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The Relationship Between Housing/Living Arrangement and Admission to Drug Treatment Centers in Virginia

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This is to certify that the doctoral study by

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Abstract

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MSPAS, Seton Hill University, 2013

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Doctoral Study Submitted in Partial Fulfillment

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Doctor of Public Health

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Abstract

Homeless veterans with substance use disorders are among the most vulnerable and inaccessible populations in Virginia, which is evident by the lack of state and local resources. This cross-sectional study was conducted to present a retrospective assessment of the Treatment Episode Data Set (TEDS) to develop an understanding of the impact of housing arrangements on admission to long-term drug treatment centers among veterans in Virginia. To guide the study, the socioecological model was selected as the theoretical framework to better examine and understand the relationship between housing/living arrangement and admission to drug treatment centers among Virginia veterans. The aim of this study was to evaluate the associations between admission to long-term drug treatment centers and the outcome of treatment or reason for transfer or discontinuance of treatment. A robust sample of 1,412 homeless veterans in Virginia were examined for this study. Chi-square and binary logistic regression analysis were conducted. Those in independent living were found to have the highest rates admission to long-term-drug/residential treatment centers. The sample of veterans in independent living arrangements at admission also had the highest frequencies of opioid dependence, alcohol dependence, and cocaine dependence, reported longer stays in treatment, and noted more frequent self-help group attendance in comparison to the three groupings of living arrangements. The positive social change implication of this study is that it highlighted the need for wraparound programs that would reduce the barriers for homeless veterans to meaningfully engage in substance use treatment.

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Dedication

I would like to dedicate this dissertation to my son Luke, I can't wait to see you in a couple months and teach you the value of hard work and dedication. To my husband Joel, for always being my rock and pushing me to greatness. My mother Valerie and my sister Laverne, for always being available when I needed them. My in-laws Ralph and Mary, for always checking in and making sure I continued to persevere. My Sorority sisters Danielle and Tenesha for all your encouragement to get this done. I love you all and thank you for all your support.

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Section 1: Foundation of the Study and Literature Review

Introduction to the Study

Federal Regulations (Title 38) defines a veteran as a person who served in the active military, naval, or air service and who was discharged or released under conditions other than dishonorable. Among this population in Virginia, and in the United States as a whole, substance abuse is a growing problem. As of January 2019, an estimated 5,783 individuals experienced homelessness in Virginia. Of that total, 652 were family households, 447 were veterans, 258 were unaccompanied young adults (aged 18-24 years), and 881 were individuals experiencing chronic homelessness ("Homeless in Virginia Statistics", 2018; "Homeless Estimation by State US Interagency Council on Homelessness", 2020). Veterans, especially those who may have witnessed combat, often struggle with addiction, with the main drugs of choice being alcohol, opiates, benzodiazepines, and cocaine. Dunne et al. (2015) found that veterans were significantly more likely than nonveterans to identify substance use as the primary cause of homelessness. This finding was also supported by that Malte et al. (2017) who found that alcohol and drug dependence was the most prevalent psychiatric disorder among the homeless.

The impact of homelessness and substance use on the economy can be seen in the Joint Legislative Audit and Review Commission, where substance misuse and relapse cost the Virginia economy at least $613 million in 2006 and is projected to keep increasing ("JLARC", 2020). Substance use disorders among homeless veterans have been shown to not only decrease opportunities for acquiring employment but also

increased the risk of infections (e.g., HIV and Hepatitis C) and incarcerations (Dunne et al., 2015).

Although homelessness has been identified as a barrier to long-term substance use disorder treatment and multiple studies have addressed substance use and homelessness, no study compared housing with nonhousing and admission to long-term substance use treatment for veteran clients recruited on the basis of having a substance use addiction. Buchholz et al. (2010) did, however, demonstrate that homeless veterans receiving substance use treatment showed less improvement over the course of treatment than veterans who were consistently housed during treatment.

This study evaluated the relationship between housing/living arrangement and admission to drug residential treatment centers among Virginia veterans through the analysis of secondary data obtained from the Substance Abuse and Mental Health Services Administration (SAMHSA). The results from this study may advance social change by providing educational information that may assist in eliminating both homelessness and substance use among veterans. The findings of this study could conceivably create positive social change at all societal levels by offering public health practitioners an opportunity to address housing, which is an important social determinant of health.

Problem Statement

According to Somers et al. (2015), homeless individuals partaking in substance abuse are among the most vulnerable and inaccessible populations. In March 2021, the U.S. Department of Housing and Urban Development (HUD) found that 580,466 people

experienced homelessness in the United States on a single night in 2020 (HUD, 2021). This reflected an increase of 12,751 people, or 2.2%, from 2019. Of these individuals, 37,252 were veterans, and between 2019 and 2020, the number of veterans experiencing homelessness increased (HUD, 2021). Although veteran status refers to a person who served in the active military, naval, or air service and was honorably discharged, the status may also apply to a reservist or member of the National Guard called to federal active duty or disabled individual (Veterans Association [VA], 2020).

Although multiple researchers have addressed substance use and homelessness, there still remains a gap comparing housing with nonhousing and admission to long-term substance use treatment for Virginia veterans. The researcher of the current study sought to contribute to the limited number of previously published studies in the area of housing and substance use treatment centers among clients recruited on the basis of having a substance use addiction. Padgett et al. (2010) stated that homeless individuals with co-occurring substance abuse are among the most vulnerable and hardest-to-reach populations. With approximately 50–70% of persons who are homeless also having a substance abuse problem, the relevancy of this public health problem is clearly noted (Padgett et al., 2010). The gap in the literature remains as to how to alleviate the trigger of homelessness and its impact on veterans seeking substance use treatment. The gap identified in the reviewed literature illustrates a lack of focus on the impact of seeking substance use treatment upon veteran homelessness. This issue is a public health concern, as homelessness can lead to increased risk of disease and lowered social mobility among veterans. Conducting this study addressed this gap while also providing data that may

benefit health practitioners in assessing how to provide interventions to mitigate homelessness and substance use among veterans.

Purpose of the Study

The purpose of this quantitative research study was to fill a gap in the literature regarding the impact of seeking substance use treatment upon veteran homelessness by exploring the relationship between housing/living arrangements and admission to residential drug treatment centers in the Virginia area. Assessment of the problem statement was established through analyzing the Treatment Episode Data Set (TEDS) system dataset to develop an understanding of the impact of housing/living arrangements on admission to long-term drug treatment centers among Virginia veterans. The control variables of age, gender, and ethnicity were also included to provide comprehensive findings that may support future researchers in addressing this issue. I also examined the association between the veteran community and the outcome of treatment, specifically the reason for transfer or discontinuance of treatment. This study was unique as it addressed a gap in determining the effectiveness of housing within this under-researched subpopulation of the Virginia area.

Research Questions

The primary goal of this research was to explore the relationship between housing/living arrangements and admission to residential drug treatment centers among Virginia veterans. The control variables of age, gender, and ethnicity were also included in this study. Additionally, this study and its research questions were guided by the

social-ecological model (SEM). The research questions that guided the current study are as follows:

Research Question 1: To what extent is there an association between veteran housing/living arrangement and admission to long-term-drug/residential treatment centers in the state of Virginia?

$H_0$1: There is not an association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia.

*H*a1: There is an association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia.

RQ2: To what extent is there an association between the outcome variable of substance abuse treatment and the predictor variable of veteran housing/living arrangement (prior to admission) in the state of Virginia?

H02: There is an association between the outcome of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia?

H0: There is not an association between the outcome of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia?

Theoretical Framework

This study used the SEM to understand the relationship between housing/living arrangement and admission to drug treatment centers among Virginia veterans. Prevention of substance abuse among veterans requires an understanding of the factors

that influence substance abuse. With its multiple levels— individual, relationship, community, and societal factors— the SEM allowed for a bettered understanding of how homelessness affects the understanding of housing/living arrangement upon veterans seeking potential substance abuse residential treatment.

The SEM of McLeroy et al. (1988) emphasized that behavior is affected by these multiple levels of influence and is often shaped by the social environment. In this study, SEM was applied to veterans and included four levels. The first level highlighted personal history factors such as education, income, or the age of first use of substances that may increase the likelihood of a veteran with housing/living arrangement (prior to admission) seeking admission to long-term drug treatment centers in the state of Virginia. Additionally, preventative strategies at this level involved life skills techniques aimed at promoting attitudes that would prevent initial substance use.

With its emphasis on relationships, particularly in this study, the second level examined how veteran family members and peers may influence their behavior to seek admission to long-term drug treatment centers. For the veterans in this study, social change strategies at this level included the use of the family-centered substance use prevention programs geared at strengthening the family relationship/dynamic. The third level of the SEM, community, explored the characteristics of neighborhoods and veteran service groups and their impact on veterans' decision to seek substance use treatment. In terms of the veterans in this study, this level may shed some valuable light on the possible implications of changing the physical and social environment of the veteran and its impact on the desire for treatment. Lastly, the fourth level explored the social factors

such as norms and stigmas. For the veterans in this study, this level addressed the stigma surrounding homelessness and substance use that will foster a climate for the avoidance of treatment by veterans.

Nature of the Study

This quantitative study used a cross-sectional design to fill the research gap by focusing specifically on the relationship between housing/living arrangement and admission to drug treatment centers in the Virginia area. This study used the dataset from the SAMHSA data archive, specifically, the TEDS from the period of 2010-2015. The TEDS system is comprised of two major components: the admissions data set (TEDS-A) and the discharges data set (TEDS-D) and serves as a repository of treatment data routinely collected by states for the purposes of monitoring their substance use treatment systems.

The independent variable in this study was the presence or absence of housing/living arrangements prior to admission. The presence or absence of housing/living arrangement was identified by whether the veteran was homeless, a dependent (i.e., living with parents or in a supervised setting), or living independently on his or her own at the time of admission. Homeless participants were deemed those with no fixed address, which included shelters. Dependent clients were deemed those living in a supervised setting, such as a residential institution, halfway house, or group home. Independent living encompassed those participants living alone or with others without supervision. The dependent variable sought admission to residential treatment centers in the state of Virginia. The control variables were: age, gender, and ethnicity. Additional

control variables included mental illness (e.g., DSM diagnosis), source of income, and social support (e.g., use of self-help groups).

The population under study were Virginia veterans/ individuals 16 years or older who had served in the uniformed services (e.g., Army, Navy, Air Force, Marines, Coast Guard, Public Health Service Commissioned Corps, Coast, and Geodetic Survey). State Federal Information Processing Standard Publication (FIPS) codes were consistent with those used by the U.S. Census Bureau. Substance use at admission (primary) included alcohol, cocaine/crack, marijuana, heroin, nonprescription methadone, other opiates and synthetics, PCP, methamphetamine, and benzodiazepines.

Literature Review

Introduction to the Literature Review

As of January 2019, an estimated 5,783 individuals experienced homelessness in Virginia. Of this total, 447 were Veterans (US Interagency Council on Homelessness, 2020). Although multiple studies have addressed substance use and homelessness, no study has compared housing with non-housing and admission to long-term substance use treatment for Virginia veteran clients recruited on the basis of having a substance use addiction. This chapter contains a review of relevant literature on homelessness, veterans, and substance abuse and its many various determinants. Key areas reviewed include the trends of homelessness and substance abuse by veterans, consequences of homelessness, risk factors for substance abuse by veterans, and current challenges to eliminating homelessness among veterans. Finally, the chapter culminates in highlighting the SEM theoretical model as the foundation model chosen for this study.

