) 0 – 30	p = 0.382 0 – 30
Non-Prescribed Prescription Stimulants	0.01 (0.16) 0 – 5	0.04 (0.68) 0 – 30	0.02 (0.51) 0 – 30	p < 0.001 0 – 30

2021

	Women Veterans	Women Non-Veterans	Men Veterans	
	Mean Days (SD) Range	Mean Days (SD) Range	Mean Days (SD) Range	
Cannabis	2.34 (7.40) 0 – 30	2.23 (7.04) 0 – 30	1.87 (6.62) 0 – 30	p = 0.062
Opioids				
Heroin	0.00 (0) 0 – 0	0.4 (1.04) 0 – 30	0.4 (1.0) 0 – 30	p = 0.771
Non-Prescribed Prescription Opioids	0.00 (0.10) 0 – 2	0.07 (1.06) 0 – 30	0.44 (0.82) 0 – 26	p = 0.303
Stimulants				
Cocaine	0.02 (0.22) 0 – 4	0.03 (0.67) 0 – 30	0.03 (0.71) 0 – 30	p = 0.090
Crack Cocaine	0.01 (0.14) 0 – 3	0.01 (0.50) 0 – 30	0.04 (0.97) 0 – 30	p = 0.042
Methamphetamine	0.144 (1.80) 0 – 28	0.11 (1.63) 0 – 30	0.14 (1.73) 0 – 30	p = 0.581
Non-Prescribed Prescription Stimulants	0.00 (0.00) 0 – 0	0.04 (0.76) 0 – 30	0.01 (0.21) 0 – 5	p = 0.138

Table 5 Summary of Adjusted Odds of Lifetime Substance Use Among Women Veterans, Women Non-Veterans, and Men Veterans Compared to the General Population of Adults

2015 – 2019

	Women Veterans	Women Non-Veterans	Men Veterans
	aOR, 95% CI, p-value	aOR, 95% CI, p-value	aOR, 95% CI, p-value
Cannabis	1.17 [1.06 – 1.29], 0.002	0.70 [0.69 – 0.71], <0.001	1.04, 1.00 – 1.09], 0.039
Opioids			
Heroin	0.62 [0.43 – 0.90], 0.012	0.50 [0.47 – 0.53], <0.001	1.17 [1.04 – 1.32], 0.008
Prescription Opioids	2.16 [1.90 – 2.46], <0.001	1.25 [1.23 – 1.28], <0.001	1.01 [0.97 – 1.06], 0.587
Non-Prescribed Prescription Opioids	1.09 [0.94 – 1.26], 0.273	1.42 [1.38 – 1.45], <0.001	1.22 [1.14 – 1.30], <0.001
Stimulants			
Cocaine	0.86 [0.75 – 0.99], 0.029	0.55 [0.54 – 0.57], <0.001	1.03 [0.98 – 1.08], 0.251
Crack Cocaine	0.98 [0.78 – 1.24], 0.981	0.49 [0.47 – 0.52], <0.001	1.01 [0.92 – 1.12], 0.845
Methamphetamine	0.88 [0.72 – 1.07], 0.197	0.62 [0.59 – 0.64], <0.001	1.13 [1.05 – 1.21], 0.001
Non-Prescribed Prescription Stimulants	1.20 [1.06 – 1.37], 0.005	0.85 [0.83 – 0.87], <0.001	0.88 [0.83 – 0.93], <0.001

2021

	Women Veterans	Women Non-Veterans	Men Veterans
	aOR, 95% CI, p-value	aOR, 95% CI, p-value	aOR, 95% CI, p-value
Cannabis	1.06 [0.87 – 1.30], 0.554	0.80 [0.77 – 0.83], <0.001	1.117 [1.07 – 1.28], <0.001
Opioids			
Heroin	0.45 [0.20 – 1.01], 0.053	0.63 [0.55 – 0.71], <0.001	1.23 [0.93 – 1.64], 0.154
Prescription Opioids	1.39 [1.12 – 1.73]. 0.003	1.24 [1.19 – 1.29], <0.001	0.93 [0.84 – 1.02], 0.137
Non-Prescribed Prescription Opioids	1.18 [0.85 – 1.64], 0.319	1.24 [1.16 – 1.32], <0.001	1.20 [1.01 – 1.41], 0.035

Stimulants			
Cocaine	0.71 [0.53 – 0.95], 0.021	0.66 [0.63 – 0.70], <0.001	1.23 [1.09 – 1.39], 0.001
Crack Cocaine	0.77 [0.46 – 1.30], 0.333	0.63 [0.57 – 0.70], <0.001	1.38 [1.11 – 1.71], 0.004
Methamphetamine	0.82 [0.55 – 1.23], 0.340	0.69 [0.63 – 0.74], <0.001	1.26 [1.05 – 1.50], 0.011
Non-Prescribed Prescription Stimulants	1.16 [0.89 – 1.51], 0.278	0.89 [0.84 – 0.94], <0.001	0.78 [0.68 – 0.91], 0.001

*****Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

Table 6 Summary of Adjusted Odds of Past-Year Substance Use Disorders Among Women Veterans, Women Non-Veterans, and Men Veterans Compared to the General Population of Adults

2015 – 2019

	Women Veterans	Women Non-Veterans	Men Veterans
	aOR, 95% CI, p-value	aOR, 95% CI, p-value	aOR, 95% CI, p-value
Cannabis	0.52, [0.32 – 0.85], 0.008	0.43 [0.41 – 0.46], <0.001	0.80 [0.66 – 0.98]. 0.027
Opioids			
Heroin	0.47 [0.88 – 0.94], <0.001	0.54 [0.46 – 0.63], <0.001	0.41 [0.24 – 0.70], 0.001
Non-Prescribed Prescription Opioids	0.93 [0.55 – 1.55], 0.767	0.63 [0.57 – 0.70], 0.001	0.78 [0.61 – 1.01], 0.059
Stimulants			
Cocaine	0.58 [0.24 – 1.39], 0.221	0.47 [0.41 – 0.53], <0.001	0.68 [0.47 – 1.00], 0.048
Methamphetamine	0.30 [0.10 – 0.93], 0.037	0.56 [0.47 – 0.61], <0.001	0.71 [0.50 – 1.00], 0.052
Non-Prescribed Prescription Stimulants	0.58 [0.19 – 1.80] 0.344	0.66 [0.56 – 0.78], <0.001	0.56 [0.32 – 1.00], 0.050

2021

	Women Veterans	Women Non-Veterans	Men Veterans
	aOR, 95% CI, p-value	aOR, 95% CI, p-value	aOR, 95% CI, p-value
Cannabis	0.72 [0.46 – 1.11], 0.139	0.54 [0.50 – 0.58], <0.001	1.13 [0.89 – 1.44], 0.308
Opioids			
Heroin	1.77 [0.25 – 12.72], 0.571	1.28 [0.92 – 1.77], 0.147	1.66 [0.60 – 4.62], 0.332
Non-Prescribed Prescription Opioids	1.86 [0.46 – 7.54], 0.383	1.18 [0.94 – 1.47], 0.155	2.08 [0.96 – 4.47], 0.062
Stimulants			
Cocaine	2.65 [0.37 – 18.98], 0.333	1.70 [1.31 – 2.21], <0.001	0.52 [0.28 – 0.97], 0.041
Methamphetamine	1.78 [0.44 – 7.21], 0.419	1.55 [1.22 – 1.97], <0.001	0.74 [0.42 – 1.28], 0.276

Non-Prescribed Prescription Stimulants	1.66 [0.23 – 11.92], 0.617	1.15 [0.84 – 1.59], 0.379	0.84 [0.34 – 1.98], 0.694

*Crack cocaine use disorder combined with cocaine use disorder by the NSDUH.

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

4.0 The Association Between Substance Use and Suicidality Among Women Veterans, 2015 – 2019: A Secondary Analysis of the National Survey on Drug Use and Health

4.1 Introduction

A significant contributor to mortality, suicide remains in the top ten leading causes of death in the United States (Centers for Disease Control and Prevention [CDC], 2023). Military Veterans experience an increased risk for suicide, and the suicide rate in this population consistently exceeds the national average (Schafer et al., 2022; U.S. Department of Veterans Affairs, 2022). In 2021, Veterans were 42% more likely than their peers to report suicidal ideation, and almost twice as likely than their peers to report suicide plans or attempts (Stanley et al., 2023). Between 5% and 13% of Veterans report recent suicidal ideation, and there is evidence to suggest that universal suicide screening may fail to accurately identify Veterans experiencing suicidal ideation (Spiller et al., 2023; Stanely et al., 2023). There remains variability in reported suicide rates among Veterans who seek VHA care compared to those who do not (Raines et al., 2023), and some evidence suggests that Veterans not engaged with VHA care are at higher risk for suicide (Monteith et al., 2020). Further, about half of Veterans who die by suicide have no prior mental health diagnosis (Simonetti et al., 2020).

Women Veterans represent an underserved population with unique risk factors for suicide. Rates of suicide among women Veterans have increased at a rate disproportionate to their Veteran and non-Veteran peers, with a 61% increase in deaths by suicide between 2005 and 2017 (Hoffmire et al., 2020). While it is not known whether or not women Veterans are at increased risk for suicide prior to entry into military service, evidence suggests that Veterans who experienced pre-military

suicidal ideation, attempts, or plans, are at increased risk for suicidal ideation and attempts after exit from the military (Bryan et al., 2013). There is evidence to suggest that women Veterans are disproportionately impacted by suicidality (Adams et al., 2021; Blosnich & Bossarte, 2017; Blosnich et al., 2021; Hoffmire et al., 2021), despite a recent decline in deaths by suicide among women Veterans in 2022 (U.S. Department of Veterans Affairs, 2022). Among non-Veteran populations, it is well-established that women are at higher risk for suicide attempts, but less likely to die by suicide compared to men, due to more limited access to lethal means, such as firearms. (Horwitz et al., 2019). While men Veterans have greater odds of firearm-related death by suicide relative to women Veterans, women Veterans are more likely than their women civilian counterparts to die by suicide via firearm (Horwitz et al., 2019), although firearm suicide deaths increased by 15% among women Veterans between 2001 and 2021 (Department of Veterans Affairs, 2023). Among Veterans, women Veterans are more likely than men Veterans to experience suicidal behaviors (Betancourt et al., 2023), although less likely to die by suicide. Nonetheless, between 2020 to 2021, there was a disproportionate increase in suicide deaths among women Veterans, increasing by nearly 25% compared to a 6% increase in men (Department of Veterans Affairs, 2023). Additionally, while men were Veterans were at 43% greater risk of death by suicide compared to civilian men, women Veterans experienced a 166% greater risk for death by suicide compared to civilian women (Department of Veterans Affairs, 2023).

Rates of substance use, particularly illicit substance use and use disorders, among women Veterans are disproportionate compared to their civilian peers. Point prevalence of opioid use disorder among women Veterans is estimated at about 1% (Beckman et al., 2022), and among Veterans diagnosed with an opioid use disorder, about 6% are women (Peltier et al., 2021). There has also been a notable rise in other illicit substance use and use disorders, including

methamphetamine and cannabis. About 0.6% of women Veterans using VHA services were diagnosed with a stimulant use disorder in 2019, and while this rate is relatively low, it was a three-fold increase from the previous decade (Hoggatt et al., 2023). There was an even sharper increase in cannabis use disorders among women Veterans utilizing VHA services between 2009 and 2019, with cannabis use disorders occurring at a rate of 2% among women Veterans in 2019, an eight-fold increase from 2009 (Hoggatt et al., 2023).

Substance use is a risk factor for suicidal behavior and death by suicide and may be a comparable risk factor to depressive disorders (Schafer et al., 2022). Approximately 6% of Veteran deaths can be attributed to suicide or substance use (Spark et al., 2023). Among Veterans engaged in VHA care, the presence of a SUD increased the risk of death by suicide, and while men were more likely to die by suicide and were more likely to have a SUD, the strength of association was stronger among women Veterans (Bohnert et al., 2017). Among Veterans utilizing VHA primary care services, drug use predicted suicide attempts but not suicidal ideation (Ashrafioun et al., 2016), and among Veterans seeking VHA pain management services, opioid use disorder was associated with a two-fold increase in suicide attempts (Ashrafioun et al., 2020). Past-year opioid use predicted suicide attempts in Veterans engaged in suicide prevention services (Chesin et al., 2019), although it did not predict suicide attempts in Veterans not engaged with VHA services.

Regarding women Veterans, less is known about the strength of substance use as a predictor for suicidality. Among women Veterans, a lifetime history of SUDs was associated with a 2.4-fold increase in odds of suicidal ideation (Stefanovics et al., 2023). Approximately two-thirds of women Veterans who engage in self-directed violence, including both suicide attempts and non-suicidal self-injurious behavior, have a co-occurring SUD (Ronzitti et al., 2019). Regarding death by suicide, data from the VHA suggests that SUDs serve as a predictor for death by suicide, and

that this association is stronger among women Veteran compared to men Veterans (Department of Veterans Affairs, 2019). In a sample of women Veterans receiving VHA care who died by suicide, the majority were prescribed a controlled substance prior to their death, and approximately 70% had utilized mental health services in the six months prior to their death (Denneson et al., 2016). While the majority of women Veterans receiving VHA care who died by suicide had utilized mental health services prior to their death, women Veterans might experience unmet mental health care needs both within the VHA and in non-VHA settings (Hoerster et al., 2012). During times of mental health crisis, Veterans are able to utilize the Veterans Crisis Line (VCL), and women Veterans utilizing the VCL are more likely to screen positive for suicide risk compared to men (Dichter et al., 2022).

