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Cross-Sectional Analysis Of The Relationship Between Violent Crime And Mental Health Disorders In A Sample Of Homeless Adults Recently Released From Jail

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By

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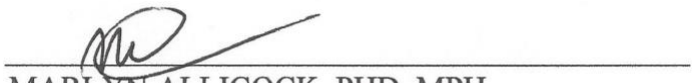

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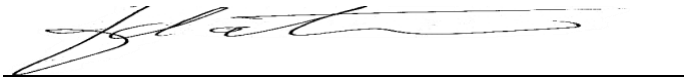

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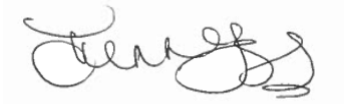

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By

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Adverse mental health conditions among incarcerated populations are high, and treatment for these conditions is particularly low. Additionally, there is a culture of stigma in the United States towards those with mental health conditions and violent criminal history, contributing to mass incarceration. The present cross-sectional study sought to assess the association between violent criminal history and mental health symptoms among recently incarcerated homeless adults in Dallas, Texas. This study included 230 participants, taking place at The Bridge Homeless Recovery Center, evaluating non-violent versus violent criminal history. Outcome measures of positive screens for post-traumatic stress disorder, generalized anxiety disorder, and depression utilized the Primary-Care Post-Traumatic Stress Disorder (PC-PTSD-4) tool, Generalized Anxiety Disorder-7 (GAD-7) tool, and Patient Health Questionnaire-8 (PHQ-8, respectively. Information was also gathered regarding age, gender, race/ethnicity, educational attainment, duration of homelessness, illicit drug use, and social connectedness via Lubben Social Network scale. Multivariable unadjusted and adjusted logistic regression models were fit to identify factors associated with the outcomes of post-traumatic stress disorder and generalized anxiety disorder. Additionally, multinomial unadjusted and adjusted logistic regression models were used to identify relative risk ratios for the relationship between depression and violent criminal history. There was no evidence of a statistically significant direct relationship between violent criminal history and positive mental health screenings. Non-Hispanic, Black participants had lower rates of positive mental health screenings for post-traumatic stress disorder and generalized anxiety disorder compared to non-Hispanic, White participants. Additionally, increased severity of depression for non-Hispanic, Black participants was less likely than in non-Hispanic, White participants. Results showed the longer an individual was homeless (two years or greater), they were less likely to be screened positive for all mental health screenings as compared with individuals with shorter duration of homelessness less than two years). Overall, there was found to be a strong relationship between illicit drug use 90 days prior to entering the study and positive mental health screenings for post-traumatic stress disorder, generalized anxiety disorder, and depression. This study found limited evidence of a relationship between violent criminal history and positive mental health disorders. This research represents an important step toward developing informative treatment plans such as increased mental health treatment and increased collaborative care to further prevent adverse mental health conditions among homeless and recently incarcerated populations.

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Introduction

In the United States during 2018, there were 2.3 million people incarcerated (meaning the act of being confined in a state/county jail or prison); that is, 756 people incarcerated for every 100,000 persons in the United States (Wagner & Sawyer, 2018). In Texas, during the same period, the incarceration rate jumped to 891 for every 100,000 persons (Prison Policy Initiative, 2018). Since 1980, the American penal system has grown at a substantial rate, with incarceration rates increasing by 60% (Massoglia & Remster, 2019). Reasons for this increase include the fall of institutionalized psychiatric care, increase legislative support for incarceration, and lack of community support for mental health (Houser, Vîlcică, Saum, & Hiller, 2019; Travis & Western, 2014; Vogel, Stephens, & Siebels, 2014).

A key factor supporting the increased incarceration rates has to do with changes in particular community health services. During the 1960s, support for psychiatric hospitals began to fall, and the release of patients into the community began to rise, into what was called "deinstitutionalization", causing community health care services to become increasingly essential but under-utilized (Houser, Vîlcică, Saum, & Hiller, 2019). Within the 1980s, a political shift occurred across all branches of government, with changes in criminal processes, such as increasing sentencing for lesser offenses, increasing served time for violent and drug crimes (Travis & Western, 2014). Later on, in the 1990s, Congress passed the "three strikes and you're out" law, meaning a person who has committed three offenses received increased jail time, with half of the states adopting this law, including Texas (Travis & Western, 2014). This increase in legislation and the "deinstitutionalization" movement in turn, caused community health care services to shift towards the criminal justice system, as police encounters with the public became the primary triage service (Vogel, Stephens, & Siebels, 2014). This growth of mass

incarceration, meaning widespread incarceration of people in state/county jails or prisons, has paved the way for many wide-reaching consequences, including mental health, that have shaped the landscape of our society for health inequalities between those experiencing incarceration (Massoglia & Pridemore, 2015).

Mental health disorders in the United States has continuously persisted with approximately 46.6. million adults experiencing mental illness in 2019 (National Institute of Mental Health, 2019). In comparison, the population of Texas consists of 26.9 million people, with 1 million experiencing mental illness; 4.5% experience depression, 1.9% experience anxiety/panic disorder, and 2.4% experience post-traumatic stress disorder (Texas Judicial Council, 2016; Meadows Mental Health Policy Institute, 2014). Mental health issues for those who are incarcerated remain high. During 2017, approximately 24% of inmates incarcerated within a Texas Department of Criminal Justice facility reported having a mental illness at the time of their incarceration (Texas Department of Criminal Justice, 2018).