Search Strategy

Databases searched for this literature review included Science Direct, EBSCO, Medline, Google Scholar, PLOS-ONE, PubMed, and SAGE Journals, as well as a Thoreau multi-database search. Population search terms included the following: *veterans, veterans in Virginia*, *homeless veterans*, *veterans with addiction*. Search terms related to outcome variables included *veterans and treatment admission*, *homeless veterans and treatment outcome*, *substance use treatment options*, *substance use*, *and admission to rehab*. Population and outcome search terms were also combined with terms *rehab*, *prevention*, *social determinants of health*, *community involvement*, *homeless*, *behavioral therapy*, and *lifestyle changes*. Searches were limited to English peer-reviewed articles published in the last 8 years. Reference pages of these articles, however, were also searched and resulted in additional articles that were published prior to 2017.

Literature Review Related to Key Variables and Concepts

The variables in this study were nominal, categorical, and continuous. The independent variable in this study was the presence or absence of housing/living arrangement prior to admission, while the dependent variable was sought admission to residential treatment centers in the state of Virginia. The control variables were age, gender, and ethnicity. The topics included in the literature review are: (a) the trend of homelessness and substance use disorder, (b) prevalence of homelessness among veterans in the United States, (c) prevalence of homelessness among veterans in Virginia, (d) substance use disorder among U.S. Veterans, (e) impact of a substance use disorder, (f)

prevention of homelessness among veterans, (g) challenges to the elimination of homelessness, and (h) gaps in the literature.

The Trend of Homelessness and Substance Use Disorder

Multiple research studies have shown that homelessness is associated with negative outcomes across a variety of health realms (Macia et al., 2020; Metraux et al., 2017; Twamley et al., 2019). Oppenheimer et al. (2016), for example, found that compared to low-income but housed individuals, homeless persons were more likely to die younger, from preventable conditions, and to have higher prevalence and severity of acute and chronic illness. These findings are supported by those of Stringfellow et al. (2016) who added that substance use disorders (SUDs) involving alcohol and illicit drugs were also strongly associated with homelessness, with a prevalence exceeding 50% in community homeless samples.

Prevalence of Homelessness Among Veterans in the United States

First documented after the Civil War, homelessness among veterans has been of major public concern for over the past 5 decades (Tsai & Rosenheck, 2015). For the general U.S. population, homelessness continues to be a public health concern and a violation of the basic human right to have access to safe and secure housing, as homelessness involves not having a "fixed, regular, and adequate nighttime residence" (de Gruyter, 2006). Homelessness is also associated with a range of negative outcomes, including medical problems, mental health disorders, and substance abuse problems. Homelessness is also associated with incarceration, frequent hospitalizations, and

increases emergency hospital costs (Harris et al., 2017; Tsai & Rosenheck, 2015; Twamley et al., 2019).

According to The Department of Housing and Urban Development (HUD), almost 50,000 veterans are homeless on any given night (Weber et al., 2017). The veteran population often faces many invisible scars of deployment including traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD), both of which correlate to an increased risk for homelessness (Tsai & Rosenheck, 2015). Additionally, the findings of Tsai and Rosenheck (2015) suggested that veterans, particularly those who served since the advent of the all-volunteer force, were at greater risk than other adults for homelessness. Similarly, Tsai et al. (2016) found that veterans were not only at greater risk for homelessness compared to their civilian counterparts, but that those aged 35 to 44 years with poor mental and physical health were each independently associated with lifetime homelessness.

Prevalence of Homelessness Among Veterans in Virginia

Virginia is the home of over 22 military bases representing each service branch (Virginia Military Bases & Installations Military Installations, 2020). As of January 2019, 5,783 individuals in the state of Virginia experienced homelessness on any given day. Of that total, 447 were veterans experiencing chronic homelessness (US Interagency Council on Homelessness, 2020). As previously mentioned, this vulnerable homeless veteran population is highly impacted by several critical issues, including substance use and trauma. Teeters et al. (2017) found that the overall prevalence of SUDs among male veterans aged 18 to 25 years was higher when compared with civilians. Further analysis

of various substances— alcohol, marijuana, opiates, cigarettes/vaping— in a 2017 study examining National Survey on Drug Use and Health data found that veterans were more likely to abuse alcohol, with 65% of veterans who enter a treatment program reporting alcohol as the drug of choice. This, ultimately, was almost double that of the general population (National Institute on Drug Abuse, 2021).

Substance Use Disorder Among Veterans in the United States

SUDs, which include substance dependence or abuse, are a significant problem in the United States. According to results from the 2018 National Survey on Drug Use and Health conducted by the SAMHSA, an estimated 164.8 million people aged 12 years or older in the United States (60.2 %) were past-month substance users (i.e., tobacco, alcohol, or illicit drugs). Among our nation's military veterans in particular, SUDs are a significant problem associated with numerous detrimental effects (Teeters et al., 2017). These detrimental effects can be seen in the work of Larson et al. (2012) who found that roughly 30% of completed suicides were preceded by alcohol or drug use, and an estimated 20% of high-risk behavior deaths were attributed to alcohol or drug overdose. Researchers found a significant link between environmental stressors such as deployment, postdeployment reintegration issues, and combat exposure to these startling statistics among the nation's veterans (Bohnert et al., 2017; Finlay et al., 2017). This was supported by Polusny et al. (2017), who added that SUDs may also emerge as a result of underlying mental health conditions, such as PTSD, associated with these environmental stressors aforementioned.

Impact of Substance Use Disorder

SUDs not only impact the individual substance users, but also impact their families and communities, thereby making it difficult to estimate the overall cost of SUDs. Goplerud et al. (2017) estimated that SUDs cost the U.S. economy about $400 billion a year. Sadly, as substance use has increased, so has misuse, leading to an increase in healthcare services among individuals struggling with a SUD (Otterstatter et al., 2018). Gryczynski et al. (2016) suggested that those diagnosed with SUD were 2.2 times more likely to be hospitalized than those who did not misuse substances. Additionally, Maeng et al. (2017) found that there was an increase in the utilization of acute care in the years before and after in the incidence of overdose. In Florida, for example, Ryan and Rosa (2020) found that healthcare costs from emergency department and inpatient visits associated with substance use were an estimated $6.4 billion between 2016 and 2018, with Medicare paying for the most patient care ($2.16 billion) followed by Medicaid and commercial insurance at roughly $1.36 billion each. Uninsured individuals struggling with SUDs, however, accounted for over $1 billion in healthcare costs (Ryan & Rosa, 2020).

Substance use also brings with it many indirect burdens on the healthcare system through the long-term effects of substance use (Hunsaker & Bush, 2018). Although drug treatment may take many forms or modalities (e.g., detoxification, residential, inpatient, and outpatient) and is constantly evolving to meet the needs of individuals struggling with addiction, the cost associated with these modalities continues to be of significant importance to the economy. Taking the societal cost of opioid misuse into consideration,

economists have calculated this cost at $55 billion in 2007 and $78 billion in 2013 (Florence et al., 2016).

The impact of SUD extends beyond its effect on health and healthcare expenditure; it also encompasses productivity losses and criminal justice involvement (Tsai et al., 2019). Researchers have estimated that incarceration in the United States costs approximately $22,000 per month, with little evidence suggesting that this approach reduced drug use or drug-related reincarceration rates for nonviolent drug offenders (Stephan, 2004).

As occurs in many U.S. states, SUDs imposed a high economic demand on the state of Virginia, wherein in 2006 nearly 1,800 Virginians were estimated to have died from substance abuse-related conditions (JLARC, 2020). The JLARC report summarized that SUDs cost the State of Virginia and localities more than $613 million in 2006, with $27 million of this cost the result of medical conditions linked to substance abuse, and $102 million the result of other substance abuse services (e.g., treatment, personal cost to families, child neglect) to Virginians.

The financial impact on Virginia's government from SUD-related costs is momentous, and in 2016, Virginia Governor Terry McAullife declared the opioid crisis a public health emergency. This led to a study by The Virginia Department of Health Division of Prevention and Health Promotion commissioned by the Center on Society and Health and Altarum to evaluate the economic repercussions of opioid-related deaths. This study found that losses in Virginia resulting from addiction and incarceration surpassed $1.5 billion in 2017 (Virginia Department of Health Division Promotion,

2021). The study ultimately showed that, of this total, $1.1 billion burdens fell on Virginia's employers and households in the form of lower productivity and wages and future earnings, while the remaining burden rested on the federal and state governments in the form of foregone tax revenues.

Prevention of Homelessness Among Veterans

Perhaps the most mainstream and influential institution identified to assist in the prevention of homelessness among veterans, the U.S. Department of Veterans Affairs (VA), reports being committed to ending homelessness among Veterans (Yang et al., 2017). By collaborating with federal, state, and local agencies as well as faith-based and community nonprofits, the VA seeks to provide much-needed housing services for veterans. One such collaboration occurred with the U.S. Department of Housing and Urban Development-VA Supportive Housing (HUD-VASH). This program provides VA support services and HUD housing vouchers to assist homeless Veterans and their families in finding sustained permanent housing. In September 2015, the VA estimated that more than 78,000 vouchers were allocated to help house Veterans across the country (Veterans Affairs, 2021).

The VA boasts of funding an estimated 600 agencies that provide over 14,500 beds for eligible Veterans. Homeless veterans, known as grantees, work closely with an assigned liaison who not only assists with housing but also works closely with community-based organizations to unite Veterans with social services and employment needed to promote housing stability. The maximum stay in this housing, however, is up to 24 months, as the ultimate goal was to advance the Veteran into permanent housing

(Veterans Affairs, 2021). Similarly, the Supportive Services for Veteran Families (SSVF) Program aids very low-income Veterans and their families who are in or transitioning to permanent housing (Nelson et al., 2021).

Since its federal initiative of 2009 to prevent and end veteran homelessness, the VA continues to diligently provide outreach efforts to homeless veterans nationally through various programs and community organizations (Tsai et al., 2021). One such program is the Health Care for Re-Entry Veterans Program (HCRV), established to address the community re-entry needs of incarcerated veterans (Holliday & Pedersen, 2017). The goal of HCRV was to not only prevent homelessness but to also reduce the impact of substance abuse problems upon community re-adjustment in hope of also decreasing the likelihood of re-incarceration (Veterans Affairs, 2021). To utilize this program, veterans must send an email with their contact information as well as a brief message regarding their situation to the state or community HCRV specialist.

Yet another VA program aimed at preventing homelessness among veterans, the Grants and Per Diem Program (GPD), provides grants to community-based agencies to establish transitional housing programs on a per diem payment basis. The GPD program was established to aid homeless veterans in having residential stability and a supportive household where the veteran can enhance their career skills (Gin et al., 2019).

The National Call Center for Homeless Veterans is one of the many programs and collaborations of the VA and is perhaps one of the most crucial components of veteran/VA interaction. This center seeks to ensure that homeless Veterans or Veterans at-risk for homelessness have free, 24/7 access to trained counselors. It is important to

note that this hotline also assists federal, state, and local partners as well as community agencies and service providers (Veterans Affairs, 2021).

According to Tsai et al. (2021), veterans aged 30 to 59 years appeared to be at the greatest risk for homelessness and were most likely to use VA homeless programs. As such, the Veterans Homelessness Prevention Demonstration Program (VHPD), which promises early intervention homelessness prevention, is likely to be of utmost importance. Veterans Affairs (2021) referenced this program as one with a focus on female veterans returning from wars in Iraq and Afghanistan, single head of household veterans families, as well as those from the National Guard and Reserve who are being discharged from the military. The goal of this program is to understand the needs of and assist this new group in maintaining and retaining stable housing.