Over 15% of women Veterans report having unmet mental healthcare needs, and unmet needs are associated with a four-fold increase in the odds of suicidal ideation (Becerra et al., 2016). While most women Veterans seek care outside of the VHA (Washington et al., 2015), among those who do seek VHA care, gender disparities exist. Women Veterans are less likely than men Veterans to receive comprehensive post-suicide attempt mental health care within the VHA (Carter et al., 2020; Chen et al., 2021), and are also less likely to be aware of suicide prevention resources than men Veterans (Tsai et al., 2020). Additionally, women Veterans may be less likely to receive evidence-based treatment for SUDs (Finlay et al., 2021; Lin et al., 2021), which is associated with increased mortality (Decker et al., 2017).

There is a paucity of data regarding the extent to which substance use, particularly cannabis, opioid, and stimulant use and use disorders, predict suicidality among women Veterans who do and do not access VHA care. Furthermore, it is not known how this relationship is moderated by access to both substance use and mental health treatment among women Veterans.

Therefore, this study seeks to examine the association between substance use, SUDs, and suicidality, and to determine if this association is moderated by access to treatment, while drawing comparisons between men Veterans, women Veterans, and women-non Veterans. We hypothesize that lifetime substance use and use disorders will more robustly predict suicidality among women Veterans compared to both comparison groups.

4.2 Methods

4.2.1 Setting and Population

This study utilized data from the 2015 to 2019 National Surveys on Drug Use and Health (NSDUH) administered by SAMHSA. Between 2015 and 2019, the NSDUH was conducted via home-based in-person interviews, with audio computer-assisted self-administered interviews utilized for sensitive items. The NSDUH utilizes a stratified multistage area probability sampling method. Noninstitutionalized adults over the age of eighteen years were included in the NSDUH sampling frame.

4.2.2 Variables and Measures

Outcome variables included past-year suicidal ideation, plans, and attempts, and were assessed dichotomously. Predictors included lifetime cannabis, opioid, and stimulant use and past-year cannabis, opioid, and stimulant use disorders. Lifetime substance use and past-year SUDs were assessed dichotomously. Opioids including heroin and non-prescribed prescription opioids,

and stimulants included cocaine, crack cocaine, methamphetamine, and non-prescribed prescription stimulants. Given the relatively small numbers of Veterans who met the criteria for stimulant and opioid use disorder, all SUDs were combined into one dichotomous drug use disorder variable, although cannabis use disorder was also analyzed separately. Past-year history of substance use treatment and mental health treatment were included as moderators and were also assessed dichotomously. Covariates included age, past-year major depressive episodes, education, race/ethnicity, and sexual identity.

4.2.3 Data Analysis

Bivariate analyses with Pearson's chi-square tests were utilized to examine differences in past twelve-month suicidal ideation, plans, and attempts between women Veterans, women non-Veterans, and men Veterans. To examine predictors of suicidality, a series of binary logistic regression analyses were conducted with past-year suicidality as the outcome variable, adjusted for age, past-year depression, race/ethnicity, education level, and sexual identity. Separate analyses were performed with each substance use variable and the aforementioned covariates. Models were stratified by sex and Veteran status. The models with the best fit were utilized to test the moderation effects of access to treatment and to determine if access to treatment moderates the relationship between substance use and suicidality. Separate models were implemented for each moderating variable (past-year substance use and mental health treatment) using interaction terms. Data was weighted as per the SAMHSA NSDUH protocol for the dataset for public use file (PUF) (SAMHSA, 2021). IBM SPSS Version 29.0.1.0 was utilized for the analysis.

4.3 Results

A total of 131,344 individuals were included in this study, including women Veterans (n = 1,655), women non-Veterans (n = 118,606), and men Veterans (n = 11,083). Women Veterans tended to be older and more likely to self-identify as lesbian or bisexual than women non-Veterans. The majority of participants self-identified as Non-Hispanic White. See Table 7 for details.

4.3.1 Prevalence of Suicidality

Approximately 8.7% of women Veterans experienced past-year suicidal ideation, compared to 6.7% and 4.6% of women non-Veterans and men Veterans, respectively. Women Veterans were about 32% more likely to have experienced suicidal ideation compared to women non-Veterans (OR = 1.32, [1.11 – 1.57], $p < 0.001$), and about 95% more likely to have experienced suicidal ideation compared to men Veterans (OR = 1.95, [1.6 – 2.37], $p < 0.001$) in the past year. About 3.6% of women had experienced past-year suicide plans, compared to 2.2% and 1.6% of women non-Veterans and men Veterans. Women Veterans were about 72% more likely than women non-Veterans to have had a suicide plan within the past year (OR = 1.72, [1.32 – 2.23], $p < 0.001$) and were over 230% more likely compared to men Veterans (OR = 2.39, [1.77 – 3.21], $p < 0.001$). Approximately 1.5% of women Veterans reported a past-year suicide attempt, compared to 1.1% and 0.5% of women non-Veterans and men Veterans, respectively. Women Veterans were about 45% more likely to have made a suicide attempt in the past year compared to women non-Veterans (OR = 1.45, [0.97 – 2.16], $p = 0.034$), and nearly 200% more likely to have made a suicide attempt compared to men Veterans (OR = 2.96, [1.85 – 4.76], $p < 0.001$).

4.3.2 Substance-Related Predictors of Suicidality

4.3.2.1 Substance-Related Predictors of Suicidal Ideation

In women Veterans, only lifetime non-prescribed prescription opioid use (aOR = 1.99, [1.04 – 3.79], p = 0.038), and lifetime cocaine use (aOR = 1.74 [1.10 = 2.74], p = 0.018) increased the odds of past-year suicidal ideation. In men Veterans, lifetime cannabis, heroin, non-prescribed prescription opioid, cocaine, crack cocaine, and methamphetamine use increased the odds of past-year suicidal ideation, although general stimulant use did not. All lifetime substance use variables were associated with increased odds of past-year suicidal ideation in women non-Veterans. See Table 8 for details. Past-year cannabis use disorder, but not combined drug use disorders, increased odds of suicidal ideation in women Veterans (aOR = 3.93 [1.21 – 13.81], p = 0.033), and men Veterans and women non-Veterans. See Tables 11 and 12 for details.

4.3.2.2 Substance-Related Predictors of Suicide Plans

Among women Veterans, lifetime cannabis use (aOR = 2.02, [1.03 – 3.96], p = 0.040), lifetime cocaine use (aOR = 2.24, 1.20 – 4.05, p = 0.011), and lifetime stimulant use (aOR = 1.87, [1.05 – 3.33], p = 0.034) increased the odds of past-year suicide plans. Among men Veterans, all lifetime substance use variables aside from stimulant use predicted past-year suicide plans, and among women non-Veterans, all lifetime substance use predicted past-year suicide plans. See Table 9 for details. Past-year cannabis use increased the odds of past-year suicide plans among women Veterans and women non-Veterans, but not men Veterans. Past-year combined drug use disorders increased the odds suicide plans among women non-Veterans and men Veterans, but not women Veterans. See Tables 11 and 12 for details.

4.3.2.3 Substance-Related Predictors of Suicide Attempts

Lifetime substance use did not increase the risk for past-year suicide attempts among women Veterans. Among men Veterans, past-year heroin, cocaine, crack cocaine, and methamphetamine use increased the odds of past-year suicide attempts. Among women non-Veterans, all lifetime substance use was associated with increased odds of past-year suicide attempts. Past-year combined drug use disorders, but not past-year cannabis use disorder, increased the odds of past-year suicide attempts among women Veterans. Among men Veterans, neither past-year cannabis use disorder nor past-year combined drug use disorder increased the odds of past-year suicide attempts, although both past-year cannabis use disorder and past-year combined drug use disorder increased odds of past-year suicide attempts among women non-Veterans. See Table 10 for details.

4.3.3 Interaction Between Access to Treatment and Substance Use on Suicidality

Among women Veterans, past-year mental health treatment moderated the relationship between lifetime non-prescribed prescription opioid use and past-year suicidal ideation (aOR = 0.33 [0.13 – 0.87], p = 0.024). In this particular model, past-year outpatient mental health treatment and non-prescribed prescription opioid use increased the odds of past-year suicidal ideation among women Veterans, although the interaction between past-year outpatient mental health treatment and non-prescribed prescription opioid use reduced odds of past-year suicidal ideation. Past-year history of substance use treatment did not moderate the relationship between lifetime substance use and past-year suicidality.

4.4 Discussion

Women Veterans were at higher risk for suicidality than men Veterans and women non-Veterans, including suicidal ideation, attempts, and plans. Nonetheless, substance use was not as robust as a predictor of suicidality in women Veterans compared to the other two groups. There are likely inherent risk factors among women Veterans that increase the risk for suicidality, such as trauma exposure, particularly military sexual trauma (Khan et al., 2019), and additional research is needed on this topic.

To our knowledge, this is the first study that has identified lifetime cocaine use as a predictor for suicidal ideation and plans among women Veterans. Among women Veterans utilizing VHA services, cocaine use disorder was associated with a three-fold increase in the risk of death by suicide (Bohnert et al., 2017), although stimulant use disorder did not increase the odds of non-suicidal self-injury among those using VHA care (Patel et al., 2021). Given that stimulant use is on the rise among Veterans (Warfield et al., 2022), the association between stimulant use and suicidality should be further explored. Additionally, rates of stimulant-related overdoses have also increased among Veterans, with a three-fold increase since 2012 (Coughlin et al., 2022), and this as a potential causal factor or mechanism for suicide should be examined. Additionally, non-prescribed prescription opioid use was associated with an approximately two-fold increased risk for past-year suicidal ideation among women Veterans. This is particularly concerning as non-prescribed prescription opioids can be lethal in an overdose, although notably, non-prescribed prescription opioid use did not increase the odds of past-year suicide attempts. Based on the data available, it is unclear what proportion of those who reported non-prescribed prescription opioid use were previously prescribed an opioid, although this is worthy of future exploration as data suggests that those discontinued from prescribed opioid therapy are at increased risk for both

overdose and suicide mortality (Oliva et al., 2020). Previous data has supported an association between opioid use and suicidal behavior and mortality among Veterans (Ashrafioun et al., 2020; Betancourt et al., 2023; Chesin et al., 2019; Gibson et al., 2022), although less is known about opioid use and use disorders related to suicidal ideation. Results from this study underscore the importance of targeted suicide prevention efforts among Veterans who use opioids, including prescription opioids.

Cannabis use and use disorders are on the rise across the United States (Compton et al., 2019), and among military Veterans (Hoggatt et al., 2021). Among Veterans utilizing VHA services, both cannabis use and cannabis use disorders were associated with an increased risk of suicidal ideation and attempts (Grove et al., 2023; Livne et al., 2023). Other data from nationally representative studies indicate that cannabis use disorders increase the risk for suicidal ideation, plans, and attempts among Veterans (Hill et al., 2021). In our study, cannabis use was associated with past year suicide plans but not attempts, and cannabis use disorder was associated with suicidal ideation and plans, although it is unclear to what extent cannabis use is related to suicidal attempts. Given that cannabis use often coincides with other substance use (Lin et al., 2021), cannabis use as a predictor for suicide attempts may be related to the likelihood of alternative, more lethal substance use, such as opioids or other central nervous system depressants. To support this, past-year combined drug use disorder increased the odds of past-year suicide attempts, but not ideation or plans among women Veterans; thus, access to more lethal medications, such as opioids or psychostimulants, may increase the risk for attempts, whereas cannabis does not. Furthermore, very little research exists exploring recreational versus medicinal cannabis use among Veterans, and how differences in recreational versus medicinal cannabis use influence mental health outcomes, including suicidality. Among Veterans using cannabis who reside in

states where medical cannabis is legal, nearly half report using medical cannabis (Davis et al., 2019), and additional research should explore medical cannabis utilization among Veterans.

Unexpectedly, past-year substance use treatment did not moderate the relationship between substance use and suicidality, although past-year mental health treatment did among women Veterans who reported lifetime non-prescribed prescription opioid use. This could be explained by the fact that past-year major depressive disorder was a stronger predictor of suicidality, and thus access to mental health, rather than substance use treatment, had a greater influence on the relationship between substance use and suicidality. Nonetheless, women Veterans who did not access mental health services but who had reported lifetime substance use were at increased risk for suicidality. Thus, efforts to reach women Veterans with substance use-related problems to facilitate access to mental health treatment should be made. Recent legislation, such as the Veterans Access, Choice, and Accountability Act of 2014 (Choice Act), may help to facilitate access to mental health and substance use treatment for women Veterans who are unable or unwilling to receive VHA services, although evidence suggests that many women who utilize non-VHA services through the Choice Act do return to VHA care (Chrystal et al., 2022). Strengthening and enhancing gender-focused mental health services at the VHA may prove useful in reducing rates of suicidality among women Veterans, although additional research is needed (Marshall et al., 2021).

4.4.1 Limitations

This study utilized self-report data through a large, nationally representative survey. That said, there are inherent biases in self-reporting, particularly as it relates to sensitive topics such as substance use and suicidality.Further, the NSDUH excludes individuals experiencing

homelessness or those in long-term or inpatient care facilities, and thus may inadequately capture both rates of suicidality and SUDs. Additionally, the relatively small number of women Veterans who reported lifetime substance use and suicidality may have resulted in a failure to capture significant associations between select lifetime substance use and use disorder variables, and suicidality. Additional research with larger sample sizes, likely utilizing VHA electronic health record data, is needed.