Challenges to the Elimination of Homelessness

Although the VA and its collaborators continue to work towards ending homelessness among veterans, homelessness continues to be a major social problem in the United States, especially among individuals with substance use disorders (Yang et al., 2017). One of the most challenging aspects of homelessness prevention efforts put forward by Park et al. (2010) centered on the task of identifying high-risk populations and the ability to reach the targeted group. Park et al. believed that this should involve reaching those who use general medical and mental health services. Similarly, Tsai et al. (2021) believed that attempts to identify and track homelessness should involve close examination of the numbers of individuals using homeless prevention and service programs.

Perhaps the most challenging occurrence to many programs is funding. During the COVID-19 pandemic, many VA programs were especially constrained. Fortunately, under the Coronavirus Aid, Relief, and Economic Security Act, funding was also given to HUD and the VA to aid state and local officials in responding to the virus. Particularly, $202 million was appropriated to provide emergency housing and homelessness prevention assistance to low-income veteran families and to provide safe housing during the global pandemic (Veterans Affairs, 2021). An additional $88 million was also allocated to the GPD program, thereby allowing the VA to waive the per diem limits during the COVID-19 crisis (Veterans Affairs, 2021). Ten million dollars were allocated to assist the VA with providing emergency shelter and supportive services, such as hotel rooms for veterans needing emergency shelter. Importantly, this shelter is to be paired with treatment and rehabilitative services (Veterans Affairs, 2021).

Another challenge to ending homelessness and SUDs among veterans is the internalized or self-stigma associated with both homelessness and SUDs. Internalized stigma is defined as the psychological impact of stigma in a society where individuals absorb the biases, negative stereotypes, and assumptions about substance use, homelessness, or any disease present in society and apply it to themselves (Wang et al., 2021). Want et al. (2021) further asserted that this self-stigma was associated with low self-esteem, treatment adherence, and recovery. Similarly, Cheney et al. (2018) found that many homeless veterans expressed concern over stigmatizing labels of failure and being weak adding to veterans' anxiety, alcohol, and other substance use.

O'Toole et al. (2015) also investigated the perception of stigma identified by homeless people as a reason for delaying or deferring SUD care and highlighted the need for more humane patient care interaction for this vulnerable and disenfranchised population. Additionally, Kertesz et al. (2013) reported significantly higher ratings of satisfaction and utilization by homeless people who received care in settings that were specifically centered on the needs of homeless people. Researchers have illustrated that the current VA processes for management of emergency health situations are ineffective for providing holistic care for veterans (Hynes et al., 2021; Teeters et al., 2017).

Gaps in Literature

Although homelessness has been identified as a barrier to long-term substance use disorder treatment and multiple studies have addressed substance use and homelessness, no study has compared housing with nonhousing and admission to long-term substance use treatment for veteran clients recruited based on having a substance use addiction. Like many studies on veterans and veteran homelessness and SUD, however, the findings may reflect insight from veterans enrolled in VA healthcare services. As such, more investigation is needed to reflect the experiences of veterans who have not used VA benefits and/or services.

Finlay et al. (2017) demonstrated that veterans are more likely to use VA healthcare rather than non-VA care for substance abuse-related services. There remains a literature gap, however, as very little has been done to support or refute this finding. Added gaps in literature may include the absence of peer support as well as access to transportation to veteran support programs. Filling these gaps would not only provide

further data needed to understand barriers associated with homelessness and inpatient treatment center admission, but it may also bring much-needed attention to homelessness in the United States, especially among veterans.

Definition of Key Terms

In this study, the following definitions apply:

*Homeless***:** Homeless refers to an individual or family who lacks a fixed, regular, and adequate nighttime residence (USICH, 2020).

Mental Health: Mental health refers to a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to make a contribution to his or her community (WHO, 2020).

Substance abuse: Substance abuse refers to the harmful or hazardous use of psychoactive substances, including alcohol and illicit drugs (Seitz et al., 2019).

Veteran: A veteran is a person who served in the active military, naval, national guard and reserves, or air service and who was discharged or released there from under conditions other than dishonorable (Veterans Affairs, 2021).

Assumptions

A cross-sectional study with secondary data was used for evaluation and assumed that the collected data were transcribed accurately. It was assumed that the states reported admissions and discharges from all facilities financed by public funds. It was also expected that the availability of proper housing can improve admission to drug treatment

programs among veterans. It was further assumed that having stable housing can improve health outcomes in veterans with substance use disorders.

Scope and Delimitations

This study focused on TEDS prepared for the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (HHS). TEDS provided treatment data collected by states for the purposes of monitoring their substance use treatment systems and included White, Black, Asian, Asian or Pacific Islander, American Indian/Alaskan Native, American Indian/other than Alaskan Native, Native Hawaiian or other Pacific islander, other single race and two or more races. The data were comprised on men and women from ages 12 to 65 years and older from all states except Georgia, Oregon, and West Virginia for the year 2017, which included veteran status. For this study, veterans under the age of 40 years were excluded as the average age of veterans in Virginia, as of September 30, 2020, was 40 to 65 (Veterans Affairs, 2021). Individuals under age 16 years were excluded from the study because they were less likely to have acquired veteran status.

Limitations

A major limitation of this study was the accuracy of the information. This study involved the use of secondary data collected from the SAMHSA data archive, specifically, the TEDS. This dataset provided state-mandated data on publicly funded admissions, and as such, it does not include all admissions to substance abuse treatment. SAMHSA, however, maintains that it encompasses that portion that would constitute the public burden for substance abuse treatment. Another key limitation of the study involved

the fact that the TEDS generally does not include data on facilities operated by federal agencies, including the Department of Veterans Affairs, the Bureau of Prisons, and the Department of Defense. These facilities may have in-house substance use treatment programs that would not have been included.

Significance

Addressing the important social determinant of health, housing has been an ongoing challenge for public health practitioners. Contemporary data illustrate that an estimated 1.4 million veterans are considered at risk of homelessness due to poverty, unsafe housing, and/or lack of support networks (National Coalition for Homeless Veterans, 2020). Researchers have further illustrated that substance use disorders among veterans are a key risk for homelessness (Metraux et al., 2017; Teeters et al., 2017). As such, it is of critical public concern to address homelessness among veterans through the framework of substance use treatment. Addressing this issue may positively contribute to social change by providing better data to support the treatment of veteran substance use disorders and prevent homelessness.

Understanding homelessness and housing issues allow public health practitioners an opportunity to address this crucial social determinant of health. Homelessness among veterans is especially important as this population sadly continues to experience consistently higher rates of homelessness (Harris et al., 2017; Twamley et al., 2019; Weber et al., 2018). Homelessness and substance use are associated with poor health outcomes and higher rates of communicable and noncommunicable diseases, which cost

the Virginia economy at least $613 million in 2006 and is projected to keep increasing (JLARC, 2020).

This study sought to fill the gap in understanding addiction treatment and homelessness by evaluating the relationship between housing/living arrangements and admission to residential drug treatment centers. The results of this study may lead to positive social change by alerting local policymakers of the need to establish and redirect funds to create and improve housing units for veterans experiencing chronic homelessness. The data from this study may mitigate or decrease veteran homelessness that is related to substance use treatment, which may create positive social change.

Summary

The many studies put forward on veterans and homelessness highlight the fact that there are numerous barriers to Veterans seeking treatment for SUDs and ultimately utilizing the VA healthcare service for homelessness. Each study has generally replicated and extended the findings of others depicting the immense need for future research into the potential long-term effects of housing interventions on SUDs as well as mental health outcomes. The findings of this study may be used to bring attention to the needs of homeless veterans with co-occurring substance abuse where having safe housing can be shown to be a positive predictor of treatment entry. In so doing, the findings may generate vital information that can be considered in planning policy and services. Specifically, future research could investigate the need for cross-sector collaborations involving public health officials, social work researchers, clinicians, and policymakers to

target the challenge of homelessness and its relationship to substance use in the veteran population.

Section 2: Research Design and Data Collection

Introduction

The purpose of this study was to determine whether there was a relationship between housing/living arrangements and admission to residential drug treatment centers among Virginia veterans. This section focuses on the research design and data collection utilized to test the hypotheses and discusses the use of secondary data retrieved from the TEDS prepared for the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (HHS). The TEDS system is comprised of two major components: the admissions data set (TEDS-A) and the discharges data set (TEDS-D). The latter component was used in this study, as it provides a reason for discharge or discontinuation of service.

Research Design and Rationale

The chosen study design was a quantitative retrospective assessment of secondary data. The use of this design methodology was ideal for gathering and analyzing numerical data from a secondary data source that could be used to address the research question and associated hypotheses. Secondary data analysis for this study was performed using data from the TEDS-D. The utilization of a secondary data source is considerably more time and cost-effective (Panchenko & Samovilova, 2020). There was no fee required to obtain access to the TEDS dataset. The purpose of this study was to determine if a relationship exists between the presence or absence of housing/living arrangement prior to admission (independent variable) and admission to residential treatment centers for the state of Virginia (dependent variable). The presence or absence of housing/living arrangement

was identified by whether the veteran was homeless, a dependent (i.e., living with parents or in a supervised setting), or living independently on his or her own at the time of admission. Homeless participants were deemed those with no fixed address, including shelters, while dependent clients involved living in a supervised setting, such as a residential institution, halfway house, or group home. Independent living included participants living alone or with others without supervision.

Methodology

Population

The target population for this study was homeless veterans in the United States. The study population included homeless veterans (male and female) aged 40 to 65 years old in Virginia during 2017. The TEDS prepared for the SAMHSA, U.S. Department of Health and Human Services (DHHS) was the secondary source of data utilized for this study. This research used the 2017 TEDS-D codebook, which contained records of TEDS discharges from substance use treatment that occurred in 2017. The TEDS-D codebook comprised data collected on men and women from age 12 to 65 years and older from all states except Georgia, Oregon, and West Virginia for the year 2017, which included veteran status. This study included veteran men and women from age 40 to 65, as this was the average age of Virginia veterans as of September 30, 2020 (VA.gov, 2021).

Study Design

In this quantitative study, the cross-sectional design was used to examine the relationship between housing/living arrangements and admission to drug treatment centers among Virginia veterans. This design allows for the measurement of the outcome

and the exposures in the study participants simultaneously (Setia, 2016). Additionally, cross-sectional study designs are often used for population-based surveys, which are useful for public health planning, evaluation, and monitoring (Setia, 2016). The total number of veteran participants for the 2017 TEDS-D dataset is 44,296. For the selection process for this study, the participants were aged 40 and older.

Access to the Data Set and Permission

TEDS-D is a free dataset managed and funded by the Center for Behavioral Health Statistics and Quality (CBHSQ) of the SAMHSA, U.S. DHHS (Samhsa.gov, 2021). Additionally, all the material within the TEDS dataset is in the public domain and may be reproduced or copied without permission from SAMHSA.

Power Analysis and Sample Size

A priori in G*Power 3.1.9.4. was utilized to determine the sample size needed to accomplish adequate power for the study as, according to Hickey et al. (2018), sample size calculations should always be performed a priori, as 'post hoc power calculations' have no value once the study is concluded (See Appendix A). Additionally, Devane et al. (2004) highlighted that formal estimations of sample size are required to ensure that the likelihood of missing an important difference is very small. As such, the parameters used involved the following: test family = z test; tails = 2; OR = 1.2; $\alpha = 0.05$; power (1-β err prob.) = 0.80; correlation = 0.3; statistical test = logistic regression. This provided the following output parameters: total sample size needed = 1138; critical z = 1.96; actual power = 0.80. Thus, 44,296 veterans was more than an adequate sample size for this study.