4.4.2 Conclusions

Women Veterans experienced suicidal ideation, plans, and attempts at higher rates than both women non-Veterans and men Veterans, although substance use was not as robust a predictor of suicidality in women Veterans compared to both other groups. Mental health treatment for women Veterans who had used non-prescribed prescription opioids, but not substance use treatment, moderated the relationship between substance use and suicidality. Given these findings, additional research is needed to identify prominent mental health and biopsychosocial risk factors for suicide in the women Veteran population. Additionally, barriers to and facilitators of access to mental health care among women Veterans should be explored, as this appears to be a protective factor as it relates to substance use and suicidality. Gender-focused programs should be fostered within the VHA to meet the mental health care needs and preferences of women Veterans, a growing population.

4.5 Tables

Table 7 Demographic Results, National Survey on Drug Use and Health

2015-2019

	Women Veterans	Women Non-Veterans	Men Veterans
Race/Ethnicity	**n (%)**	**n (%)**	**n (%)**
Non-Hispanic White	1,040 (62.8%)	70,172 (59.2%)	8,395 (75.7%)
Non-Hispanic Black	285 (17.2%)	15,725 (13.3%)	1,200 (10.8%)
Non-Hispanic Native American/Alaska Native	17 (1.0%)	1,664 (1.4%)	141 (1.3%)
Non-Hispanic Native Hawaiian	4 (0.2%)	580 (0.5%)	31 (0.3%)
Non-Hispanic Asian	21 (1.3%)	5,555 (4.7%)	168 (1.5%)
Non-Hispanic Multiracial	85 (5.1%)	3,929 (3.3%)	400 (3.6%)
Hispanic	203 (12.3%)	20,981 (17.7%)	748 (6.7%)
Age	**n (%)**	**n (%)**	**n (%)**
18 – 25 years	245(15.0%)	35,911 (31.8%)	879 (7.9%)
26-29 years	167 (10.1%)	10,498 (9.3%)	544 (4.9%)
30-34 years	254 (15.4%)	12,863 (11.4%)	815 (7.4%)
35-49 years	574 (34.7%)	30,241 (26.8%)	2,731 (24.6%)
50-64 years	303 (18.3%)	13,296 (11.8%)	2,013 (18.2%)
65 years and older	109 (6.6%)	10,207 (9.0%)	4,098 (37.0%)
Sexual Orientation	**n (%)**	**n (%)**	**n (%)**
Heterosexual	1,428 (86.9%)	100,393 (90.9%)	10,719 (97.5%)
Lesbian/gay	79 (4.8%)	2,210 (2.0%)	107 (1.0%)
Bisexual	136 (8.3%)	7,876 (7.1%)	169 (1.5%)
Education Level	**n (%)**	**n (%)**	**n (%)**

Some high school	21 (1.3%)	13,587 (12.1%)	645 (5.9%)
High school diploma/GED	250 (15.1%)	27,641 (24.5%)	3,190 (28.8%)
Some college	531 (32.1%)	28,505 (25.2%)	3,068 (27.7%)
Associate's degree	326 (19.7%)	11,493 (10.2%)	1,266 (11.4%)
College graduate or higher	524 (31.7%)	31,790 (28.1%)	2,911 (26.3%)
Past-Year Major Depressive Episode	**n (%)**	**n (%)**	**n (%)**
	252 (15.3%)	12,745 (11.3%)	659 (5.9%)

Both frequencies and percentages are weighted as per the SAMHSA NSDUH.

Table 8 Summary of Adjusted Odds Ratios for Lifetime Substance Use and Past-Year Suicidal Ideation from Individual Models

	Women Veterans			Women Non-Veterans			Men Veterans		
	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Cannabis use	1.41	0.93 – 2.14	0.104	1.67	1.57 – 1.76	< 0.001	1.74	1.40 – 2.16	< 0.001
Heroin use	0.36	0.07 – 1.83	0.220	2.14	1.86 – 2.46	< 0.001	2.13	1.44 – 3.16	< 0.001
Non-prescribed prescription opioid use	1.99	1.04 – 3.79	0.038	1.51	1.42 – 1.61	< 0.001	1.96	1.51 – 2.54	< 0.001
Cocaine use	1.74	1.10 – 2.74	0.018	1.68	1.57 – 1.80	< 0.001	1.76	1.42 – 2.18	< 0.001
Crack cocaine use	1.11	0.52 – 2.37	0.786	2.13	1.88 – 2.40	< 0.001	2.20	1.59 – 3.04	< 0.001
Methamphetamine use	0.95	0.48 – 1.87	0.871	2.00	1.82 – 2.19	< 0.001	2.26	1.74 – 2.95	< 0.001
Any stimulant use	1.13	0.72 – 1.75	0.599	1.02	1.01 – 1.03	< 0.001	1.02	0.98 – 1.05	0.360

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

Table 8.1 Interaction Between Past-Year Mental Health Treatment and Lifetime Non-Prescribed Prescription Opioid Use on Suicidal Ideation among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.88	0.79 – 0.98	0.016
Past-year major depression	8.39	5.46 – 12.90	<0.001
Education	0.91	0.77 – 1.07	0.242
Race	1.03	0.94 – 1.1	0.512
Sexual identity	1.43	1.10 – 1.86	0.008
Past-year outpatient mental health treatment	2.29	1.40 – 3.74	0.001
Non-prescribed prescription opioid use	2.133	1.17 – 3.89	0.013
Interaction between outpatient mental health treatment x lifetime non-prescribed prescription opioid use	0.33	0.13 – 0.87	0.024

Table 9 Summary of Adjusted Odds Ratios for Lifetime Substance Use and Past-Year Suicide Plans from Individual Models

	Women Veterans			Women Non-Veterans			Men Veterans		
	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Cannabis use	2.02	1.03 – 3.96	0.040	1.66	1.50 – 1.82	< 0.001	1.40	0.98 – 2.00	0.068
Heroin use	1.08	0.21 – 5.70	0.925	2.22	1.83 – 2.68	< 0.001	2.13	1.23 – 3.70	0.007
Non-prescribed prescription opioid use	1.64	0.62 – 4.35	0.320	1.46	1.32 – 1.62	< 0.001	1.86	1.19 – 2.90	0.007
Cocaine use	2.20	1.20 – 4.05	0.011	1.63	1.46 – 1.81	< 0.001	1.53	1.09 – 2.17	0.015
Crack cocaine use	1.09	0.39 – 3.03	0.869	2.09	1.74 – 2.50	< 0.001	2.02	1.24 – 3.30	0.005
Methamphetamine use	1.51	0.65 – 3.51	0.339	2.08	1.81 – 2.39	< 0.001	2.64	1.78 – 3.91	< 0.001
Any stimulant use	1.87	1.05 – 3.33	0.034	1.02	1.01 – 1.03	0.004	1.03	0.98 – 1.08	0.338

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

Table 10 Summary of Adjusted Odds Ratios for Lifetime Substance Use and Past-Year Suicide Attempts from Individual Models

	Women Veterans			Women Non-Veterans			Men Veterans		
	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Cannabis use	1.12	0.50 – 2.72	0.807	2.18	1.89 – 2.51	< 0.001	1.55	0.84 – 2.88	0.163
Heroin use	2.35	0.26 – 21.52	0.448	2.78	2.19 – 3.53	< 0.001	3.21	1.42 – 7.24	0.005
Non-prescribed prescription opioid use	2.46	0.53 – 11.14	0.244	1.74	1.51 – 2.01	< 0.001	1.45	0.74 – 2.82	0.280
Cocaine use	2.03	0.79 – 5.19	0.140	2.00	1.74 – 2.31	< 0.001	2.55	1.44 – 4.49	0.001
Crack cocaine use	0.66	0.08 – 5.25	0.698	2.50	1.98 – 3.14	< 0.001	3.14	1.49 – 6.59	0.003
Methamphetamine use	0.53	0.07 – 4.13	0.546	2.47	2.06 – 2.96	< 0.001	3.24	1.71 – 6.15	< 0.001
Any stimulant use	1.10	0.43 – 2.79	0.848	1.02	1.01 – 1.04	0.006	1.02	0.95 – 1.11	0.563

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

Table 11 Summary of Adjusted Odds Ratios for Lifetime Suicidality and Past-Year Cannabis Use Disorder from Individual Models

	Women Veterans			Women Non-Veterans			Men Veterans		
	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Past-year suicidal ideation	3.93	1.12 – 13.81	0.033	2.14	1.89 – 2.42	< 0.001	2.00	1.09 – 3.70	0.026
Past-year suicide plans	4.96	1.10 – 22.42	0.037	1.99	1.69 – 2.35	< 0.001	0.90	0.33 – 2.45	0.834
Past-year suicide attempts	3.91	0.45 – 34.34	0.219	2.58	2.12 – 3.14	< 0.001	1.65	0.46 – 5.94	0.441

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

Table 12 Summary of Adjusted Odds Ratios for Suicidality and Past-Year Combined Substance Use Disorders from Individual Models

	Women Veterans			Women Non-Veterans			Men Veterans		
	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Past-year suicidal ideation	2.28	0.92 – 5.67	0.075	2.51	2.28 – 3.77	< 0.001	3.72	2.47 – 5.61	< 0.001
Past-year suicide plans	2.07	0.68 – 6.36	0.202	2.50	2.19 – 2.84	< 0.001	2.16	1.21 – 3.85	0.009
Past-year suicide attempts	4.11	1.00 – 16.81	0.049	3.38	2.89 – 3.96	< 0.001	2.13	0.85 – 5.37	0.109

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

5.0 Mental Health and Substance Use Treatment Receipt Among Women Veterans with a Substance Use Disorder, 2015 – 2019: A Secondary Analysis of the National Survey on Drug Use and Health

5.1 Introduction

Women Veterans who experience mental health and SUDs are at risk for a variety of health and psychosocial disparities (Harrington et al., 2019), and may face unique, gender-specific barriers to treatment access both within the VHA and in civilian settings. There is conflicting evidence about mental health care access among women Veterans, and only 25% of Veterans across both sexes who could benefit from mental health treatment receive it (Hoerster et al., 2012). In a sample of the National Post-Deployment Adjustment Survey (NPDAS), Elbogen et al. (2013) examined the use of treatment provided by VHA and non-VHA services in post-9/11 Veterans. About 7% of Veterans had been hospitalized for mental health treatment in their lifetime, 56% of whom had been hospitalized at a VHA facility. Of the 25% of Veterans who had previously sought outpatient mental health treatment, 62% had done so at a VHA facility. A larger proportion of women veterans as compared to men reported using exclusively non-VHA facilities for both inpatient and outpatient mental health treatment. Irrespective of the source of care, women Veterans were more likely than men to report having current mental health problems (30% and 23% of women Veterans and men Veterans, respectively, were diagnosed with a mental health disorder) and were more willing to seek treatment (Elbogen et al., 2013), in that 24% of women Veterans compared to 13% of men Veterans reported seeking mental health services.

While women Veterans with SUDs may be more likely to seek treatment as compared to men, they may face perceived or tangible barriers in doing so through the VHA. Barriers that women Veteran face when accessing VHA care include limited knowledge about eligibility for VHA services, lack of accessible VHA services (Washington et al., 2015), negative perceptions and experience of VHA care (Wagner, Dichter, & Mattocks, 2015), and perceptions that VHA does not provide gender-sensitive or appropriately trauma-informed care for women (Washington et al., 2011). Other findings have suggested that women and men are equally likely to access VHA care, although, for women Veterans, positive perceptions of VHA care predicted the likelihood of VHA mental health care utilization (Fox et al., 2015). Rather unexpectedly, perceived fit (i.e., attitudes about one's fit within the VHA) did not predict service utilization in women Veterans (Fox et al., 2015), which is supported by the work of Hoerster et al., (2012) who reported that stigma-related or trust-related barriers were not associated with decreases in rates of mental health treatment access. However, less is known about barriers that women Veterans might face accessing treatment outside of VHA facilities, despite the fact that more than half of women Veterans receive non-VHA mental health services (Washington et al., 2015).

Veterans with SUDs might face increased barriers to treatment. Less than one-third of Veterans with a mental health or SUD report care utilization (Kline et al., 2022). SUDs are associated with an increased risk for suicidality among women Veterans, and this association is stronger among women Veterans than among men Veterans (Aslan et al., 2020; Blakey et al., 2021; Bohnert et al., 2017; Ilgen et al., 2010; Runnals et al., 2014). Further, SUDs are associated with worsening mental health outcomes, and limited engagement in treatment, among women Veterans (Ecker et al., 2020). As access to treatment may be a protective factor for not only

suicidality (Nichter et al., 2020; Riblet et al., 2019), but also mental health outcomes, it is imperative that barriers to treatment among this population are identified and addressed.

The purpose of this study is to examine differences in mental health treatment access among women Veterans with a past-year history of a SUD, in addition to examining barriers to mental health treatment access and their association with treatment receipt in women Veterans, while drawing comparisons to women non-Veterans and men Veterans. We hypothesize that women Veterans with a SUD will have increased barriers to care as compared to their peers, and may differ from their peers related to types of barriers faced.

5.2 Methods

5.2.1 Setting and Population

This study utilized data from the 2015 to 2019 versions of the NSDUH conducted by the SAMHSA (SAMHSA, n.d.). NSDUH interviews are primarily conducted in person, although audio computer-assisted self-administered interviews are utilized for sensitive items. SAMHSA utilizes a stratified, multistage area probability sampling method to conduct the NSDUH. Participants in this study included adults over the age of eighteen years.