Inclusion Criteria

Inclusion criteria outlines who can be included in a study population and are often perceived as the key features of the target population needed to answer the research question (Patino & Ferreira, 2018a). As such, the inclusion criteria for this study were residents of Virginia, veteran men and women aged 40 to 65 years old, and identify as Black/African American, White, Asian, Other single race, Two or more races, Native Hawaiian or Other Pacific Islander.

Exclusion Criteria

According to Patino and Ferreira (2018a), exclusion criteria refer to features of the potential study participants who meet the inclusion criteria but present with additional characteristics that could interfere with the success of the study or increase the risk of an unfavorable outcome. For this study, the exclusion criteria were as follows: under the age of 40; answered not sure, I do not know, or failed or refused to answer research questions. Additionally, participants who do not reside in Virginia and are not veterans were excluded.

Instrumentation Constructs

The TEDS prepared for the SAMHSA, U.S. DHHS was utilized as the data source for this study. The study used the 2017 TEDS-D codebook, specifically, as it contained records regarding the reason for discharge or discontinuation of service, service setting at discharge (type of service the client was receiving prior to discharge), as well as the presence or absence of housing/living arrangement prior to admission which occurred

in 2017, making it ideal as the most complete secondary data source pertaining to substance abuse, veterans, and treatment centers.

Operationalization Constructs

Table 1 describes each variable that was used in this study in order to answer the research question and is broken down into definition of the variable, name of the variable, measurement, and respondents of the variable. Table 1 also includes a definition of the variable, the name of the variable, measurement, and respondents of the variable. The variables listed in Table 1 include dependent living, independent living, homeless, age, and veteran status. The variables for this study were taken from the 2017 TEDS-D database.

Table 1

Independent and Dependent Variables

Name	Meaning
Dependent living	Living with parents or in a supervised setting. Served as an individual primary predictor variable in this study.
Independent living	Living alone or with others without supervision. Served as an individual primary predictor variable in this study.
Homeless	No fixed address; includes shelters. Served as an individual primary predictor variable in this study.
Veteran status	Served on active duty in the U.S. Army, Navy, Marine Corps, Coast Guard, or Commissioned Corps of the U.S. Public Health Service or National Oceanic and Atmospheric Administration, or served as a Merchant Marine seaman during World War II.
Age	40 to 65 years old
Admission to residential treatment centers	The type of service the client was receiving prior to discharge
Substance Abuse Treatment	This is an outcome variable that is based upon the predictor variable of veteran housing/living arrangement (prior to admission).
Race	Race refers to the individuals self-reported racial identification. Served as a control variable.
Gender	Gender refers to either categorization as male or female. Served as a control variable.
Mental Illness	Mental illness refers to a DSM diagnosis identified during admission or discharge of the patient. Served as a control variable.
Source of Income	Source of income refers to the income that was received prior to discharge or at admission among patients. Served as a control variable.
Social Support	Social support is identified in the TEDS-D database as the use of self-help groups. Served as a control variable.

Table 2 shows the itemization of variables that were fundamental to operationalize the research question and the responses provided by each participant. Additionally, Table 2 shows the measurement for each variable and whether it was the independent or dependent variable.

Independent Variables

For this study, the independent variables were homeless (yes, no), dependent living (living with parents or in a supervised setting) and were living independently. The variables for this study were taken from the 2017 TEDS-D database.

Dependent Variables

The dependent variable for this study was seeking admission to residential treatment centers. This variable was taken from the 2017 TEDS-D database and participants who were admitted and not admitted to residential treatment was used for this study.

Table 2

Definition of Variables

Name	Type of Measurement	Definition	Levels/Category
Homeless	Categorical	No fixed address; includes shelters.	Yes No
Dependent living	Categorical	Living with parents or in a supervised setting	Yes No
Independent living	Categorical	Living alone or with others without supervision.	Yes No
Admission to residential treatment centers	Categorical	Long term admission (more than 30 days)	Yes No

Note. The variables for this study are taken from the 2017 TEDS-D database.

Data Analysis Plan

IBM SPSS Statistics Version 25 was used for the data analysis plan as well as the 2017 TEDS-D data plan from SAMHSA website. Additionally, descriptive analysis was used, which showed the percentage distributions as well as the frequency in order to analyze the demographic characteristics of the sample and population.

Chi-square (χ^2) analysis was used to analyze variables to decipher whether there was a relationship between housing/living arrangement and admission to residential drug treatment centers among veterans. The Chi-square (χ^2) analysis was chosen in this study as it commonly tests whether 2 categorical variables are independent or compares the distribution of a categorical variable to a hypothetical distribution (Schober & Vetter, 2019). Moreover, Chi-square (χ2) analysis answered the question of statistical significance difference between how the categories answered a given question. This richness of detail, according to McHugh (2013), allows the researcher to understand the results and thus be able to derive more detailed information from this statistic than from many others. Ultimately, the Cramer's V is used to test the data if a significant Chi-square result has been achieved (McHugh, 2013). Cramer's V varies between 0 and 1, where close to 0 shows little association between variables while closer to 1indicates a strong association (McHugh, 2013).

Because this study involved a single dichotomous dependent variable (admission to residential treatment centers) and multiple independent variables (homeless, a dependent, living with parents or in a supervised setting, or living independently) binomial logistic regression was used.

Research Questions and Hypotheses

Research Question 1: To what extent is there an association between veteran housing/living arrangement and admission to long-term-drug/residential treatment centers in the state of Virginia?

$H_0$1**:** There is an association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia.

$H_0$1**:** There is not an association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia.

Research Question 2: To what extent is there an association between the outcome variable of substance abuse treatment and the predictor variable of veteran housing/living arrangement (prior to admission) in the state of Virginia?

$H_0$2**:** There is an association between the outcome of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia?

$H_0$2**:** There is not an association between the outcome of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia?

Threats to Validity

As Tofthagen (2012) stated, the ultimate goal of interventional studies is to establish a cause-and-effect relationship between the intervention and one or more outcomes, where internal and external validity concepts reflect whether or not the results of a study are trustworthy and meaningful. The validity of a research study includes both internal and external validity.

Internal Validity

Internal validity refers to the extent to which the observed results represent the truth in the population being studied and are not due to methodological errors (Patino &

Ferreira, 2018b). Internal validity includes the selection bias, history, mortality, maturation, and instrumentation and ultimately examines whether the study conduct, design, and analysis answer the research questions without bias (Andrade, 2018). An internal threat to the 2017 TEDS-D dataset was in the selection of participants in the study due to the lack of data on facilities (likely serving veterans as well as the homeless) operated by federal agencies, such as the Bureau of Prisons and the Department of Veterans Affairs.

External Validity

External validity refers to whether the study findings can be generalized to other contexts (Andrade, 2018). As such, a lack of external validity suggests that the results of the study may not apply to participants who differ from the study population, leading to the low likelihood of adoption of the data findings (Patino & Ferreira, 2018b). In this study, an external threat may be the possibility of selection bias, as the 2017 TEDS-D dataset is not designed only for patients with housing issues at admission or discharge from treatment. The current study was expansive and focused on many behavioral issues with regard to SUD treatment.

Ethical Procedures

The 2017 TEDS-D database is a free database prepared for the SAMHSA, U.S. DHHS. Per SAMHSA, all material appearing in the TEDS database is in the public domain and may be reproduced or copied without permission from SAMHSA, citation of the source is, however, appreciated. The ethical concern for this data was that of confidentiality. To facilitate this concern, the TEDS employed data swapping using an

algorithm that matches records in a different state, but within the same Census region and division. If a match is not found, the TEDS records outside the Census division and, if still no match is found, records from outside the Census region. This process is repeated until a match is found and swap achieved. Approval was obtained from Walden IRB, and the approval number is 10-29-21-0668202.

Summary

This study utilized a cross-sectional quantitative approach employing a secondary data source from the 2017 TEDS-D database. The purpose of this study was to determine whether there is a relationship between homeless (independent variable), a dependent (independent variable), or living independently (independent variable), and seeking admission to residential treatment centers (dependent variable). Sampling was conducted by utilizing a Stratified Random Sample based on the state of the residence conducted through the utilization of the 2017 TEDS-D database. Inclusion criteria for this study included residents of Virginia; veteran men and women aged 40 to 65 years old; and identified as Black/African American, White, Asian, Other single race, Two or more races, Native Hawaiian, or Other Pacific Islander. Exclusion criteria were those who did not reside in Virginia, were not veterans, were under the age of 40, answered “not sure” and “I do not know”, or missed or refused to answer research questions. In Section 3, presents an evaluation of the study results. This study was limited, as the findings only delineated associations between predictor and outcome variables. The findings are not ideal for demonstrating causations or intervention effects. The findings of the study may, however, be used to inspire future research. The study was also limited to the use of

secondary data, which was ideal for this study, but is not representative of all homeless populations across the United States.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative research study using a cross-sectional design was to fill a gap in the literature regarding the impact of seeking substance use treatment upon veteran homelessness by exploring the relationship between housing/living arrangements and admission to residential drug treatment centers in the Virginia area. Specifically, the primary goal of this research was to explore the relationship between housing/living arrangements and admission to residential drug treatment centers among Virginia veterans. The independent variable in this study was presence or absence of housing/living arrangements prior to admission. The presence or absence of housing/living arrangement was identified by whether the veteran was homeless, a dependent (living with parents or in a supervised setting) or living independently on his or her own at the time of admission. The dependent variable was admission to residential treatment centers in the state of Virginia and substance abuse treatment. To test the research questions and hypotheses, data were analyzed using chi-square analysis. In line with this, the following research questions and hypotheses guided this study:

RQ1: To what extent is there an association between veteran housing/living arrangement and admission to long-term-drug/residential treatment centers in the state of Virginia?

H01: There is an association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia.

H0: There is not an association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia.

RQ2: To what extent is there an association between the outcome variable of substance abuse treatment and the predictor variable of veteran housing/living arrangement (prior to admission) in the state of Virginia?

H02: There is an association between the outcome of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia?

H0: There is not an association between the outcome of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia?

This section focuses on presenting the quantitative analysis to address the research question of the study. The study outcomes can be found in tables and graphs with descriptive narratives. MS Excel and SPSS were used for the data analysis. Section 3 is first organized by a discussion of the assessment of the dataset for secondary analysis. The information presented includes the results of the descriptive statistics of study variables as well as the chi-square and binary logistic regression analysis used to address the research questions of the study. The section ends with the summary of the results.

Accessing the Data Set for Secondary Analysis

The participants of the study were homeless veterans in the United States. Specifically, the study population included homeless veterans (male and female) aged 40

to 65 years old from the State of Virginia. Data were obtained from the years 2017-2019 TEDS-D datasets that were prepared for the SAMHSA, U.S. DHHS. The total number of samples in the 2017-2019 TEDS-D dataset was 1,661,207. This raw data set was filtered to include only the samples that met the inclusion criteria of homeless veterans (male and female) aged 40 to 65 years old and from the State of Virginia. The final dataset included 1,412 samples who were homeless veterans, both male and female.