5.2.2 Variables and Measures

Outcome variables included past-year receipt of mental health treatment, assessed dichotomously, in addition to a past-year inability to access mental health treatment, the latter

assessed by the following question: “During the past 12 months, was there any time when you needed mental health treatment or counseling for yourself but didn’t get it?” Utilization of prescribed psychotropic medication (e.g., antidepressants, anxiolytics, mood stabilizers) within the past year was assessed dichotomously. Reasons for not seeking treatment were assessed with the following question: “Which of these statements explains why you did not get the mental health treatment or counseling you needed?” and responses options included inability to afford cost of treatment, lack of insurance coverage, concern about effects on the job, concern about the opinions of neighbors, uncertainty about where to go for services, lack of believe that treatment would be effective, transportation issues, and lack of time. These responses were then categorized as affordability/cost-related barriers (e.g., couldn’t afford the cost of treatment, lack of insurance coverage), stigma-related reasons (e.g., concern about effects on the job, concern about the opinions of neighbors), lack of knowledge/understanding related to mental health services (e.g., uncertain of where to go for services, didn’t believe treatment would be effective), and logistical barriers (e.g., transportation issues, lack of time). A past-year history of SUD was assessed dichotomously. Covariates included age, sexual identity, race/ethnicity, level of education, past-year major depressive episodes, and past-year SUDs. Age was categorized as follows: 18 – 25 years; 26-29 years; 30-34 years; 35-49 years; 50-64 years; and 65 years and older. Sexual identity response options include straight/heterosexual, lesbian/gay, and bisexual. Additional responses options such as asexual or pansexual were not included in the SAMHSA NSDUH. Race/ethnicity was categorized as non-Hispanic white, non-Hispanic Black, non-Hispanic Native American/Alaska Native, non-Hispanic native Hawaiian, non-Hispanic Asian, non-Hispanic multiracial, and Hispanic. Level of education included less than high school diploma; high school diploma; some college, no degree; Associate’s degree; and Bachelor’s degree or higher. Past-year

major depressive episodes and past-year SUDs were categorized dichotomously. Presence of a past-year major depressive episode and past-year SUDs was assessed by a series of SAMHSA NSDUH questions that corresponded with DSM-5 diagnostic criteria for major depressive episodes and SUDs.

5.2.3 Data Analysis

Bivariate analyses with chi-squared tests were first utilized to examine differences in past-year receipt of inpatient and mental health treatment, in addition to a past-year inability to access mental health treatment among women Veterans, women non-Veterans, and men Veterans with a past-year history of SUD. Utilization of psychotropic medication was also analyzed utilizing chi-squared tests. Subsequently, a series of multiple logistic regression analyses were conducted with past-year mental health treatment as the outcome variable, adjusted for age, past-year depression, race/ethnicity, education level, sexual identity, and past-year SUD with treatment barriers included as predictors. Separate analyses were conducted with each predictor due to the relatively small number of Veterans who had reported these barriers. Barriers to treatment were collected via self-report to the following question "Which of these statements explains why you did not get the mental health treatment or counseling you needed?" and responses were categorized by the investigator as affordability/cost-related barriers, stigma-related reasons, lack of knowledge/understanding related to mental health services, and logistical barriers. Data was weighted as per the SAMHSA NSDUH protocol for the dataset for public use file (PUF) (SAMHSA, 2021). IBM SPSS Version 29.0.1.0 was utilized for the analysis.

5.3 Results

5.3.1 Demographic Results

A total of 131,344 individuals were included in this study, including women Veterans (n = 1,655), women non-Veterans (n = 118,606), and men Veterans (n = 11,083). Women Veterans were less likely to identify as heterosexual compared to both women non-Veterans and men Veterans. Women Veterans were also more likely than their peers to have education beyond a high school diploma. Additionally, women Veterans were more likely to experience a major depressive episode within the past year compared to both women Veterans and women non-Veterans. See Table 7 for details.

5.3.2 Mental Health Treatment

See Table 13 for details pertaining to mental health treatment access. Women Veterans with a past-year history of a SUD were more likely to have received outpatient mental health treatment in the past year compared to women non-Veterans and men Veterans with past-year SUDs. Approximately 37% of women Veterans with a past-year SUD received outpatient mental health treatment, compared to 26% of women non-Veterans (OR = 1.65, [1.04 – 2.62], p = 0.014) and 22.8% of men Veterans (OR = 1.96, [1.19 – 3.24, p = 0.004). There were no significant differences between groups related to past-year inpatient mental health treatment. Women Veterans were more likely than men Veterans to have been prescribed psychotropic medication in the past year. Approximately 43% of women Veterans with a past-year SUD were prescribed psychotropic medications, compared to 27% of their men Veteran peers (OR = 1.99, [1.22 – 3.22],

p = 0.002). Approximately 38% of women Veterans with a SUD reported an inability to access mental health treatment within the past year, compared to 19% of men Veterans (OR = 2.64, [1.59 – 4.38], p < 0.001).

5.3.3 Substance Use Treatment

Women Veterans with a SUD did not differ from women non-Veterans in receipt of past-year substance use treatment. Women Veterans with a past-year SUD were more likely than men Veterans with a past-year SUD to have received substance use treatment within the past year. Approximately 59% of women Veterans with a SUD received treatment within the past year, compared to 42% of men Veterans with a past-year SUD (OR = 1.41, [0.74 – 2.68], p = 0.041). Among those with a past-year history of SUD, there were no significant between-group differences regarding inability to access substance use treatment.

5.3.4 Barriers to Treatment

Women Veterans were more likely to report stigma-related barriers to accessing mental health treatment compared to both women non-Veterans and men Veterans. Approximately 67% of women Veterans reported stigma-related barriers to mental health treatment access compared to 38% and 41% of women non-Veterans (OR = 3.23, [1.51 – 6.95], p < 0.001) and men-Veterans (OR = 2.92, [1.23 – 6.94], p = 0.007), respectively. There were no significant between-group differences related to barriers to mental health treatment secondary to a lack of knowledge or understanding surrounding mental health treatment, logistic-related barriers, or cost-related barriers. Affordability/cost-related barriers, stigma-related barriers, lack of

knowledge/understanding related to mental health services, and logistical barriers were not associated with receipt of past-year mental health treatment among women Veterans when adjusting for past-year substance use. Among men Veterans, only a lack of knowledge or understanding surrounding mental health services was associated with a reduced likelihood of past-year mental health treatment receipt (aOR = 0.43 [0.21 – 0.87], p = 0.019). All categories of barriers were associated with a reduced likelihood of past-year mental health treatment receipt among women non-Veterans, aside from stigma-related barriers. See Tables 14and 15 for details.

5.4 Discussion

While women Veterans with a SUD were more likely to access outpatient mental health and substance use treatment and were more likely to be prescribed psychotropic medication than their counterparts, they were also more likely to report an inability to access mental health treatment within the last year. Reasons for this finding are not clear but could be related to the fact that women Veterans have greater care demands, or because they have a greater desire and willingness to seek care. Previous data have suggested that women Veterans have a greater perceived need for care than their male counterparts (Willitson et al., 2020). There were between-group differences as it relates to stigma-related barriers and cost-/affordability-related barriers, although such barriers did not predict access to treatment among women Veterans. Evidence suggests that women Veterans might be more receptive and willing to seek mental health treatment compared to their peers (Elbogen et al., 2013), but nonetheless report experiencing unmet care needs. Previous data suggests that as many as 15% of women Veterans might experience unmet mental health needs and that this is associated with increased odds of suicidality and self-injurious

behavior (Becerra et al., 2016). Thus, while in this study women Veterans sought care at higher rates than their counterparts, there is still evidence to suggest that women Veterans may perceive that their care needs are not adequately being met, and that this unmet need may result in adverse health outcomes.

The proportion of women Veterans in this study who received past-year mental health treatment was higher compared to previous studies. In a national, prospective study of women Veterans, in which those who used VHA care and those who did not were included, 27% of women Veterans had sought mental health treatment in the past six months, compared to our finding of 37% among women Veterans with a SUD (Williston et al., 2020). Because the study authored by Williston and colleagues included both VHA and non-VHA sources of care, it is possible that the proportion of women Veterans who received past-year mental health treatment is higher when compared to studies utilizing exclusively VHA data, and it is also possible that women Veterans with SUDs may be more likely to access mental health services than those without a SUD due to the frequency of psychiatric and substance-related comorbidities.

While previous data have demonstrated lower proportions of past-year mental health treatment receipt among Veterans, previous studies have also demonstrated higher rates of psychotropic medication use than the results of the present study. In a study of Veterans utilizing VHA services who were diagnosed with depression, approximately 50% were prescribed a psychotropic medication, although a greater proportion were engaged in therapy (Leung et al., 2021). However, our findings align with previous studies highlighting that women Veterans are more likely to be prescribed psychotropic medications than men Veterans (Adams et al., 2021). Bernardy et al. (2013) utilized national VHA administrative data and found that women Veterans with posttraumatic stress disorder were more likely to be prescribed psychotropic medications

compared to their male counterparts; however, it is not clear to what extent this is related to Veteran preference or provider bias.

In this study, women Veterans were more likely than their peers to report inability to access treatment, likely related to the increased proportion of women Veterans who reported stigma-related barriers to mental health treatment, including concern about the opinions of neighbors, concern about possible effects on their job, concern that others would learn of their mental health problems or that confidentiality would be breached, and concern that they would receive forced or involuntary treatment. While women Veterans were more likely to report stigma-related barriers to care than their peers, there were no between-group differences related to lack of knowledge or understanding surrounding mental health treatment, logistic-related barriers, or cost-related barriers. This was an unexpected finding, as previous studies have highlighted a lack of knowledge and understanding surrounding mental health services among women Veterans (Evans et al., 2019) as a barrier to care, in addition to logistical barriers such as lack of childcare or lack of time to receive treatment (Godier-McBard et al., 2023; Marshall et al., 2021; Newins et al., 2019). Previous studies have utilized VHA administrative data to examine barriers to care; however, because the present study utilized nationally representative data that included women Veterans who sought VHA care and those who did not, it is possible that those seeking non-VHA care experienced fewer barriers, or were able to overcome these barriers.

It is likely that women Veterans face barriers to treatment that are unique to both their gender and identity as Veterans that were not captured within the NSDUH, such as institutional betrayal due to military sexual trauma (Kelly, 2021; Monteith et al., 2021), of which there are high rates among women Veterans, or due to concerns about harassment seeking mental health care within the VHA due to the largely male-dominated environment (Klapp et al., 2019). Additional

research is needed to explore these barriers on a large scale, including how they may influence women Veterans' decisions to access non-VHA care, and whether they remain barriers outside of VHA settings.

Women Veterans were more likely to report experiencing stigma-related barriers to treatment. However, self-reported barriers, including affordability/cost-related barriers, stigma-related barriers, lack of knowledge/understanding related to mental health services, and logistical barriers, did not predict receipt of past-year mental health treatment among women Veterans. Among men Veterans, only a lack of knowledge or understanding surrounding mental health services predicted a lower likelihood of accessing mental health treatment within the past year. It is unclear to what extent these barriers were ameliorated by the recent Veterans Access, Choice, and Accountability Act of 2014 (Choice Act), which may have helped minimize certain barriers as those with VHA benefits are now able to access affordable non-VHA care. The VHA was an early adopter of telepsychiatry services (Lindsay et al., 2019; Schreck et al., 2020), and this shift to virtual care might have reduced barriers to services among Veterans, particularly affordability/cost-related and logistical barriers. Evidence supports that VHA telepsychiatry services increase access to both psychotherapy and medication management visits, improve continuity of care, and reduce treatment attrition (Jacobs et al., 2019). While it is possible that telepsychiatry services might have reduced gender-specific barriers among women Veterans, particularly those related to parenting or childcare issues, recent evidence suggests that men Veterans were more likely to remain enrolled with VHA telehealth services (Gray et al., 2022). Additional research is needed to examine how the proliferation of telepsychiatry services might influence access to care and perceived barriers to care, particularly among Veterans with SUDs

who are at increased risk for insecure housing (Manhapra et al., 2021), and thus may lack access to Internet connectivity needed for these services.

In addition to the early adoption and proliferation of telepsychiatry services, the VHA also engages in targeted outreach programs to identify Veterans at risk for mental health problems and to facilitate access to psychiatric care and associated resources. As an example, the Recovery Engagement and Coordination for Health–Veterans Enhanced Treatment (REACH VET) attempts to promote mental health engagement within VHA, through which Veterans identified as high-risk for adverse mental health outcomes are contacted by various members of the healthcare team both during and in between appointments, while offered more comprehensive mental health services (Matarazzo et al. 2023). These strategies, coupled with telepsychiatry services and the Choice Act, may have successfully reduced barriers to treatment access among Veterans at high risk for negative outcomes, including those with SUDs, although additional research on how women Veterans have utilized these services is needed.

5.4.1 Limitations

Limitations of this study included the self-reported nature of data collection, in addition to response bias. Notably, however, the NSDUH does report response rates that are comparable to other population-based surveys, and may capture individuals who are not presenting for treatment in a way that electronic health record data does not. While the NSDUH is nationally representative, the survey does not capture individuals who are insecurely housed or residing in institutional settings. Given that Veterans with SUDs are at higher risk for homelessness and hospitalization, this survey may have not adequately captured barriers to care amongst this population.

Additionally, the relatively low number of women Veterans with a SUD may have resulted in an analysis that failed to identify statistical differences between groups.

5.4.2 Conclusions

Women Veterans were more likely to access mental health and substance use care than their peers, although paradoxically were more likely to report an inability to access treatment. Further, women Veterans were more likely to report stigma-related barriers to mental health treatment, although this did not predict receipt of treatment within the past year. The VHA has implemented a variety of initiatives, such as the REACH VET program to identify Veterans at risk for negative mental health outcomes and to facilitate access to mental health care. Additional research is needed to discern how these programs may influence both barriers to and facilitators of care among Veterans, with special consideration for underserved or minority Veterans, including women Veterans In the future, gender-specific programs should be developed within the VHA and throughout civilian settings that increase access to high-quality mental health treatment among women Veterans.