Among the final sample of participants, the largest age group was between 55 to 64 years old, which compromised of 39.7% (*n* = 561) of the sample. There were 415 (29.4%) aged 50 to 54 years old, 182 (12.9%) aged 45 to 49 years old, 173 (12.3%) aged 40 to 44 years old, and 81 (5.7%) were aged 65 years old.

Table 3

Frequency and Percentage Summary of Age at Admission of Samples (n = 1,412)

	n	%
Age at admission		
40-44 years	173	12.3
45-49 years	182	12.9
50-54 years	415	29.4
55-64 years	561	39.7
65 years old	81	5.7

Results

Descriptive Statistics of Study Variables

This section provides the results of descriptive statistical analysis to summarize the data of the study variables. First, the data regarding demographic information, veteran

housing/living arrangement, and admission to long-term-drug/residential treatment centers of the sample is summarized in Table 4. For gender, the majority (*n* = 1,338; 94.8%) of the homeless veterans were male. For race, the majority of the participants were either Black or African American (*n* = 603; 42.7%) or White (*n* = 775; 53.5%).

In terms of ethnicity, almost all the individuals under study were not of Hispanic or Latino origin (*n* = 1,373; 97.2%). For marital status, the highest percentage among the sample were never married (*n* = 510; 36.1%) or divorced or widowed (*n* = 479; 33.9%). For education, more than half of the participants had 12 years of education experience or have GED education status (*n* = 887; 62.8%). For employment status at admission, almost half of the sample were unemployed (*n* = 623; 44.1%) and 35.3% (*n* = 499) were not in the labor force. For employment status at discharge, 33.1% (*n* = 467) of the participants were not in the labor force wherein 16.1% of the sample were retired or disabled at discharge. Only 5% of the population were pregnant at admission.

For the housing/living arrangements prior to admission, 60% of the participants were independently living at admission. There were 19.1% who were homeless and 10% were dependently living at admission. For the housing/living arrangements prior to discharge, the highest percentage (36.4%) among the veterans were dependent living at discharge. There were 30.4% who were independently living at discharge, and 4.5% were homeless at discharge. In terms of source of income/support, the highest percentage among the veterans had source of income of retirement/pension or disability, which comprised 18.4% (*n* = 260).

Almost all (*n* = 1,353; 95.8%) participants had no arrests in the 30 days prior to admission. More than half (*n* = 919; 65.1%) of the sample had no arrests in the 30 days prior to discharge. In terms of service setting at admission, half (*n* = 726; 51.4%) of the veterans had a service setting of ambulatory, nonintensive outpatient at admission. There were 17.9% who have service setting of ambulatory, intensive outpatient, and 13.1% have service setting of rehab/residential, short term (30 days or fewer) at admission. In terms of service setting at discharge, half (*n* = 727; 51.5%) of the participants have a service setting of ambulatory, non-intensive outpatient at discharge. There were 17.9% who have service setting of ambulatory, intensive outpatient and 13% who have service setting of rehab/residential, short term (30 days or fewer) at discharge.

Table 4

Frequency and Percentage Summaries of Demographic Information, Veteran Housing/Living Arrangement, and Admission to Long-Term-Drug/Residential Treatment Centers of Samples

	n	%
Biologic sex		
Male	1338	94.8
Female	74	5.2
Race		
Missing/unknown/not collected/invalid	16	1.1
American Indian (other than Alaska Native)	19	1.3
Asian or Pacific Islander	2	0.1
Black or African American	603	42.7
White	755	53.5
Asian	4	0.3
Other single race	5	0.4
Two or more races	7	0.5
Native Hawaiian or Other Pacific Islander	1	0.1
Hispanic or Latino origin (ethnicity)		
Missing/unknown/not collected/invalid	20	1.4
Puerto Rican	1	0.1
Mexican	1	0.1
Cuban or other specific Hispanic	5	0.4
Not of Hispanic or Latino origin	1373	97.2
Hispanic or Latino, specific origin not specified	12	0.8
Marital status		

Missing/unknown/not collected/invalid	17	1.2
Never married	510	36.1
Now married	224	15.9
Separated	182	12.9
Divorced, widowed	479	33.9
Education		
Missing/unknown/not collected/invalid	15	1.1
8 years or less	10	0.7
9-11 years	102	7.2
12 years (or GED)	887	62.8
13-15 years	162	11.5
16 years or more	236	16.7
Employment status at admission		
Missing/unknown/not collected/invalid	99	7.0
Full-time	134	9.5
Part-time	57	4.0
Unemployed	623	44.1
Not in labor force	499	35.3
Employment status at discharge		
Missing/unknown/not collected/invalid	361	25.6
Full-time	148	10.5
Part-time	65	4.6
Unemployed	371	26.3
Not in labor force	467	33.1
Detailed "not in labor force" category at admission		
Missing/unknown/not collected/invalid	937	66.4

Homemaker	1	0.1
Student	3	0.2
Retired, disabled	247	17.5
Resident of institution	5	0.4
Other	219	15.5
Detailed "not in labor force" category at discharge		
Missing/unknown/not collected/invalid	960	68.0
Homemaker	1	0.1
Student	7	0.5
Retired, disabled	228	16.1
Resident of institution	9	0.6
Other	207	14.7
Pregnant at admission		
Missing/unknown/not collected/invalid	1340	94.9
Yes	1	0.1
No	71	5.0
Living arrangements at admission		
Missing/unknown/not collected/invalid	155	11.0
Homeless	269	19.1
Dependent living	141	10.0
Independent living	847	60.0
Living arrangements at discharge		
Missing/unknown/not collected/invalid	406	28.8
Homeless	63	4.5
Dependent living	514	36.4
Independent living	429	30.4

Source of income/support		
Missing/unknown/not collected/invalid	830	58.8
Wages/salary	131	9.3
Public assistance	63	4.5
Retirement/pension, disability	260	18.4
Other	128	9.1
Service setting at admission		
Detox, 24-hour, hospital inpatient	38	2.7
Detox, 24-hour, free-standing residential	49	3.5
Rehab/residential, short term (30 days or fewer)	185	13.1
Rehab/residential, long term (more than 30 days)	158	11.2
Ambulatory, intensive outpatient	253	17.9
Ambulatory, non-intensive outpatient	726	51.4
Ambulatory, detoxification	3	0.2
Service setting at discharge		
Detox, 24-hour, hospital inpatient	37	2.6
Detox, 24-hour, free-standing residential	49	3.5
Rehab/residential, short term (30 days or fewer)	184	13.0
Rehab/residential, long term (more than 30 days)	159	11.3
Ambulatory, intensive outpatient	253	17.9
Ambulatory, non-intensive outpatient	727	51.5
Ambulatory, detoxification	3	0.2

Second, the descriptive statistics of the summaries of data regarding substance use, substance use diagnosis, and treatment among the 1,412 samples of the participants who are aged 40 to 65 years old and from the State of Virginia are summarized in Table

5. Only 16.3% of the sample have planned medication-assisted opioid therapy. For number of days waiting to enter treatment, the highest percentage (*n* = 601; 42.6%) among the study population have zero number of days waiting to enter treatment. More than half (*n* = 814; 57.6%) of the individuals under study responded that 'transferred to another treatment program or facility' was the reason for their discharge or discontinuance of treatment. For the length of stay in treatment, the highest percentage of responses among the sample was the range of 1 to 15 day (*n* = 713; 50.5%). In terms of number of previous substance use treatment episodes, more than half (*n* = 882; 62.5%) of the population have one or more prior treatment episodes.

In terms of primary substance used among the individuals under study, almost half of the sample responded that heroin (*n* = 123; 44.9%) was the primary substance used at admission. The top three highest response percentages of primary substance used at admission among the individuals under study were alcohol (*n* = 516; 36.5%), heroin (*n* = 359; 25.4%), and cocaine/crack (*n* = 244; 17.3%). On the other hand, the top three highest response percentages of primary substance used at discharge among the sample were also alcohol (*n* = 511; 36.2%), heroin (*n* = 383; 27.1%), and cocaine/crack (*n* = 223; 15.8%). In terms of the usual route of administration of primary substance used at admission, the highest percentage of responses among the sample was oral (*n* = 575; 40.7%). The second and third highest percentages of responses were smoking (*n* = 246; 17.4%) and inhalation method (*n* = 244; 17.3%), respectively. For frequency of use of primary substance at admission, almost half (*n* = 634; 44.9%) of the individuals under study responded that they used their primary substance at admission daily. For frequency

of use of primary substance at discharge, the highest percentage (39%) of the sample responded that they also used their primary substance at discharge daily. For the age at first use of primary substance, the highest percentage of response was 30 years and over (*n* = 276; 19.5%).

In terms of secondary substance used among the individuals under study, the highest percentage (28.7%) of the sample responded that they did not use any secondary substance at admission. Further, the highest percentage (30.8%) of the sample responded that they did not use any secondary substance at discharge. In terms of the usual route of administration of secondary substance used at admission, the highest percentage of responses among the population was smoking (*n* = 299; 21.2%). The second highest percentage of response was oral method (*n* = 203; 14.4%). For frequency of use of secondary substance at admission, the highest percentages of response were some use (*n* = 320; 22.7%). For frequency of use of secondary substance at discharge, the highest percentage of responses was also some use (*n* = 511; 36.2%). For the age at first use of secondary substance, the highest percentage of response was 15 to 17 years old (*n* = 156; 11%).

In terms of tertiary substance used among the individuals under study, the majority (*n* = 1,030; 72.9%) of the population responded that there was no tertiary substance used at admission. The majority (*n* = 1,008; 71.4%) of the veterans responded that there was also no tertiary substance used at discharge. In terms of the usual route of administration of tertiary substance used at admission, the majority (*n* = 1,258; 89.1%) of the sample have missing or no response. For frequency of use of tertiary substance at

admission, the majority (*n* = 1,261; 89.3%) of the participants have missing or no response. For frequency of use of tertiary substance at discharge, the majority (*n* = 1,227; 86.9%) of the sample have missing or no response. For the age at first use of tertiary substance, the majority (*n* = 1,259; 89.2%) of the population have missing or no response.

Table 5

Frequency and Percentage Summaries of Substance Use, Substance Use Diagnosis, and Treatment of Samples

	n	%
Planned medication-assisted opioid therapy		
Missing/unknown/not collected/invalid	7	0.5
Yes	230	16.3
No	1175	83.2
Number of days waiting to enter treatment		
Missing/unknown/not collected/invalid	653	46.2
0	601	42.6
1-7	114	8.1
8-14	23	1.6
15-30	16	1.1
31 or more	5	0.4
Reason for discharge or discontinuance of treatment		
Treatment completed	229	16.2
Dropped out of treatment	278	19.7
Terminated by facility	73	5.2
Transferred to another treatment program or facility	814	57.6
Incarcerated	12	0.8
Death	5	0.4
Other	1	0.1
Length of stay in treatment (days)		
1 to 15 days	713	50.5
16 to 30 days	164	11.5
31 to 45 days	77	5.5
46 to 60 days	86	6.1
61 to 90 days	92	6.5
91 to 120 days	77	5.5
121 to 180 days	94	6.7
181 to 365 days	78	5.5
More than a year	31	2.2
Number of previous substance use treatment episodes		
Missing/unknown/not collected/invalid	67	4.7
No prior treatment episodes	463	32.8
One or more prior treatment episodes	882	62.5
Substance use at admission (primary)		

Missing/unknown/not collected/invalid	10	0.7
None	124	8.8
Alcohol	516	36.5
Cocaine/crack	244	17.3
Marijuana/hashish	31	2.2
Heroin	359	25.4
Non-prescription methadone	2	0.1
Other opiates and synthetics	52	3.7
PCP	2	0.1
Methamphetamine	40	2.8
Other amphetamines	7	0.5
Other stimulants	2	0.1
Benzodiazepines	8	0.6
Other non-barbiturate sedatives or hypnotics	1	0.1
Other	14	1.0
Substance use at discharge (primary)		
Missing/unknown/not collected/invalid	88	6.2
None	14	1.0
Alcohol	511	36.2
Cocaine/crack	223	15.8
Marijuana/hashish	32	2.3
Heroin	383	27.1
Non-prescription methadone	1	0.1
Other opiates and synthetics	88	6.2
PCP	2	0.1
Other hallucinogens	1	0.1
Methamphetamine	44	3.1
Other amphetamines	8	0.6
Benzodiazepines	8	0.6
Other	9	0.6
Frequency of use at admission (primary substance)		
Missing/unknown/not collected/invalid	192	13.6
No use in the past month	366	25.9
Some use	220	15.6
Daily use	634	44.9
Frequency of use at discharge (primary substance)		
Missing/unknown/not collected/invalid	177	12.5
No use in the past month	441	31.2
Some use	243	17.2
Daily use	551	39.0

Third, the descriptive statistics of the summaries of data regarding outcome of substance use and substance use treatment among the 1,412 samples of homeless veterans who are aged 40 to 65 years old and from the State of Virginia are summarized in Table 6. Only 17.1% of the veterans who have IV drug use (IDU) reported their current IV drug used at admission. For substance reported at admission, the top three highest response percentages of substances reported at admission among the veterans were alcohol (*n* = 697; 49.4%), cocaine/crack (*n* = 540; 38.2%), and heroin (*n* = 424; 30%). For substance use type, less than half (*n* = 581; 41.1%) of the 1,412 homeless veterans used other drugs only. In terms of DSM diagnosis, the top three highest response percentages among the veterans were opioid dependence (*n* = 458; 32.4%), alcohol dependence (*n* = 450; 31.9%), and cocaine dependence (*n* = 193; 13.7%). Less than half (*n* = 613; 43.4%) of the veterans have co-occurring mental and substance use disorders. In terms of the health insurance at admission, almost half (*n* = 628; 44.5%) of the 1,412 homeless veterans responded they have Medicaid. For primary source of payment for treatment, less than half (*n* = 609; 43.1%) of the veterans also responded they use Medicaid. In terms of the frequency of attendance at substance use self-help groups in the 30 days prior to admission, the majority (*n* = 980; 69.4%) of the veterans responded no attendance. In terms of the frequency of attendance at substance use self-help groups in the 30 days prior to discharge, the highest percentage (41.4%) of the veterans also responded no attendance.

Table 6

Frequency and Percentage Summaries of Outcome of Substance Use and Substance Abuse Treatment of Samples

	n	%
Substance reported at admission		
Alcohol reported at admission	697	49.4
Cocaine/crack reported at admission	540	38.2
Marijuana/hashish reported at admission	164	11.6
Heroin reported at admission	424	30.0
Non-Rx methadone reported at admission	3	0.2
Other opiates/synthetics reported at admission	94	6.7
PCP reported at admission	5	0.4
Other hallucinogens reported at admission	3	0.2
Methamphetamine reported at admission	51	3.6
Other amphetamines reported at admission	9	0.6
Other stimulants reported at admission	3	0.2
Benzodiazepines reported at admission	40	2.8
Other non-barbiturate sedatives/hypnotics reported at admission	2	0.1
Other drug reported at admission	36	2.5
Substance use type		
None	134	9.5
Alcohol only	252	17.8
Other drugs only	581	41.1
Alcohol and other drugs	445	31.5
DSM diagnosis		

Missing/unknown/not collected/invalid	80	5.7
Alcohol-induced disorder	28	2.0
Substance-induced disorder	22	1.6
Alcohol intoxication	4	0.3
Alcohol dependence	450	31.9
Opioid dependence	458	32.4
Cocaine dependence	193	13.7
Cannabis dependence	19	1.3
Other substance dependence	71	5.0
Alcohol abuse	26	1.8
Cannabis abuse	13	0.9
Other substance abuse	7	0.5
Opioid abuse	8	0.6
Cocaine abuse	14	1.0
Anxiety disorders	1	0.1
Depressive disorders	3	0.2
Bipolar disorders	1	0.1
Other mental health condition	14	1.0
Co-occurring mental and substance use disorders		
Missing/unknown/not collected/invalid	41	2.9
Yes	613	43.4
No	758	53.7
Frequency of attendance at substance use self-help groups in the 30 days prior to admission		
Missing/unknown/not collected/invalid	99	7.0
No attendance	980	69.4

1-3 times in the past month	79	5.6
4-7 times in the past month	101	7.2
8-30 times in the past month	137	9.7
Some attendance, frequency is unknown	16	1.1
Frequency of attendance at substance use self-help groups in the 30 days prior to discharge		
Missing/unknown/not collected/invalid	442	31.3
No attendance	580	41.1
1-3 times in the past month	69	4.9
4-7 times in the past month	94	6.7
8-30 times in the past month	180	12.7
Some attendance, frequency is unknown	47	3.3

Results of Post-Hoc Power Analysis

A post-hoc power analysis was conducted to check if the final actual number of samples included in the study of 1,412 samples of homeless veterans (male and female) who are aged 40 to 65 years old and from the State of Virginia was enough to reach a minimum of 80% power. A post-hoc power analysis for a chi-square analysis with a total sample size of 1,412, a medium effect size of 0.30, and a level of significance of 0.05 resulted in a computation power of 1.00 or 100% (see Appendix A). Thus, the final number of samples of 1,412 homeless veterans generated the highest possible statistical power of 100%, which is also greater than the minimum of 80% for a quantitative study. The final sample size was perfectly adequate according to the post-hoc power analysis for the statistical analysis of chi-square analysis. The sample size of the dataset was robust.

Results of Statistical Assumption Testing

Chi-square analysis was conducted to address the research questions of the study. Certain required assumptions should be satisfied before conducting the tests. The chi-square analysis is a non-parametric test which does not require the normality assumption. The results of assumption testing are presented in the next paragraphs.

There are two required assumptions for the chi-square analysis. These include the following: (a) the two variables involved in the chi-square analysis should be measured at an ordinal or nominal level (i.e., categorical data), and (b) the two variables should consist of two or more categorical, independent groups. Both were satisfied, as the variables involved in the chi-square analysis included (a) housing/living arrangements prior to admission, (b) seeking admission to residential treatment centers, and (c) substance abuse treatment is categorically measured variable wherein each have two or categorical groupings.

A chi-square analysis was conducted to address Research Question One to determine whether there was a significant association between veteran housing/living arrangement and admission to long-term-drug/residential treatment centers in the state of Virginia as well as Research Question Two to determine whether there was a significant association between the outcome variable of substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia. A level of significance of 0.05 was used. This means that there is a significant relationship existing between the two variables when the *p*-value of the X^2 statistic is less than or equal to the critical value of the level of significance set at 0.05. When a significant relationship is

observed, cross tabulation between variables was created to analyze the degree of their significant relationship.

Results of Chi-Square Analysis for Research Questions One

As stated, a chi-square analysis was conducted to address Research Question One to determine whether there was a significant association between veteran housing/living arrangement and admission to long-term-drug/residential treatment centers in the state of Virginia. The dependent variable of admission to long-term-drug/residential treatment centers was measured using two question items of (a) service setting at admission and (b) DSM diagnosis. A level of significance of 0.05 was used in the chi-square analysis. Results of the chi-square analysis for research question one is shown in Table 7.

Results of the chi-square analysis showed that there was significant association between living arrangements at admission and service setting at admission ($X^2[18] = 133.52$, $p < 0.001$) as well as between living arrangements at admission and DSM diagnosis ($X^2[51] = 331.45$, $p < 0.001$). There were significant associations as the p-values of the X^2 statistic was less than the level of significance value set at 0.05. Investigation of the Cramer's V statistic showed little strength of both the associations between living arrangements at admission and service setting at admission (0.18) and living arrangements at admission and DSM diagnosis (0.28). With this result, the null hypothesis for Research Question One was rejected by the results of the chi-square analysis. The alternative hypothesis for Research Question One which states that there is an association between veteran housing/living arrangement (prior to admission) and

admission to long-term-drug treatment centers in the state of Virginia was supported by the results of the chi-square analysis.

Table 7

Results of Chi-Square Analysis of Association Between Veteran Housing/Living Arrangement and Admission to Long-Term-Drug/Residential Treatment Centers in the State of Virginia

Independent Variable	Dependent Variable	Pearson Chi-Square Value	df	Asymptotic Significance (2-sided)	Cramer's V
Living arrangements at admission	Service setting at admission	133.52	18	0.000*	0.18
	DSM diagnosis (SuDS 4 or SuDS 19)	331.45	51	0.000*	0.28

*Significant at level of significance of 0.05

Cross tabulation of responses between living arrangements at admission and service setting at admission in Table 8 revealed that the sample group of veterans who were independently living at admission had the highest frequencies of admission to long-term-drug/residential treatment centers, specifically in the service settings of (a) ambulatory, nonintensive outpatient (n = 1447); (b) ambulatory, intensive outpatient (n = 179); and (c) and rehab/residential, short term (30 days or fewer; n = 106) among the three groupings of living arrangements. On the other hand, the sample group of veterans who were dependently living at admission had the least frequencies of admission to long-term-drug/residential treatment centers specifically in the service settings of (a) detox, 24-hour, hospital inpatient (n = 2); (b) detox, 24-hour, free standing (n =2), and (c);

rehab/residential, short term (30 days or fewer; *n* = 17)

Further, cross tabulation of responses between living arrangements at admission and DSM diagnosis in Table 8 revealed that the sample group of veterans who were independently living at admission had the highest frequencies of DSM diagnosis in three substance areas of (a) opioid dependence (*n* = 314); (b) alcohol dependence (*n* = 200); and (c) cocaine dependence (*n* =125) among the three groupings of living arrangements. On the other hand, the sample group of veterans who were dependently living at admission had the least frequencies of DSM diagnosis in these three substance areas of (a) opioid dependence (*n* = 14); (b) alcohol dependence (*n* = 54); and (c) cocaine dependence (*n* =17).