5.5 Tables

Table 13 Receipt of Past-Year Mental Health and Substance Use Treatment

	Women Veterans	Women Non-Veterans	Men Veterans	
	n (%)	n (%)	n (%)	
Outpatient mental health treatment	29 (36.7%)	1,540 (26.0%)	115 (22.8%)	p = 0.026
Inpatient mental health treatment	7 (8.8%)	1,364 (6.1%)	31 (6.19%)	p = 0.626
Psychotropic medication utilization	34 (42.5%)	2,152 (36.3%)	137 (27.1%)	p < 0.001
Substance use treatment	12 (41.4%)	742 (45.6%)	2,133 (58.3%)	p = 0.001
Inability to access treatment	30 (38%)	2,024 (34.1%)	95 (18.8%)	p < 0.001

Table 14 Self-Reported Barriers to Mental Health and Substance Use Treatment

	Women Veterans (n = 30)	Women Non-Veterans (n = 2,010)	Men Veterans (n = 92)	
	n (%)	n (%)	n (%)	
Lack of knowledge/understanding	11 (36.7%)	6,979 (48.7%)	45 (49.5%)	p = 0.418
Logistic-related barriers	12 (40%)	602 (30.0%)	25 (27.5%)	p = 0.426
Stigma-related barriers	20 (66.7%)	768 (38.2%)	37 (40.7%)	p = 0.006
Cost-affordability barriers	11 (36.7%)	990 (49.3%)	35 (38.0%)	p = 0.046

Table 15 Summary of Adjusted Odds of Outpatient Mental Health Treatment by Self-Reported Barrier from Individual Models

	Women Veterans (n = 30)	Women Non-Veterans (n = 2,010)	Men Veterans (n = 92)
	aOR [CI], p-value	aOR [CI], p-value	aOR [CI], p-value
Lack of knowledge/understanding	1.49 [0.32 – 6.91], 0.608	0.57 [0.47 – 0.69], <0.001	0.43 [0.21 – 0.87], 0.019
Logistic-related barriers	0.77 [0.17 – 3.58], 0.736	0.80 [0.66 – 0.98], 0.032	0.87 [0.43 – 1.73], 0.682
Stigma-related barriers	0.93 [0.19 – 4.62], 0.927	1.10 [0.91 – 1.33], 0.336	1.65 [0.84 – 3.24], 0.143
Cost-affordability barriers	0.71 [0.13 – 3.88], 0.694	0.81 [0.67 – 0.97], 0.025	0.72 [0.34 – 1.53], 0.394

*Covariates include age, race/ethnicity, past-year major depression, sexual orientation, and education status.

6.0 Dissertation Discussion

This dissertation research utilized data from the SAMHSA NSDUH to examine substance use, suicidality, and access to care among women Veterans, while drawing comparisons between women non-Veterans and men Veterans. Paper 1 (Chapter 3) focuses on rates of lifetime substance use, frequency of past 30-day substance use, and past-year SUDs for cannabis, opioids, and stimulants. Paper 2 (Chapter 4) examines differences in past twelve-month suicidal ideation, plans, and attempts between women Veterans, women non-Veterans, and men Veterans, while also examining substance-related predictors for suicidality among women Veterans, women non-Veterans, and men Veterans. Paper 3 (Chapter 5) examines past-year receipt of mental health treatment and past-year inability to access mental health treatment among women Veterans, women non-Veterans, and men Veterans with a past-year SUD.

6.1 Summary of Dissertation Findings

Paper 1 utilized NSDUH data from 2015 to 2019 (n = 214,505) and 2021 (n = 47,291) to examine lifetime use, past-year use disorder, and frequency of use over the past month for the following substances: cannabis, opioids (heroin, prescription opioid, and non-prescribed prescription opioids), and stimulants (cocaine, crack-cocaine, methamphetamine, and non-prescribed prescription stimulants). The key findings of Paper 1 included:

- From both 2015 to 2019 and in 2021, women Veterans were more likely than both women non-Veterans and men Veterans to have ever used cannabis ($p < 0.001$).

Approximately 58% and 55% of women Veterans reported having used cannabis in their lifetime from 2015 to 2019 and in 2021, respectively. When controlling for past-year depression and demographic characteristics, women Veterans had increased odds of lifetime cannabis use compared to the general population between 2015 and 2019 (aOR = 1.17 [1.06 – 1.29, p = 0.002), but not in 2021. Despite having greater odds of lifetime cannabis use, women Veterans were less likely to have a past-year cannabis use disorder compared to women non-Veterans and men veterans. Between 2015 and 2019, the adjusted odds ratio for past-year cannabis use disorder among women Veterans was 0.52 [0.32 – 0.85] (p = 0.008), although adjusted odds were not significant in 2021.

- Approximately 80% and 70% of women Veterans had used prescription opioids in their lifetime from 2015 to 2019 and 2021, respectively, with women Veterans more likely than both women non-Veterans and men Veterans to have used prescription opioids across both timeframes ($p < 0.001$). Between 2015 and 2019, women Veterans were about 250% and 80% more likely to have used prescription opioids compared to women non-Veterans (OR = 2.49 [2.20 – 2.82] and men Veterans (OR = 1.81 [1.59 – 2.06], respectively ($p < 0.001$). When controlling for past-year depression and demographic characteristics, women Veterans had increased odds of lifetime prescription opioid use between 2015 and 2019 (aOR = 2.16 [1.90 – 2.46], $p <0.001$), and in 2021 (aOR = 1.39 [1.12 – 1.73], p = 0.003) compared to the general population. Regarding non-prescribed prescription opioid use, approximately 12.3% of women Veterans report a lifetime history of non-prescribed prescription opioid use, compared to 10.6% (OR = 1.19, [1.02 – 1.37], p = 0.012), and 9.8% (OR = 1.29, [1.10 – 1.52], p = 0.005) of women non-

Veterans and men Veterans, respectively. Nonetheless, only a very small percentage of women Veterans experienced a past-year opioid use disorder.

- Approximately 18% and 17.6% of women Veterans reported a history of any stimulant use (cocaine, crack-cocaine, and methamphetamine) during their lifetime from 2015 to 2019 and 2021, and during both timeframes were more likely than both women non-Veterans and men Veterans to have used a stimulant ($p < 0.001$) but were not more likely to have a stimulant use disorder.

Most notably, while lifetime substance use was generally higher among women Veterans than both peer groups, women Veterans were not notably at increased risk for the development of a past-year SUD; this finding was particularly notable as it relates to opioid use. The vast majority of women Veterans were prescribed an opioid in their lifetime, and more than one in ten women Veterans reported taking an opioid from a non-prescribed source. Yet, nonetheless, women Veterans have very low rates of past-year opioid use disorder and were not at higher risk for past-year opioid use disorder as compared to their counterparts. It is unclear what protective factors mitigate the risk of lifetime substance use progressing to a SUD among women Veterans, although this is an area worthy of additional exploration in the future.

Paper 2 utilized data from the 2015 to 2019 NSDUH to examine rates of past-year suicidal ideation, plans, and attempts among women Veterans, women non-Veterans, and men Veterans, while also examining predictors (including lifetime cannabis, opioid, and stimulant use and past-year cannabis, opioid, and stimulant use disorders) of suicidal ideation, plans, and attempts. The key findings of Paper 2 included:

- Women Veterans were more likely to experience suicidal ideation, plans, and attempts than both women non-Veterans and men Veterans. Women Veterans experienced a

greater than two-fold increased odds in past-year suicidal plans and attempts compared to men Veterans.

- In women Veterans, only lifetime non-prescribed prescription opioid use (aOR = 1.99, [1.04 – 3.79], p = 0.038), and lifetime cocaine use (aOR = 1.74 [1.10 = 2.74], p = 0.018) increased the odds of past-year suicidal ideation.
- Among women Veterans, lifetime cannabis use (aOR = 2.02, [1.03 – 3.96], p = 0.040), lifetime cocaine use (aOR = 2.24, 1.20 – 4.05, p = 0.011), and lifetime stimulant use (aOR = 1.87, [1.05 – 3.33], p = 0.034) increased the odds of past-year suicide plans.

Women Veterans were at higher risk for suicidality than men Veterans and women non-Veterans, including suicidal ideation, attempts, and plans. However, substance use did not as robustly predict suicidality in women Veterans compared to their peers. Further, past-year substance use treatment did not moderate the relationship between substance use and suicidality, while past-year mental health treatment did moderate the relationship between past-year suicidal ideation and lifetime non-prescribed prescription opioid use. Past-year major depressive disorders were strong predictors of suicidality, as expected, and thus access to mental health rather than substance use treatment had a greater influence on the relationship between substance use and suicidality.

Paper 3 examined past-year receipt of mental health treatment and past-year inability to access mental health treatment among women Veterans, women non-Veterans, and men Veterans with a past-year SUD, and also examined predictors of past-year inability to access mental health treatment among women Veterans, women non-Veterans, and men Veterans. Key findings of Paper 3 include:

- Women Veterans with a past-year history of a SUD were more likely to have received outpatient mental health treatment in the past year compared to women non-Veterans and men Veterans with past-year SUDs. Approximately 37% of women Veterans with a past-year SUD received outpatient mental health treatment, compared to 26% of women non-Veterans (OR = 1.65, [1.04 – 2.62], p = 0.014) and 22.8% of men Veterans (OR = 1.96, [1.19 – 3.24, p = 0.004).
- Women Veterans were more likely than men Veterans to have been prescribed psychotropic medication in the past year. Approximately 43% of women Veterans with a past-year SUD were prescribed psychotropic medications, compared to 27% of their men Veteran peers (OR = 1.99, [1.22 – 3.22], p = 0.002).
- Women Veterans were more likely to report stigma-related barriers to accessing mental health treatment compared to both women non-Veterans and men Veterans. Approximately 67% of women Veterans reported stigma-related barriers to mental health treatment access compared to 38% and 41% of women non-Veterans (OR = 3.23, [1.51 – 6.95], p < 0.001) and men-Veterans (OR = 2.92, [1.23 – 6.94], p = 0.007), respectively.
- Women Veterans with a SUD were more likely to access outpatient mental health and substance use treatment and were more likely to be prescribed psychotropic medication than their counterparts, yet paradoxically, were more likely to report an inability to access mental health treatment within the last year.

Women Veterans were more likely to report an inability to access mental health treatment within the last year, despite the fact that they received treatment at higher rates than their counterparts. It is unclear if this is related to a greater willingness to seek care among

women Veterans, or related to the fact that women Veterans may have a greater burden of care needs. Thus, this is an area worthy of additional exploration in the future.

Taken together, the results of this dissertation work highlight that women Veterans are different than their peers in unique and sometimes unexpected ways. Many health promotion or treatment interventions designed to address both substance use and suicidality in Veterans were developed with research comprising largely male Veterans, and thus may not apply to women Veterans. There is a clear need for additional research on gender-specific, evidence-based interventions to reduce the burden of both substance use and suicide in this population.

6.1.1 Overall Study Limitations

While this study utilized data from a large, nationally representative survey, there are inherent limitations. Foremost, this study relied on self-report data which may have introduced bias, particularly related to sensitive topics including substance use. Nonetheless, the NSDUH does utilize a series of self-report questions in line with the DSM-5 criteria to identify past-year SUDs in those who may have never been formally diagnosed, thus potentially identifying those who would have been missed via electronic health record data. The NSDUH also excludes individuals experiencing homelessness or those in long-term or inpatient care facilities, and thus may inadequately capture both rates of suicidality and SUDs, as these individuals are more likely to experience hospitalization or residential treatment. Lastly, there was a relatively small number of women Veterans, which may have resulted in a lack of statistical power. Additional research with larger sample sizes is needed, although this is likely reliant on VHA electronic health record data given the relatively small number of women Veterans in the population. Alternatively, methodological strategies such as the oversampling of women Veterans may be successful. The

Comparative Health Assessment Interview, as an example, oversampled women Veterans, and did utilize substance use screening tools, but to our knowledge did not include items on SUDs. Finally, while the NSDUH does include items related to past-year depression, other pertinent mental health diagnoses, such as posttraumatic stress disorder were excluded, and further, there were no items related to lifetime trauma exposure. Given the high rates of trauma among Veterans, derived from both combat trauma, military sexual trauma, and adverse childhood experiences, future research should attempt to include trauma as a confounding variable, when data availability permits.

6.1.2 Future Directions

Additional research with larger numbers of women Veterans is needed; in these instances, VHA administrative data can likely be leveraged to examine substance use and suicide among women Veterans. Additionally, VHA data might allow for the use of biological measurements, including urine drug screens, to augment ICD-10 diagnostic data, which can be inaccurate at times. As mentioned above, methods such as the oversampling of women Veterans might be a strategy to allow for more robust research related to women Veterans and mental health or substance use outcomes.

While this research largely focused on women Veterans, future work should also include gender-diverse Veterans, including transgender and non-binary Veterans, who are at risk for suicidality. This was not possible given the items on the NSDUH which did not allow for comprehensive responses, which only in 2023 included questions about gender identity.

As women Veterans differ from their peers as it relates to both substance use and suicidality, there is a need for targeted interventions that are grounded in evidence to be utilized among women Veterans. Future research should seek to develop and evaluate interventions that

seek to reduce rates of substance use and use disorders, and suicidality, among women Veterans. At present, there are few gender-focused substance use treatment programs within the VHA, and thus future research could evaluate outcomes for women Veterans who complete these programs and may support the need for the development of additional gender-focused programs.