Table 8

Cross Tabulation of Between Veteran Housing/Living Arrangement and Admission to Long-Term-Drug/Residential Treatment Centers in the State of Virginia

Grouping Variable	Category	Statistics	Living arrangements at admission			
			Missing/unknown /not collected/invalid	Homeless	Dependent living	Independent living
Service setting at admission	Detox, 24-hour, hospital inpatient	n	0	18	2	18
		%	0.00%	6.70%	1.40%	2.10%
	Detox, 24-hour, free-standing residential	n	7	6	2	34
		%	4.50%	2.20%	1.40%	4.00%
	Rehab/residential, short term (30 days or fewer)	n	11	51	17	106
		%	7.10%	19.00%	12.10%	12.50%
	Rehab/residential, long term (more than 30 days)	n	16	40	41	61
		%	10.30%	14.90%	29.10%	7.20%
	Ambulatory, intensive outpatient	n	10	41	23	179
		%	6.50%	15.20%	16.30%	21.10%
	Ambulatory, non-intensive outpatient	n	110	113	56	447
		%	71.00%	42.00%	39.70%	52.80%
	Ambulatory, detoxification	n	1	0	0	2
		%	0.60%	0.00%	0.00%	0.20%
DSM diagnosis (SuDS 4 or SuDS	Missing/unknown /not collected/invalid	n	7	5	11	57
		%	4.50%	1.90%	7.80%	6.70%
	Alcohol-induced disorder	n	0	3	0	25
		%	0.00%	1.10%	0.00%	3.00%

19)	Substance-induced disorder	n	4	2	1	15
		%	2.60%	0.70%	0.70%	1.80%
	Alcohol intoxication	n	0	2	0	2
		%	0.00%	0.70%	0.00%	0.20%
	Alcohol dependence	n	49	147	54	200
		%	31.60%	54.60%	38.30%	23.60%
	Opioid dependence	n	69	61	14	314
		%	44.50%	22.70%	9.90%	37.10%
	Cocaine dependence	n	14	37	17	125
		%	9.00%	13.80%	12.10%	14.80%
	Cannabis dependence	n	2	2	0	15
		%	1.30%	0.70%	0.00%	1.80%
	Other substance dependence	n	2	4	39	26
		%	1.30%	1.50%	27.70%	3.10%
	Alcohol abuse	n	3	2	2	19
		%	1.90%	0.70%	1.40%	2.20%
	Cannabis abuse	n	0	2	1	10
		%	0.00%	0.70%	0.70%	1.20%
	Other substance abuse	n	1	0	1	5
		%	0.60%	0.00%	0.70%	0.60%
	Opioid abuse	n	1	0	1	6
		%	0.60%	0.00%	0.70%	0.70%
	Cocaine abuse	n	3	0	0	11
		%	1.90%	0.00%	0.00%	1.30%
	Anxiety disorders	n	0	0	0	1

	%	0.00%	0.00%	0.00%	0.10%
Depressive disorders	n	0	1	0	2
	%	0.00%	0.40%	0.00%	0.20%
Bipolar disorders	n	0	1	0	0
	%	0.00%	0.40%	0.00%	0.00%
Other mental health condition	n	0	0	0	14
	%	0.00%	0.00%	0.00%	1.70%

Results of Chi-Square Analysis for Research Questions Two

A chi-square analysis was conducted to address Research Question 2 to determine whether there was a significant association between veteran housing/living arrangement and substance abuse treatment in the state of Virginia. The dependent variable of substance abuse treatment was measured using four question items of (a) length of stay in treatment (days), (b) number of arrests in the 30 days prior to admission, (c) number of arrests in the 30 days prior to discharge, and (d) frequency of attendance at substance use self-help groups in the 30 days prior to admission. A level of significance of 0.05 was used in the chi-square analysis. The results of the chi-square analysis for Research Question 2 is shown in Table 9.

Results of the chi-square analysis showed that there was a significant association between living arrangements at admission and length of stay in treatment ($X^2[108] = 212.83$, $p < 0.001$); between living arrangements at admission and number of arrests in the 30 days prior to discharge ($X^2[9] = 61.51$, $p < 0.001$); and between living arrangements at admission and frequency of attendance at substance use self-help groups in the 30 days prior to admission ($X^2[15] = 309.39$, $p < 0.001$). There were also significant associations because the p-values of the X^2 statistic were less than the level of significance value set at 0.05. Investigation of the Cramer's V statistic revealed that there was also little strength of associations between living arrangements at admission and length of stay in treatment (0.22), between living arrangements at admission and number of arrests in the 30 days prior to discharge (0.12), and between living arrangements at admission and frequency of attendance at substance use self-help groups in the 30 days prior to admission (0.27). With this result, the null hypothesis for Research Question Two

was rejected by the results of the chi-square analysis. The alternative hypothesis for research question two which states that there is an association between the substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia was supported by the results of the chi-square analysis. On the other hand, results of the chi-square analysis revealed that living arrangement at admission was not significantly associated with number of arrests in the 30 days prior to admission ($X^2[9] = 8.74$, $p = 0.46$). There were no significant associations, as the p-value of the X^2 statistic was greater than the level of significance value set at 0.05.

Table 9

Results of Chi-Square Analysis of Association Between Veteran Housing/Living Arrangement and Outcome Substance Abuse Treatment in the State of Virginia

Independent Variable	Dependent Variable	Pearson Chi-Square Value	df	Asymptotic Significance (2-sided)	Cramer's V
Living arrangements at admission	Length of stay in treatment (days)	212.83	108	0.000*	0.22
	Frequency of attendance at substance use self-help groups in the 30 days prior to admission	309.39	15	0.000*	0.27

*Significant at level of significance of 0.05

Cross tabulation of responses between living arrangements at admission and length of stay in treatment in Table 10 showed that sample group of veterans who were independently living at admission had the greatest length of stay in treatment, while sample group of veterans who were dependently living at admission had the shortest length of stay in treatment. Cross tabulation of responses between living arrangements at admission and number of arrests in the 30 days prior to discharge in Table 10 revealed

that sample group of veterans who were independently living at admission had the highest number of arrests in the 30 days prior to discharge, while the sample group of veterans who were dependently living at admission had the fewest number of arrests in the 30 days prior to discharge.

Cross tabulation of responses between living arrangements at admission and frequency of attendance at substance use self-help groups in the 30 days prior to admission in Table 10 revealed that sample group of veterans who were independently living at admission had the highest frequencies of attendance at substance use self-help groups in the 30 days prior to admission in each of the following response categories: 8 to 30 times (n = 72), 4 to 7 times (n = 54), and 1 to 3 times (n =54) in the past month. On the other hand, veterans who were dependently living at admission had the lowest frequencies of attendance at substance use self-help groups in the 30 days prior to admission in each of the following response categories: 8 to 30 times (n = 21) and 1 to 3 times (n =21) in the past month among the three groupings of living arrangements.

Table 10

Cross Tabulation of Between Veteran Housing/Living Arrangement and Outcome Substance Abuse Treatment in the State of Virginia

Grouping Variable	Category	Statistics	Living arrangements at admission			
			Missing/unknown/not collected/invalid	Homeless	Dependent living	Independent living
Length of stay in treatment (days)	1 to 15 days	n	94	161	82	376
		%	60.50%	59.80%	58.00%	44.30%
	16 to 30 days	n	14	41	13	96
		%	8.80%	15.10%	9.10%	11.30%
	31 to 45 days	n	8	10	6	53
		%	5.20%	3.70%	4.30%	6.30%
	46 to 60 days	n	13	14	6	53
		%	8.40%	5.20%	4.30%	6.30%
	61 to 90 days	n	10	19	7	56
		%	6.50%	7.10%	5.00%	6.60%
	91 to 120 days	n	2	9	7	59
		%	1.30%	3.30%	5.00%	7.00%
	121 to 180 days	n	7	12	10	65
		%	4.50%	4.50%	7.10%	7.70%
	181 to 365 days	n	5	3	5	65
		%	3.20%	1.10%	3.50%	7.70%
	More than a year	n	2	0	5	24
		%	1.30%	0.00%	3.50%	2.80%
	Missing/unknown/not collected/invalid	n	56	4	7	32
		%	36.10%	1.50%	5.00%	3.80%
Frequency of attendanc	No attendance	n	80	201	73	626

e at substance use self-help groups in the 30 days prior to admission		%	51.60%	74.70%	51.80%	73.90%
	1-3 times in the past month	n	5	13	5	56
		%	3.20%	4.80%	3.50%	6.60%
	4-7 times in the past month	n	0	14	33	54
		%	0.00%	5.20%	23.40%	6.40%
	8-30 times in the past month	n	11	33	21	72
		%	7.10%	12.30%	14.90%	8.50%
	Some attendance, frequency is unknown	n	3	4	2	7
		%	1.90%	1.50%	1.40%	0.80%

To further analyze the data, a binary logistic regression was conducted to determine whether homelessness, dependent living, or independent living significantly predict the admission to residential treatment centers. Assumptions of the binary logistic regression were satisfied because the dependent variable was binary in nature while the independent variables were nominal. There was also independence of observations because participants either belonged or did not belong to the group that was admitted to residential treatment centers. To analyze the data, the service setting was recoded to binary variables wherein participants who were in-patients were classified as admitted to residential treatment centers while participants who were ambulatory were classified as not admitted to residential treatment centers.

The result of the binary logistic regression determined whether being homeless is a significant predictor of being admitted to residential treatment centers. The residential treatment center is where participants receive substance abuse treatment, which was the dependent variable in the analysis. The coefficient B for homeless variable was -.977, which indicated that a change of category from not homeless to homeless decreases the chance of not being admitted to residential treatment centers by .977 (p-value < .01). The coefficient B for dependent living variable was -1.027, which indicated that a change of category from not dependent living to dependent living decreases the chance of not being admitted to residential treatment centers by 1.027 (p-value < .01). The Nagelkerke R square value of .043 indicated that the model explains 4.3% of the variance in the admission to residential treatment centers variable.

Table 11

Binary Logistic Regression of Admission to Residential Treatment Centers

		B	S.E.	Wald	df	Sig.	Odds Ratio
Step 1[a]	Homeless (ref. Yes)	-0.977	0.230	18.071	1	0.000	0.376
	Dependent Living (ref. Yes)	-1.027	0.258	15.873	1	0.000	0.358
	Independent Living (ref. Yes)	-0.216	0.209	1.064	1	0.302	0.806
	Constant	0.951	0.448	4.504	1	0.034	2.588

For the second research question, the frequency of substance treatment was recoded into a binary variable wherein 0 represented no attendance and 1 represented attendance to substance use treatment. The result of the binary logistic regression determined that the dependent living variable is a significant predictor of receiving substance use treatment. The substance use treatment variable is the representation of participants receiving or not receiving substance abuse treatment, which was the dependent variable in the analysis. The coefficient B for dependent living variable was -1.258, which indicated that a change of category from independently living to dependently living decreases the chance of not receiving substance use treatment by 1.258 (p-value < .01). Being homeless or independently living do not significantly predict the substance use treatment variable. The Nagelkerke R square value of .033 indicated that the model explains 3.3% of the variance in the substance use treatment variable.

Table 12

Binary Logistic Regression of Substance Use Treatment

		B	S.E.	Wald	df	Sig.	Odds Ratio
Step 1[a]	Homeless (ref. Yes)	-0.293	0.293	1.003	1	0.317	0.746
	Dependent Living (ref. Yes)	-1.258	0.309	16.619	1	0.000	0.284
	Independent Living (ref. Yes)	-0.240	0.268	0.800	1	0.371	0.787
	Constant	0.354	0.564	0.393	1	0.531	1.424

Summary

The purpose of this quantitative research study using a cross-sectional design was to determine the impact of seeking substance use treatment upon veteran homelessness by exploring the relationship between housing/living arrangements and admission to residential drug treatment centers in the Virginia area. As stated, chi-square analysis was conducted to address the two research questions of this study. For Research Question 1, the results of the chi-square analysis revealed that there was a significant association between veteran housing/living arrangement (prior to admission) and admission to long-term-drug treatment centers in the state of Virginia. Specifically, the results showed that there were significant associations between living arrangements at admission and service setting at admission as well as between living arrangements at admission and DSM diagnosis. The strength of the associations was only little or weak. A binary logistic regression analysis was conducted to determine whether the homelessness, independent living, and dependent living variables significantly predict the participants' admission to substance abuse treatment. The result of the analysis determined that being homeless and

dependently living are significant predictors of being admitted to substance abuse treatment.