This dissertation work highlighted that, despite receiving mental health treatment at higher rates than their counterparts, women Veterans still report unmet care needs. Qualitative research could be used in the future to better understand this phenomenon, as to whether this finding is related to women Veteran's greater willingness to seek treatment, versus having a greater burden of care needs. While the VHA has prioritized women's health over the last decade, additional research is needed related to VHA infrastructure for women Veterans. As an example, a small proportion of VHA facilities offer gender-specific treatment for mental health and substance use, and program evaluations of these treatment programs are needed. Such program evaluations can support the expansion of gender-specific mental health and substance use treatment programs throughout the VHA system. Additionally, research is warranted surrounding how the CHOICE Act and other recent legislation have changed access to care among women Veterans, and whether the VHA has the resources in place to meet this demand.

Finally, additional research is needed to evaluate emerging substance use, such as synthetic cannabinoids and synthetic opioids (e.g., Kratom, fentanyl), among women Veterans. Items related to these particular substances were not included in the NSDUH. However, given the high rates of lifetime cannabis and opioid use identified in this study, it is possible that women Veterans are utilizing synthetic cannabinoids and opioids at higher rates than their peers, as well, and this should be explored in the future.

6.1.3 Dissertation Conclusions

Women Veterans were at higher risk for select substance use-related outcomes than women non-Veterans and men Veterans and were notably at increased risk for past-year suicidal ideation, attempts, and plans. Women Veterans with SUDs reported unmet mental health needs, but nonetheless received treatment at higher rates than women non-Veterans and men Veterans, although it is unclear to what extent care was received at VHA versus non-VHA sources. The results of this dissertation work can inform future clinical and legislative efforts designed to better address the needs of women Veterans. As an example, women Veterans might require additional screening for lifetime substance use, SUDs, and suicide. Mental health care providers should be aware of these findings as they might influence care delivery for women Veterans. There has been recent federal legislation (i.e., Deborah Sampson Act of 2020, Commander John Scott Hannon Veterans Mental Health Care Improvement Act of 2019) passed to improve health care quality and access among women Veterans, and outcomes of these legislative efforts should be evaluated.

In summary, this dissertation work adds to the body of knowledge surrounding women Veterans and their mental health and substance-use-related needs. A growing yet vulnerable population, women Veterans deserve access to high-quality, evidence-based, and timely services. Access to such services will improve outcomes and quality of life among women Veterans, and thus additional epidemiological and interventional research is warranted.

Appendix A : National Survey on Drug Use and Health Codebook

Please see attached links to SAMHSA NSDUH Codebooks:

2015: https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2015/NSDUH-2015-datasets/NSDUH-2015-DS0001/NSDUH-2015-DS0001-info/NSDUH-2015-DS0001-info-codebook.pdf

2016: https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2016/NSDUH-2016-datasets/NSDUH-2016-DS0001/NSDUH-2016-DS0001-info/NSDUH-2016-DS0001-info-codebook.pdf

2017: https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2017/NSDUH-2017-datasets/NSDUH-2017-DS0001/NSDUH-2017-DS0001-info/NSDUH-2017-DS0001-info-codebook.pdf

2018: https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2018/NSDUH-2018-datasets/NSDUH-2018-DS0001/NSDUH-2018-DS0001-info/NSDUH-2018-DS0001-info-codebook.pdf

2019: https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2019/NSDUH-2019-datasets/NSDUH-2019-DS0001/NSDUH-2019-DS0001-info/NSDUH-2019-DS0001-info-codebook.pdf

2021: https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2021/NSDUH-2021-datasets/NSDUH-2021-DS0001/NSDUH-2021-DS0001-info/NSDUH-2021-DS0001-info-codebook.pdf

Appendix B

Table 16 Association Between Lifetime Non-Prescribed Prescription Opioid Use and Past-Year Suicidal Ideation Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.87	0.79 – 0.97	0.001
Education	0.89	0.76 – 1.05	0.179
Race	1.04	.95 – 1.13	0.381
Sexual identity	1.39	1.08 – 1.81	0.012
Past-year major depression	11.00	7.49 – 16.17	<0.001
Lifetime non-prescribed prescription opioid use	1.99	1.04 – 3.79	0.038

Table 17 Association Between Lifetime Cocaine Use and Past-Year Suicidal Ideation Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.87	0.79 – 0.97	0.011
Education	0.91	0.77 – 1.07	0.255
Race	1.03	0.94 – 1.12	0.522
Sexual identity	1.38	1.07 – 1.79	0.014
Past-year major depression	11.44	7.80 – 16.76	<0.001
Lifetime cocaine use	1.74	1.10 – 2.74	0.018

Table 18 Association Between Lifetime Cannabis Use and Past-Year Suicide Plans Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.99	0.78 – 1.06	0.220
Education	0.88	0.70 – 1.12	0.311
Race	1.05	0.93 – 1.19	0.418
Sexual identity	1.29	0.91 – 1.84	0.150
Past-year major depression	12.87	7.17 – 23.10	<0.001
Lifetime cannabis use	2.02	1.03 – 3.96	0.040

Table 19 Association Between Lifetime Cocaine Use and Past-Year Suicide Plans Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.89	0.76 – 1.04	0.141
Education	0.88	0.66 – 1.11	0.267
Race	1.03	0.91 – 1.17	0.623
Sexual identity	1.30	0.91 – 1.84	0.149
Past-year major depression	13.31	7.43 – 23.85	<0.001
Lifetime cocaine use	2.20	1.20 – 4.05	0.011

Table 20 Association Between Lifetime Non-Prescribed Prescription Stimulant Use and Past-Year Suicide Plans Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.91	0.78 – 1.06	0.207
Education	0.86	0.68 – 1.09	0.206
Race	1.05	0.93 – 1.18	0.452
Sexual identity	1.31	0.93 – 1.87	0.127
Past-year major depression	12.58	6.97 – 22.72	<0.001
Non-prescribed prescription stimulant use	1.87	1.05 – 3.33	0.034

Table 21 Association Between Past-Year Cannabis Use Disorder Use and Past-Year Suicidal Ideation Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.89	0.80 – 0.99	0.029
Education	0.90	0.76 – 1.06	0.189
Race	1.03	0.95 – 1.12	0.503
Sexual identity	1.39	1.07 – 1.80	0.012
Past-year major depression	11.91	8.12 – 17.45	<0.001
Past-year cannabis use disorder	3.93	1.12 – 13.81	0.033

Table 22 Association Between Past-Year Cannabis Use Disorder Use and Past-Year Suicide Plans Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.92	0.79 – 1.07	0.254
Education	0.86	0.68 – 1.08	0.194
Race	1.04	0.92 – 1.17	0.562
Sexual identity	1.30	0.91 – 1.85	0.146
Past-year major depression	14.24	7.95 – 25.51	<0.001
Past-year cannabis use disorder	4.96	1.10 – 22.42	0.037

Table 23 Association Between Past-Year Combined Substance Use Disorder Use and Past-Year Suicide Attempts Among Women Veterans

	aORs	Confidence Interval	p-value
Age	0.70	0.57 – 0.86	<0.001
Education	1.04	0.70 – 1.54	0.858
Race	0.92	0.74 – 1.14	0.427
Sexual identity	0.66	0.34 – 1.30	0.231
Past-year major depression	10.50	4.45 – 24.77	<0.001
Past-year combined substance use disorder	4.11	1.00 – 16.81	0.049

Bibliography

Adams, R. E., Hu, Y., Figley, C. R., Urosevich, T. G., Hoffman, S. N., Kirchner, H. L., ... & Boscarino, J. A. (2021). Risk and protective factors associated with mental health among female military veterans: results from the veterans' health study. *BMC Women's Health*, *21*(1), 1-10.

Aletraris, L., Graves, B. D., & Ndung'u, J. J. (2023). Assessing the impact of recreational cannabis legalization on cannabis use disorder and admissions to treatment in the United States. *Current Addiction Reports*, 1-12.

American College of Obstetricians and Gynecologists. (2022). Health care for women in the military and women veterans. *Committee Opinion*, 547.

Ashrafioun, L., Pigeon, W. R., Conner, K. R., Leong, S. H., & Oslin, D. W. (2016). Prevalence and correlates of suicidal ideation and suicide attempts among veterans in primary care referred for a mental health evaluation. *Journal of Affective Disorders*, *189*, 344-350.

Ashrafioun, L., Zerbo, K. R., Bishop, T. M., & Britton, P. C. (2020). Opioid use disorders, psychiatric comorbidities, and risk for suicide attempts among veterans seeking pain care. *Psychological Medicine*, *50*(12), 2107-2112.

Aslan, M., Radhakrishnan, K., Rajeevan, N., Sueiro, M., Goulet, J. L., Li, Y., ... & Harvey, P. D. (2020). Suicidal ideation, behavior, and mortality in male and female US veterans with severe mental illness. *Journal of Affective Disorders*, *267*, 144-152.

Back, S. E., Payne, R. L., Simpson, A. N., & Brady, K.T. (2010). Gender and prescription opioids: Findings from the National Survey on Drug Use and Health. *Addictive Behaviors, 35*(11), 1001-1007.

Baer, M. M., Tull, M. T., & Gratz, K. L. (2022). Substance use frequency relates to suicidal ideation through perceived burdensomeness and to suicide attempts through capability for suicide. *Archives of Suicide Research*, *26*(3), 1520-1540.

Bahraini, N., Brenner, L. A., Barry, C., Hostetter, T., Keusch, J., Post, E. P., ... & Matarazzo, B. B. (2020). Assessment of rates of suicide risk screening and prevalence of positive screening results among US veterans after implementation of the veterans affairs suicide risk identification strategy. *JAMA Network Open*, *3*(10), e2022531-e2022531.

Becerra, M. B., Becerra, B. J., Hassija, C. M., & Safdar, N. (2016). Unmet mental healthcare need and suicidal ideation among US veterans. *American Journal of Preventive Medicine*, *51*(1), 90-94.

Beckman, K. L., Williams, E. C., Hebert, P. L., Frost, M. C., Rubinsky, A. D., Hawkins, E. J., ... & Lehavot, K. (2022). Associations among military sexual trauma, opioid use disorder, and gender. *American Journal of Preventive Medicine*, *62*(3), 377-386.

Begley, M. R., Ravindran, C., Peltzman, T., Morley, S. W., Stephens, B. M., Ashrafioun, L., & McCarthy, J. F. (2022). Veteran drug overdose mortality, 2010–2019. *Drug and Alcohol Dependence*, *233*, 109296.

Bernardy, N. C., Lund, B. C., Alexander, B., Jenkyn, A. B., Schnurr, P. P., & Friedman, M. J. (2013). Gender differences in prescribing among veterans diagnosed with posttraumatic stress disorder. *Journal of General Internal Medicine*, *28*, 542-548.

Betancourt, C. A., Kitsantas, P., Goldberg, D. G., & Hawks, B. A. (2023). Prescription opioid misuse and suicidal behaviors among US veterans: a cross-sectional study from the 2015–2019 National Survey on Drug Use and Health. *The Journal of Behavioral Health Services & Research*, *50*(2), 150-164.

Blakey, S. M., Dillon, K. H., Wagner, H. R., Simpson, T. L., Beckham, J. C., Calhoun, P. S., & Elbogen, E. B. (2022). Psychosocial well-being among veterans with posttraumatic stress disorder and substance use disorder. *Psychological Trauma: Theory, Research, Practice, and Policy*, *14*(3), 421.

Blosnich, J. R., & Bossarte, R. M. (2017). Premilitary trauma as a correlate of suicidal ideation among veterans. *Psychiatric Services*, *68*(8), 755-755.

Blosnich, J. R., Garfin, D. R., Maguen, S., Vogt, D., Dichter, M. E., Hoffmire, C. A., ... & Schneiderman, A. (2021). Differences in childhood adversity, suicidal ideation, and suicide attempt among veterans and nonveterans. *American Psychologist*, *76*(2), 284.

Boden, M. T., & Hoggatt, K. J. (2018). Substance use disorders among veterans in a nationally representative sample: prevalence and associated functioning and treatment utilization. *Journal of Studies on Alcohol and Drugs*, *79*(6), 853-861.

Bohnert, K. M., Ilgen, M. A., Louzon, S., McCarthy, J. F., & Katz, I. R. (2017). Substance use disorders and the risk of suicide mortality among men and women in the US Veterans Health Administration. *Addiction*, *112*(7), 1193-1201.

Bonn-Miller, M. O., Harris, A. H., & Trafton, J. A. (2012). Prevalence of cannabis use disorder diagnoses among veterans in 2002, 2008, and 2009. *Psychological Services*, *9*(4), 404.

Bozzay, M. L., Liu, R. T., & Kleiman, E. M. (2014). Gender and age differences in suicide mortality in the context of violent death: findings from a multi-state population-based surveillance system. *Comprehensive Psychiatry*, *55*(5), 1077-1084.

Browne, K. C., Dolan, M., Simpson, T. L., Fortney, J. C., & Lehavot, K. (2018). Regular past

year cannabis use in women veterans and associations with sexual trauma. *Addictive Behaviors*, *84*, 144-150.

Browne, K. C., Stohl, M., Bohnert, K. M., Saxon, A. J., Fink, D. S., Olfson, M., ... & Hasin, D. S. (2022). Prevalence and correlates of cannabis use and cannabis use disorder among US veterans: results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC-III). *American Journal of Psychiatry*, *179*(1), 26-35.

Bryan, C. J., Bryan, A. O., Ray-Sannerud, B. N., Etienne, N., & Morrow, C. E. (2014). Suicide attempts before joining the military increase risk for suicide attempts and severity of suicidal ideation among military personnel and veterans. *Comprehensive Psychiatry*, *55*(3), 534-541.

Bullman, T., Hoffmire, C., Schneiderman, A., & Bossarte, R. M. (2015). Time dependent gender differences in suicide risk among Operation Enduring Freedom and Operation Iraqi Freedom veterans. *Annals of Epidemiology*, *25*(12), 964-965.

Carter, A., Borrero, S., Wessel, C., Washington, D. L., Bean-Mayberry, B., Corbelli, J., ... & Zickmund, S. (2016). Racial and ethnic health care disparities among women in the Veterans Affairs healthcare system: a systematic review. *Women's Health Issues*, *26*(4), 401-409.

Carter, S. P., Malte, C. A., Rojas, S. M., Hawkins, E. J., & Reger, M. A. (2020). Examination of potential disparities in suicide risk identification and follow-up care within the Veterans Health Administration. *Suicide and Life-Threatening Behavior*, *50*(6), 1127-1139.

Centers for Diesase Control and Prevention (2023). *Facts about suicide.* Retrieved from https://www.cdc.gov/suicide/facts/index.html#:~:text=Suicide%20affects%20people%20of%20all,%2D14%20and%2020%2D34.

Chen, J. I., Cameron, D. C., Laliberte, A. Z., Hooker, E. R., Niederhausen, M., & Denneson, L. M. (2021). Assessment of suicidal intent in self-directed violence and subsequent care received among military veterans: A national study of gender differences. *Medical Care*, *59*, S17.

Chesin, M., Interian, A., Kline, A., Hill, L. S., King, A., Miller, R., ... & Stanley, B. (2019). Past year opioid misuse and suicide attempt are positively associated in high suicide risk veterans who endorse past-year substance use. *Addictive Behaviors*, *99*, 106064.

Chrystal, J. G., Frayne, S., Dyer, K. E., Moreau, J. L., Gammage, C. E., Saechao, F., ... & Hamilton, A. B. (2022). Women veterans' attrition from the VA Health Care System. *Women's Health Issues*, *32*(2), 182-193.

Chu, C., Buchman-Schmitt, J. M., Stanley, I. H., Hom, M. A., Tucker, R. P., Hagan, C. R., ... & Joiner Jr, T. E. (2017). The interpersonal theory of suicide: A systematic review and meta-analysis of a decade of cross-national research. *Psychological Bulletin*, *143*(12), 1313.

Compton, W. M., Han, B., Jones, C. M., & Blanco, C. (2019). Cannabis use disorders among adults in the United States during a time of increasing use of cannabis. *Drug and Alcohol Dependence*, *204*, 107468.

Congressional Research Service. (2021). *Veterans Health Administration: Gender-specific health care services for women Veterans.* Retrieved from https://crsreports.congress.gov

Coughlin, L. N., Zhang, L., Bohnert, A. S., Maust, D. T., Goldstick, J., & Lin, L. (2022). Patient characteristics and treatment utilization in fatal stimulant-involved overdoses in the United States Veterans Health Administration. *Addiction*, *117*(4), 998-1008.

Decker, K. P., Peglow, S. L., Samples, C. R., & Cunningham, T. D. (2017). Long-term outcomes after residential substance use treatment: Relapse, morbidity, and mortality. *Military Medicine*, *182*(1-2), e1589-e1595.

Denneson, L. M., Cromer, R., Jacobson, L. E., Teo, A., & Dobscha, S. K. (2016). Female Veterans who died by suicide: qualitative analysis of medical records. *Military Behavioral Health*, *4*(3), 276-284.

Department of Veterans Affairs. (2019). *Suicide among women Veterans: Risk factors associated with mental health and emotional well-being.* Retrieved from https://www.mentalhealth.va.gov/suicide_prevention/docs/Literature_Review_FSTP_Womens_Mental_Health_Emotional_Well-being_508_FINAL_06-18-2019.pdf

Department of Veterans Affairs. (2023). *2023 National Veteran Suicide Prevention Report.* VA Suicide Prevention Office of Mental Health and Suicide Prevention. Retrieved from https://www.mentalhealth.va.gov/docs/data-sheets/2023/2023-National-Veteran-Suicide-Prevention-Annual-Report-FINAL-508.pdf

Dichter, M. E., Krishnamurti, L. S., Chhatre, S., Hoffmire, C. A., Monteith, L. L., Bellamy, S. L., ... & McCoy, I. (2022). Gender differences in veterans' use of the Veterans Crisis Line (VCL): Findings from VCL call data. *General Hospital Psychiatry*, *74*, 65-70.

Doran, N., Bismark, A., Khalifian, C., Mishra, J., De Peralta, S., & Martis, B. (2021). Associations between veteran encounters with suicide prevention team and suicide-related outcomes. *Suicide and Life-Threatening Behavior*, *51*(4), 729-735.

Dyer, K. E., Potter, S. J., Hamilton, A. B., Luger, T. M., Bergman, A. A., Yano, E. M., & Klap, R. (2019). Gender differences in veterans' perceptions of harassment on Veterans Health Administration grounds. *Women's Health Issues*, *29*, S83-S93.

Earnshaw, V., Smith, L., & Copenhaver, M. (2013). Drug addiction stigma in the context of methadone maintenance therapy: an investigation into understudied sources of stigma. *International Journal of Mental Health and Addiction*, *11*(1), 110-122.

Ecker, A. H., Lang, B., Hogan, J., Cucciare, M. A., & Lindsay, J. (2020). Cannabis use disorder

among veterans: Comorbidity and mental health treatment utilization. *Journal of Substance Abuse Treatment*, *109*, 46-49.

Elbogen, E. B., Wagner, H. R., Johnson, S. C., Kinneer, P., Kang, H., Vasterling, J. J., ... & Beckham, J. C. (2013). Are Iraq and Afghanistan veterans using mental health services? New data from a national random-sample survey. *Psychiatric Services*, *64*(2), 134-141.

Evans, E. A., Glover, D. L., Washington, D. L., & Hamilton, A. B. (2018). Psychosocial factors that shape substance abuse and related mental health of women military veterans who use community-based services. *Substance Use & Misuse*, *53*(11), 1878-1892.

Evans, E. A., Tennenbaum, D. L., Washington, D. L., & Hamilton, A. B. (2019). Why women veterans do not use VA-provided health and social services: Implications for health care design and delivery. *Journal of Humanistic Psychology*, 0022167819847328.

Finlay, A. K., Harris, A. H., Timko, C., Yu, M., Smelson, D., Stimmel, M., & Binswanger, I. A. (2021). Disparities in access to medications for opioid use disorder in the Veterans Health Administration. *Journal of Addiction Medicine*, *15*(2), 143.

Fox, A. B., Meyer, E. C., & Vogt, D. (2015). Attitudes about the VA health-care setting, mental illness, and mental health treatment and their relationship with VA mental health service use among female and male OEF/OIF veterans. *Psychological Services*, *12*(1), 49.

Fuehrlein, B. S., Mota, N., Arias, A. J., Trevisan, L. A., Kachadourian, L. K., Krystal, J. H., ... & Pietrzak, R. H. (2016). The burden of alcohol use disorders in US military veterans: results from the National Health and Resilience in Veterans Study. *Addiction*, *111*(10), 1786-1794.

Gibson, C. J., Li, Y., Jasuja, G. K., Keyhani, S., & Byers, A. L. (2022). Long-term psychoactive medications, polypharmacy, and risk of suicide and unintended overdose death among midlife and older women veterans. *Journal of General Internal Medicine*, *37*(Suppl 3), 770-777.

Godier-McBard, L. R., Wood, A., Kohomange, M., Cable, G., & Fossey, M. (2023). Barriers and facilitators to mental healthcare for women veterans: a scoping review. *Journal of Mental Health*, *32*(5), 951-961.

Gray, K. E., Rao, M., Gunnink, E., Eschenroeder, L., Geyer, J. R., Nelson, K. M., & Reddy, A. (2022). Home telehealth in the veterans health administration: trends and correlates of length of enrollment from 2010 to 2017. *Journal of General Internal Medicine*, *37*(12), 3089-3096.

Grove, J. L., Kimbrel, N. A., Griffin, S. C., Halverson, T., White, M. A., Blakey, S. M., ... & Calhoun, P. S. (2023). Cannabis use and suicide risk among Gulf War veterans. *Death Studies*, *47*(5), 618-623.

Harrington, K. M., Nguyen, X. M. T., Song, R. J., Hannagan, K., Quaden, R., Gagnon, D. R., ... & Striker, R. (2019). Gender differences in demographic and health characteristics of the million veteran program cohort. *Women's Health Issues*, *29*, S56-S66.

Hasin, D. S., Saxon, A. J., Malte, C., Olfson, M., Keyes, K. M., Gradus, J. L., ... & Wall, M. M. (2022). Trends in cannabis use disorder diagnoses in the US Veterans Health Administration, 2005–2019. *American Journal of Psychiatry*, *179*(10), 748-757.

Hill, M. L., Loflin, M., Nichter, B., Norman, S. B., & Pietrzak, R. H. (2021). Prevalence of cannabis use, disorder, and medical card possession in US military veterans: Results from the 2019–2020 National Health and Resilience in Veterans Study. *Addictive Behaviors*, *120*, 106963.

Hill, M. L., Nichter, B., Loflin, M., Norman, S. B., & Pietrzak, R. H. (2021). Comparative associations of problematic alcohol and cannabis use with suicidal behavior in US military veterans: A population-based study. *Journal of Psychiatric Research*, *135*, 135-142.

Hoerster, K. D., Lehavot, K., Simpson, T., McFall, M., Reiber, G., & Nelson, K. M. (2012). Health and health behavior differences: US Military, veteran, and civilian men. *American Journal of Preventive Medicine*, *43*(5), 483-489.

Hoerster, K. D., Malte, C. A., Imel, Z. E., Ahmad, Z., Hunt, S. C., & Jakupcak, M. (2012). Association of perceived barriers with prospective use of VA mental health care among Iraq and Afghanistan veterans. *Psychiatric Services*, *63*(4), 380-382.

Hoffmire, C. A. (2021). Association of lifetime homelessness and justice involvement with psychiatric symptoms, suicidal ideation, and suicide attempt among post-9/11 veterans. *Journal of Psychiatric Research*, *144*, 455-461.

Hoffmire, C. A., Monteith, L. L., Forster, J. E., Bernhard, P. A., Blosnich, J. R., Vogt, D., ... & Schneiderman, A. I. (2021). Gender differences in lifetime prevalence and onset timing of suicidal ideation and suicide attempt among post-9/11 veterans and nonveterans. *Medical Care*, *59*, S84-S91.

Hoggatt, K. J., Chawla, N., Washington, D. L., & Yano, E. M. (2023). Trends in substance use disorder diagnoses among Veterans, 2009–2019. *The American Journal on Addictions*.

Hoggatt, K. J., Jamison, A. L., Lehavot, K., Cucciare, M. A., Timko, C., & Simpson, T. L. (2015). Alcohol and drug misuse, abuse, and dependence in women veterans. *Epidemiologic Reviews*, *37*(1), 23-37.

Hoggatt, K. J., Harris, A. H., Washington, D. L., & Williams, E. C. (2021). Prevalence of substance use and substance-related disorders among US Veterans Health Administration patients. *Drug and Alcohol Dependence*, *225*, 108791.

Holliday, R., Forster, J. E., Desai, A., Miller, C., Monteith, L. L., Schneiderman, A. I., &

Klap, R., Darling, J. E., Hamilton, A. B., Rose, D. E., Dyer, K., Canelo, I., ... & Yano, E. M. (2019). Prevalence of stranger harassment of women veterans at Veterans Affairs medical centers and impacts on delayed and missed care. *Women's Health Issues*, *29*(2), 107-115.

Horwitz, A. G., Smith, D. L., Held, P., & Zalta, A. K. (2019). Characteristics of veteran and civilian suicide decedents: A sex-stratified analysis. *American Journal of Preventive Medicine*, *56*(5), e163-e168.

Ilgen, M. A., Bohnert, A. S., Ignacio, R. V., McCarthy, J. F., Valenstein, M. M., Kim, H. M., & Blow, F. C. (2010). Psychiatric diagnoses and risk of suicide in veterans. *Archives of General Psychiatry*, *67*(11), 1152-1158.

Jacobs, J. C., Blonigen, D. M., Kimerling, R., Slightam, C., Gregory, A. J., Gurmessa, T., & Zulman, D. M. (2019). Increasing mental health care access, continuity, and efficiency for veterans through telehealth with video tablets. *Psychiatric Services*, *70*(11), 976-982.

Kelly, U. A. (2021). Barriers to PTSD treatment-seeking by women veterans who experienced military sexual trauma decades ago: The role of institutional betrayal. *Nursing Outlook*, *69*(3), 458-470.

Khan, A. J., Li, Y., Dinh, J. V., Donalson, R., Hebenstreit, C. L., & Maguen, S. (2019). Examining the impact of different types of military trauma on suicidality in women veterans. *Psychiatry Research*, *274*, 7-11.

Kimbrel, N. A., DeBeer, B. B., Meyer, E. C., Gulliver, S. B., & Morissette, S. B. (2016). Nonsuicidal self-injury and suicide attempts in Iraq/Afghanistan war veterans. *Psychiatry Research*, *243*, 232-237.

Kimbrel, N. A., Meyer, E. C., DeBeer, B. B., Gulliver, S. B., & Morissette, S. B. (2018). The impact of cannabis use disorder on suicidal and nonsuicidal self-injury in Iraq/Afghanistan-era veterans with and without mental health disorders. *Suicide and Life-Threatening Behavior*, *48*(2), 140-148.