For Research Question 2, results of the chi-square analysis showed that there was a significant association between substance abuse treatment and veteran housing/living arrangement (prior to admission) in the state of Virginia. Specifically, the results showed that there were significant associations between living arrangements at admission and length of stay in treatment; between living arrangements at admission and number of arrests in the 30 days prior to discharge; and between living arrangements at admission and frequency of attendance at substance use self-help groups in the 30 days prior to admission. The strength of the associations was only little or weak. The binary logistic regression also determined that dependently living significantly predicts receiving substance use treatment.

Section 4 concludes the study. Implications of the results of the data analysis are discussed. Further, suggestions on how the findings may be applied in an organizational setting and a summary of recommendations for future research are discussed in Section 4.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The current literature lacks evidence regarding the impact of seeking substance use treatment upon homeless veterans. Although multiple studies have provided evidence that substance abuse is higher among homeless individuals (e.g., Padgett et al., 2010; Somers et al., 2015) and is a particular concern for homeless veterans (Malte et al., 2017), a gap remains in regard to comparing admission to long-term substance use treatment for Virginia veterans depending on housing status. Therefore, the purpose of this quantitative research study was to fill a gap in the literature regarding the impact of seeking substance use treatment upon veteran homelessness by exploring the relationship between housing/living arrangements and admission to residential drug treatment centers in the Virginia area.

Data on 1,414 Virginia veterans aged 40 to 65 years seeking substance use treatment were obtained from SAMSHA data archives. The findings of the current study suggest that Virginia veterans who live independently are more likely to be admitted to long-term-drug/residential treatment centers, receive a DSM diagnosis, have a longer stay in treatment, and attend self-help groups more in the 30 days prior to admission. The findings of this study could conceivably create positive social change at all societal levels by offering public health practitioners an opportunity to address an important social determinant of health: housing. In the following sections, the findings of the current study are discussed within the context of the current literature. Recommendations for future studies and implication for practice are also discussed.

Interpretation of the Findings

The current study addressed a significant gap in the current literature. Though substance abuse has been identified as the primary cause of homelessness among veterans (Dunne et al., 2015; Malte et al., 2017) and rates of substance abuse is high among homeless individuals (Somers et al., 2015), few studies have examined how housing is associated with treatment for substance abuse disorders among veterans. Consistent with the socioecological model and previous studies, the current study found that Virginia veterans who live independently are more likely to be admitted to long-term-drug/residential treatment centers, receive a DSM diagnosis, have a longer stay in treatment, and attend self-help groups more in the 30 days prior to admission. These findings indicated that where a veteran lives is associated with seeking treatment for a substance abuse disorder. These findings build upon the socioecological model that highlights the importance of one's environment in the engagement of necessary social support structures (Teeters et al., 2017). Therefore, the culmination of these findings highlights the need to address challenges associated with one's living arrangements to alleviate the barriers to treatment.

Veterans living independently may experience fewer barriers to treatment compared to homeless veterans, allowing them to access treatment more easily and at greater rates compared to homeless veterans. Veterans living independently may have greater access to resources that support them in seeking treatment and do not face the stigma of homelessness that can prevent homeless veterans from seeking treatment (Cheney et al., 2018; Kertesz et al., 2013; O'Toole et al., 2015; Wang et al., 2021). In the

following sections, the findings associated with each research question are discussed within the context of the current literature.

RQ1: To What Extent Is There an Association Between Veteran Housing/Living Arrangement and Admission to Long-Term-Drug/Residential Treatment Centers in the State of Virginia?

Consistent with previous literature, there was a significant association between veteran housing/living arrangement and admission to long-term-drug/residential treatment centers in the state of Virginia. Veterans living independently at admission had the highest frequencies of admission to long-term-drug/residential treatment centers and rates of DSM diagnosis. Veterans living dependently at admission had the least frequent rate of admission to long-term-drug/residential treatment centers.

In accordance with the socioecological model, the current study found evidence that the social environment in which veterans live may influence their behavior in seeking long-term-drug/residential treatment. The findings of the current study indicate that the context in which the veteran lives (i.e., their living arrangement) shapes their behavior. Different living arrangements may be correlated with differing levels of interpersonal support (level 2), may offer differing levels of community support (level 3), and it is possible that some housing arrangements are impacted more significantly by social factors (level 4). The differences in these socioecological model levels may explain, at least in part, the group differences found in the current study.

Though the community offers support for veterans who abuse substances, homeless veterans may not be able to access treatment as easily as veterans who live

independently or dependently. Accessing substance abuse treatment or any of the programs provided by the VA requires resources that homeless veterans may not have access to, such as a phone, transportation, or the internet. For example, the HCRV program requires veterans to send an email with their contact information to access this program (Holliday & Pedersen, 2017; Veterans Affairs, 2021). Other available programs include hotlines and voucher programs that require veterans to have access to these resources to reach the programs. It is possible that these policies are a significant barrier to homeless veterans. Previous criticisms of these programs have noted that they are ineffective at reaching homeless veterans (Hynes et al., 2021; Teeters et al., 2017), which may at least partially explain their ineffectiveness.

These same barriers may not exist for veterans who are living independently. They may have more financial stability and more regular access to the resources needed to access these programs. As such, they do not face the same barriers to substance abuse treatment and are able to seek treatment more easily.

Interpersonal support may also vary between veterans who are homeless, living dependently, and living independently. Living dependently may provide veterans with greater access to interpersonal support compared to veterans living independently. Veterans living dependently may be in contact with a variety of services that provide them with holistic support, such as social support from family, case management services, and in-home care. These services may reduce the need for veterans living dependently to seek substance abuse treatment.

In terms of societal impacts on veterans' willingness to seek treatment, homeless veterans may face several other barriers to treatment may. Homeless veterans are often anxious to seek treatment or access support due to the stigma of being both a homeless veteran and an individual with a substance use disorder. These anxieties often keep homeless veterans from accessing services (Cheney et al., 2018; Kertesz et al., 2013; O'Toole et al., 2015; Wang et al., 2021). It is possible that these anxieties around stigma and bias may also play a role in homeless veterans' admission to long-term-drug/residential treatment centers in the state of Virginia.

RQ2: To What Extent Is There an Association Between the Outcome Variable of Substance Abuse Treatment and the Predictor Variable of Veteran Housing/Living Arrangement (Prior to Admission) in the State of Virginia?

In accordance with previous literature, this study found that there was a significant association between living arrangement and length of stay as well as frequency of attendance at substance use self-help groups in the 30 days prior to admission. Veterans living independently at admission had the greatest length of stay in treatment and the most frequent attendance at substance abuse self-help groups. Veterans living dependently had the lowest length of stay in treatment and the least frequent attendance at substance abuse self-help groups.

As with the first research question, homeless veterans may not be able to access the resources needed for these programs as easily as veterans who live independently or dependently. For example, if a homeless veteran does not have access to consistent transportation, they are unlikely to be able to frequently attend substance abuse self-help

groups. Veterans living independently may have greater access to these resources, so they are able to stay longer in treatment and attend groups more regularly. Further, the supports that veterans living dependently have may reduce their need for to long-term-drug/residential treatment.

Living arrangement at admission was not significantly associated with number of arrests in the 30 days prior to admission. Overall, the rate of arrests prior to admission was low in the current study, as 96% of the sample had no arrests in the 30 days prior to admission. It is possible that this low rate of arrests in the current study explains, at least in part, the lack of association in the current study. The low number of arrests may have reduced the power of the analyses to find an association. It should also be noted that most participants in the current study, regardless of living arrangement, were seeking nonintensive outpatient treatment. It is possible that participants in the current study were experiencing less severe symptoms of their substance use disorder at the time the data were collected. As they may have had more control over their symptoms, they may have been less likely to be arrested.

Limitations of the Study

The findings of the current study should be considered within the context of a few limitations. First, the current study may not be generalizable to the larger population of veterans in the United States. Participants from the current study come from one state where access to treatment and rates of homelessness among veterans may be different. Future research should consider including a larger population of veterans across multiple states.

Second, the majority of participants in the current study were living independently. Over 60% of participants were living independently, while 20% reported that they were homeless at admission. The low number of homeless veterans may have reduced the ability of the current study to identify group differences. Future research may consider oversampling for homeless veterans to better identify possible group differences.

Finally, though female veterans make up 10% of the population of United States veterans (Veterans Affairs, 2021), only 5% of the participants in the current study were female. Therefore, the findings of the current study may not represent the experiences of female veterans as well as they represent the experiences of male veterans. Future research may consider examining the experiences of female veterans seeking substance abuse treatment depending on their housing arrangements.

Recommendations

Despite the limitations outlined above, the findings of the current study can be used to inform future research. First, a better understanding of the barriers to treatment for homeless veterans may be warranted. Future research may consider qualitatively examining the barriers homeless veterans face when seeking substance abuse treatment, which may provide insight for practitioners serving homeless veterans.

Second, the findings of the current study were focused only on veterans in the state of Virginia. It is possible that veterans in other states have different experiences than veterans in Virginia, such as access to treatment or housing support. Future research may

consider examining how veteran housing/living arrangement is associated with admission to long-term-drug/residential treatment across different states.

Finally, the sample of homeless veterans in the current study was small compared to the sample of veterans who live independently. This may have impacted the ability of the current study to identify group differences. Previous researchers have noted the difficulty reaching homeless veteran populations (Tsai & Rosenheck, 2015). Future research may consider oversampling for homeless veterans when examining how housing impacts substance abuse treatment among veterans.

Implications for Professional Practice and Social Change

Previous criticisms of programs to prevent substance abuse among homeless veterans have noted that they are ineffective at reaching homeless veterans (Hynes et al., 2021; Teeters et al., 2017). Accessing these programs often requires resources to which homeless veterans may not consistently have access, such as transportation, a phone, or internet access. For example, the HCRV program requires veterans to send an email with their contact information to access this program (Holliday & Pedersen, 2017; Veterans Affairs, 2021). The findings of the current study suggest that the barriers to treatment and services are severe enough to limit veterans' substance abuse treatment. Programs and practitioners should consider reducing the barriers to treatment for homeless veterans. They may consider providing access to transportation for treatment, not requiring access to a phone or internet to access services or providing care in nontraditional settings that may be easier for homeless veterans to access.

The current study has the potential to create positive social change by providing evidence of the barriers to substance abuse treatment homeless veterans face. Substance abuse disorders are a serious concern among homeless veterans (Malte et al., 2017), yet according to the findings of the current study, homeless veterans do not seek treatment as often as those who live independently. Therefore, it appears that the population at the highest risk is not being reached. The findings of the current study may be used by practitioners to reduce the barriers to substance use disorder treatment for homeless veterans.

Conclusion

The purpose of this quantitative research study was to fill a gap in the literature regarding the impact of seeking substance use treatment upon veteran homelessness by exploring the relationship between housing/living arrangements and admission to residential drug treatment centers in the Virginia area. Data on 1,414 Virginia veterans aged 40 to 65 years seeking substance use treatment were obtained from SAMSHA data archives. A series of chi-square analyses were conducted to examine differences in veterans' substance abuse treatment depending on their living arrangement.

The current study found that Virginia veterans who live independently are more likely to be admitted to long-term-drug/residential treatment centers, receive a DSM diagnosis, have a longer stay in treatment, and attend self-help groups more in the 30 days prior to admission. In addition to addressing a significant gap in the current literature, the current study also provided some evidence that homeless veterans face significant barriers to treatment and supports that hinder their ability to seek treatment.

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Appendix A: G*Power Analysis