Klap, R., Darling, J. E., Hamilton, A. B., Rose, D. E., Dyer, K., Canelo, I., ... & Yano, E. M. (2019). Prevalence of stranger harassment of women veterans at Veterans Affairs medical centers and impacts on delayed and missed care. *Women's Health Issues*, *29*(2), 107-115.

Kline, A. C., Panza, K. E., Nichter, B., Tsai, J., Harpaz-Rotem, I., Norman, S. B., & Pietrzak, R. H. (2022). Mental health care use among US military veterans: Results from the 2019–2020 National Health and Resilience in Veterans Study. *Psychiatric Services*, *73*(6), 628-635.

Krishnamurti, L. S., Denneson, L. M., Agha, A., Beyer, N., Mitchell, S., & Dichter, M. E. (2023). Improving suicide prevention for women veterans: Recommendations from VHA suicide prevention coordinators. *General Hospital Psychiatry*.

Kroll-Desrosiers, A. R., Skanderson, M., Bastian, L. A., Brandt, C. A., Haskell, S., Kerns, R. D., & Mattocks, K. M. (2016). Receipt of prescription opioids in a national sample of pregnant veterans receiving Veterans Health Administration care. *Women's Health Issues*, *26*(2), 240-246.

Leung, L. B., Ziobrowski, H. N., Puac-Polanco, V., Bossarte, R. M., Bryant, C., Keusch, J., ... & Kessler, R. C. (2021). Are veterans getting their preferred depression treatment? A national observational study in the veterans health administration. *Journal of General Internal Medicine*, 1-7.

Lin, L. A., Bohnert, A. S., Blow, F. C., Gordon, A. J., Ignacio, R. V., Kim, H. M., & Ilgen, M. A. (2021). Polysubstance use and association with opioid use disorder treatment in the US Veterans Health Administration. *Addiction*, *116*(1), 96-104.

Lindsay, J. A., Day, S. C., Amspoker, A. B., Fletcher, T. L., Hogan, J., Day, G., ... & Martin, L.A. (2019). Personalized implementation of video telehealth. *Psychiatric Clinics*, *42*(4), 563-574.

Livne, O., Mannes, Z. L., McDowell, Y. E., Shmulewitz, D., Malte, C. A., Saxon, A. J., & Hasin, D. S. (2023). Mental and physical health conditions among US Veterans with cannabis use and cannabis use disorders. *Current Addiction Reports*, 1-17.

Manhapra, A., Stefanovics, E., & Rosenheck, R. (2021). The association of opioid use disorder and homelessness nationally in the veterans health administration. *Drug and Alcohol Dependence*, *223*, 108714.

Marshall, V., Stryczek, K. C., Haverhals, L., Young, J., Au, D. H., Ho, P. M., ... & Sayre, G. (2021). The focus they deserve: Improving women veterans' health care access. *Women's Health Issues*, *31*(4), 399-407.

Matarazzo, B. B., Eagan, A., Landes, S. J., Mina, L. K., Clark, K., Gerard, G. R., ... & Reger, M. (2023). The Veterans Health Administration REACH VET Program: suicide predictive modeling in practice. *Psychiatric Services*, *74*(2), 206-209.

Meffert, B. N., Morabito, D. M., Sawicki, D. A., Hausman, C., Southwick, S. M., Pietrzak, R. H., & Heinz, A. J. (2019). US veterans who do and do not utilize Veterans Affairs health care services: demographic, military, medical, and psychosocial characteristics. *The Primary Care Companion for CNS Disorders*, *21*(1), 26992.

Monteith, L. L., Bahraini, N. H., & Menefee, D. S. (2017). Perceived burdensomeness, thwarted belongingness, and fearlessness about death: Associations with suicidal ideation among female veterans exposed to military sexual trauma. *Journal of Clinical Psychology*, *73*(12), 1655-1669.

Monteith, L. L., Holliday, R., Miller, C., Schneider, A. L., Hoffmire, C. A., Bahraini, N. H., &

Forster, J. E. (2020). Suicidal ideation, suicide attempt, and non-suicidal self-injury among female veterans: Prevalence, timing, and onset. *Journal of Affective Disorders*, *273*, 350-357.

Monteith, L. L., Holliday, R., Schneider, A. L., Miller, C. N., Bahraini, N. H., & Forster, J. E. (2021). Institutional betrayal and help-seeking among women survivors of military sexual trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, *13*(7), 814.

Mosher, H. J., Krebs, E. E., Carrel, M., Kaboli, P. J., Vander Weg, M. W., & Lund, B. C. (2015). Trends in prevalent and incident opioid receipt: an observational study in Veterans Health Administration 2004–2012. *Journal of General Internal Medicine*, *30*(5), 597-604.

National Institute on Drug Abuse. (2023). *Drug overdose death rates.* Retrieved from https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates

Newins, A. R., Wilson, S. M., Hopkins, T. A., Straits-Troster, K., Kudler, H., & Calhoun, P. S. (2019). Barriers to the use of Veterans Affairs health care services among female veterans who served in Iraq and Afghanistan. *Psychological Services*, *16*(3), 484.

Nichter, B., Hill, M., Norman, S., Haller, M., & Pietrzak, R. H. (2020). Mental health treatment utilization among US military veterans with suicidal ideation: Results from the National Health and Resilience in Veterans Study. *Journal of Psychiatric Research*, *130*, 61-67.

Oliva, E. M., Bowe, T., Manhapra, A., Kertesz, S., Hah, J. M., Henderson, P., ... & Trafton, J. A. (2020). Associations between stopping prescriptions for opioids, length of opioid treatment, and overdose or suicide deaths in US veterans: observational evaluation. *BMJ*, *368*.

Paquette, C. E., Daughters, S. B., & Witkiewitz, K. (2022). Expanding the continuum of substance use disorder treatment: Nonabstinence approaches. *Clinical Psychology Review*, *91*, 102110.

Patel, T. A., Mann, A. J., Blakey, S. M., Aunon, F. M., Calhoun, P. S., Beckham, J. C., & Kimbrel, N. A. (2021). Diagnostic correlates of nonsuicidal self-injury disorder among veterans with psychiatric disorders. *Psychiatry Research*, *296*, 113672.

Peltier, M. R., Sofuoglu, M., Petrakis, I. L., Stefanovics, E., & Rosenheck, R. A. (2021). Sex differences in opioid use disorder prevalence and multimorbidity nationally in the Veterans Health Administration. *Journal of Dual Diagnosis*, *17*(2), 124-134.

Raines, A. M., Houtsma, C., Boffa, J. W., & Constans, J. I. (2023). A response to Operation Deep Dive's Interim Report on Veteran suicide rates. *Military Medicine*, *188*(5-6), 141-142.

Riblet, N. B., Kenneally, L., Shiner, B., & Watts, B. V. (2019). Health care processes contributing to suicide risk in veterans during and after residential substance abuse treatment. *Journal of Dual Diagnosis*, *15*(4), 217-225.

Ronzitti, S., Loree, A. M., Potenza, M. N., Decker, S. E., Wilson, S. M., Abel, E. A., ... & Goulet, J. L. (2019). Gender differences in suicide and self-directed violence risk among veterans with post-traumatic stress and substance use disorders. *Women's Health Issues*, *29*, S94-S102.

Runnals, J. J., Garovoy, N., McCutcheon, S. J., Robbins, A. T., Mann-Wrobel, M. C., Elliott, A., ... & Strauss, J. L. (2014). Systematic review of women veterans' mental health. *Women's Health Issues*, *24*(5), 485-502.

Schafer, K. M., Duffy, M., Kennedy, G., Stentz, L., Leon, J., Herrerias, G., ... & Joiner, T. E. (2022). Suicidal ideation, suicide attempts, and suicide death among Veterans and service members: A comprehensive meta-analysis of risk factors. *Military Psychology*, *34*(2), 129-146.

Shreck, E., Nehrig, N., Schneider, J. A., Palfrey, A., Buckley, J., Jordan, B., ... & Chen, C. K. (2020). Barriers and facilitators to implementing a US Department of Veterans Affairs Telemental Health (TMH) program for rural veterans. *Journal of Rural Mental Health*, *44*(1), 1.

Schuman, D. L., Cerel, J., & Praetorius, R. T. (2019). Suicide in US women veterans: An interpersonal theory perspective on suicide prevention policies. *Social Work in Public Health*, *34*(5), 418-429.

Simonetti, J. A., Piegari, R., Maynard, C., Brenner, L. A., Mori, A., Post, E. P., ... & Trivedi, R. (2020). Characteristics and injury mechanisms of veteran primary care suicide decedents with and without diagnosed mental illness. *Journal of General Internal Medicine*, 1-7.

Spark, T. L., Reid, C. E., Adams, R. S., Schneider, A. L., Forster, J., Denneson, L. M., ... & Brenner, L. A. (2023). Geography, rurality, and community distress: deaths due to suicide, alcohol-use, and drug-use among Colorado Veterans. *Injury Epidemiology*, *10*(1), 8.

Spiller, T. R., Na, P. J., Merians, A. N., Duek, O., Ben-Zion, Z., Tsai, J., ... & Pietrzak, R. H. (2023). Changes in mental health among US military veterans during the COVID-19 pandemic: A network analysis. *Journal of Psychiatric Research*, *165*, 352-359.

Stanley, I. H., Flarity, K. M., & April, M. D. (2023). Suicide ideation, plans, and attempts attributed to the COVID-19 pandemic among US Veterans. *JAMA Network Open*, *6*(6), e2320193-e2320193.

Substance Abuse and Mental Health Services Administration. (2020). *2019 National Survey on Drug Use and Health: Public use file codebook.* Retrieved from https://www.datafiles.samhsa.gov/sites/default/files/field-uploads-protected/studies/NSDUH-2019/NSDUH-2019-datasets/NSDUH-2019-DS0001/NSDUH-2019-DS0001-info/NSDUH-2019-DS0001-info-codebook.pdf

Substance Abuse and Mental Health Services Administration (2022). *Key substance use and*

mental health indicators in the United States: Results from the 2021 National Survey on Drug Use and Health. Retrieved from https://www.samhsa.gov/data/sites/default/files/reports/rpt39443/2021NSDUHFFRRev010323.pdf

Tsai, J., Snitkin, M., Trevisan, L., Kraus, S. W., & Pietrzak, R. H. (2020). Awareness of suicide prevention programs among US military veterans. *Administration and Policy in Mental Health and Mental Health Services Research*, *47*, 115-125.

U.S. Department of Veterans Affairs. (2022). *National suicide prevention annual report.* Retrieved from https://www.mentalhealth.va.gov/docs/data-sheets/2022/2022-National-Veteran-Suicide-Prevention-Annual-Report-FINAL-508.pdf

U.S. Department of Veterans Affairs. (2020). *Women Veterans in focus.* Retrieved from https://www.womenshealth.va.gov/materials-and-resources/facts-and-statistics.asp

Van Orden, K. A., Witte, T. K., Gordon, K. H., Bender, T. W., & Joiner Jr, T. E. (2008). Suicidal desire and the capability for suicide: tests of the interpersonal-psychological theory of suicidal behavior among adults. *Journal of Consulting and Clinical Psychology*, *76*(1), 72.

Vance, B., Alhussain, K., & Sambamoorthi, U. (2020, April). Five-year trend in healthcare access and patient-reported health outcomes among women veterans. *Nursing Forum, 55*(2), 165-173.

Volkow, N. D., Han, B., Compton, W. M., & McCance-Katz, E. F. (2019). Self-reported medical and nonmedical cannabis use among pregnant women in the United States. *Journal of the American Medical Association*, *322*(2), 167-169.

Wagner, C., Dichter, M. E., & Mattocks, K. (2015). Women veterans' pathways to and perspectives on Veterans Affairs health care. *Women's Health Issues*, *25*(6), 658-665.

Warfield, S. C., Bharat, C., Bossarte, R. M., DePhilippis, D., Farrell, M., Hoover Jr, M., ... & Degenhardt, L. (2022). Trends in comorbid opioid and stimulant use disorders among Veterans receiving care from the Veterans Health Administration, 2005–2019. *Drug and Alcohol Dependence*, *232*, 109310.

Washington, D. L., Bean-Mayberry, B., Riopelle, D., & Yano, E. M. (2011). Access to care for women veterans: delayed healthcare and unmet need. *Journal of General Internal Medicine*, *26*, 655-661.

Washington, D. L., Farmer, M. M., Mor, S. S., Canning, M., & Yano, E. M. (2015). Assessment of the healthcare needs and barriers to VA use experienced by women veterans: findings from the national survey of women Veterans. *Medical Care, 53*(4), S23-S31.

Williams, E. C., Fletcher, O. V., Frost, M. C., Harris, A. H., Washington, D. L., & Hoggatt, K. J.

(2022). Comparison of substance use disorder diagnosis rates from electronic health record data with substance use disorder prevalence rates reported in surveys across sociodemographic groups in the Veterans Health Administration. *JAMA Network Open*, *5*(6), e2219651-e2219651.

Williston, S. K., Bramande, E. A., Vogt, D. S., Iverson, K. M., & Fox, A. B. (2020). An examination of the roles of mental health literacy, treatment-seeking stigma, and perceived need for care in female veterans' service use. *Psychiatric Services*, *71*(2), 144-150.

Wilson, S. M., Burroughs, T. K., Newins, A. R., Dedert, E. A., Medenblik, A. M., McDonald, S. D., ... & Calhoun, P. S. (2018). The association between alcohol consumption, lifetime alcohol use disorder, and psychiatric distress among male and female veterans. *Journal of Studies on Alcohol and Drugs*, *79*(4), 591-600.