Incarceration and Mental Health

Many structural and behavioral risk factors that cause an individual to be predisposed to enter the criminal justice system that create complications in establishing a clear causal relationship between health and incarceration (Massoglia & Remster, 2019). These structural factors include stigma, poverty, lack of access to healthcare, homelessness, and education, whereas behavioral risk factors can consist of substance abuse and increased exposure to violence (Dumont, Brockmann, Dickman, Alexander, & Rich, 2012; Massoglia & Remster, 2019). A study conducted with data collected through the National Longitudinal Survey of Youth (Schnittker & John, 2007) focused on the relationship between incarceration and physical health.

The study found individuals were more likely to develop more chronic health problems after incarceration, regardless of the number of incarceration periods or length. Schnittker and John (2007) also showed that incarceration was associated with adverse changes in chronic health.

Using the same population one year later through the National Longitudinal Survey of Youth, author Massoglia (2008) found two areas in which incarcerated individuals experienced adverse changes in health status. First, those that experienced incarceration contracted more infectious diseases, the most prevalent being HIV, hepatitis B, and tuberculosis, due to increased exposure from being in confined areas with others infected, shared personal hygiene items, poor ventilation, and poor access to healthcare, therefore exacerbating the spread of disease. Second, those with adverse health status changes after incarceration were found to have increased development of stress-related conditions, the most common being obesity, heart disease, and mental illness such as major depression, anxiety, and panic disorders (Massoglia, 2008). These adverse health conditions can be attributed to increased jail encounters serving as acute stressors, causing chronic physical and mental health complications, found to be stemming from antagonistic relationships between inmates themselves and between inmates and guards of the jail, overcrowded conditions, and increased exposure to violence (Massoglia & Pridemore, 2018; Dumont, Brockmann, Dickman, Alexander, & Rich, 2012)

There are additionally long-lasting implications for those who have mental health complications and have been incarcerated. In a national survey conducted by the Bureau of Justice Statistics in 2014, approximately 64% of inmates in jails across the United States reported being diagnosed or having symptoms of one or more mental health disorders (Travis & Western, 2014). Additionally, mental health disorders among average state jail inmate populations accounted for approximately 29.7% of inmates screened positive for major

depression, compared to 7.9% of the general population and 17% of inmates screened positive for anxiety and panic disorder, compared to 2.7% of the general population (Al-Rousan, Rubenstein, Sieleni, Deol, & Wallace, 2017; Begun, Early, & Hodge, 2015). Furthermore, the access to treatment for mental health among incarcerated populations is severely lacking, with less than 35% of inmates reporting receiving treatment while incarcerated (Treatment Advocacy Center, 2014; Bureau of Justice Statistics, 2017). Lack of access to treatment can be due to understaffing in correctional institutions, lack of funding for treatment programs, overcrowded hospital conditions leading to lack of transfers from inmates needed additional psychiatric aid (Treatment Advocacy Center, 2014; Mental Illness Policy Organization, 2019). Mental health conditions may differ among those with a non-violent versus violent criminal history (Cuellar, Snowden, & Ewing, 2007). Reasons for this difference suggest persons with mental health conditions that are not managed, displaying abnormal behavior may result in increased exposure to criminal justice system (Cuellar, Snowden, & Ewing, 2007). In a national sample of homeless adults, 71% of participants that were charged with a violent offense, also were diagnosed with a mental illness (Theriot & Segal, 2005). This high prevalence rate of mental health disorders among incarcerated populations compared to the general population highlights the importance of proper mental healthcare access and the criminalization of mental health conditions (Begun, Early, & Hodge, 2015).

This access to mental health treatment among recently incarcerated populations is particularly important among populations experiencing homelessness. The state of homelessness can be described as a person living in a temporary shelter (with shelter being defined as emergency shelter, transitional housing, an institution such as being incarcerated or hospitalized) or a place not meant for human habitation (Department of Housing and Urban Development,

2020). According to the Department of Housing and Urban Development (2020), in 2019, there were approximately 552,630 people experiencing homelessness in the United States; within Texas, there were approximately 25,000 people experiencing homelessness. Adverse health conditions are a much greater risk among those experiencing homelessness compared to the general population; the most common conditions being infectious diseases (including HIV/AIDS, bronchitis, and tuberculosis), mental health problems (including post-traumatic stress disorder, depression, and panic disorders), and substance abuse problems (National Institute of Health, 2020). There are significant barriers the homeless population experiences that contribute to these adverse health conditions that include limited access to healthcare, poor nutrition, harmful exposure to severe weather, unsanitary living conditions, violence, and stress (National Institute of Health, 2020; (Parsell, Have, Denton, & Walter, 2018). It is important to note the intersectionality of mental health and homelessness. The homeless population experiences mental health conditions at a rate of 49% compared to the general population of 14% in the United States (National Healthcare for the Homeless Council, 2019; National Institute of Mental Health, 2019). Reasons for this are individuals experiencing homelessness are more likely to have adverse mental health due to chronic environmental stressors, increased exposure to infectious disease, and increased involvement with the criminal justice system (National Institute of Health, 2020; Greenberg et al., 2008; Morrison, 2009).

As mentioned previously, substance abuse is considered to be an indicator of mental health complications due to the behavioral risk substance abuse poses. According to the American Addiction Center (2020), approximately 19.7 million adults (38%) in the United States experience substance abuse, with 8.5 million adults have co-occurring mental health and substance abuse disorders and only 7.4% of adults will receive treatment for both throughout

their lifetime. Comparatively, 17.8% of Texas adults experience substance abuse with 9.5% of Texas adults experiencing co-occurring mental health and substance abuse disorders (Texas Judicial Council, 2016; Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). The criteria for co-occurring mental health disorder and substance abuse disorder means an individual must meet the criteria for both simultaneously (Center for Substance Abuse Treatment, 2005). These coexisting conditions become increasingly true for specifically those diagnosed with post-traumatic stress disorder in addition to substance abuse disorder. Despite this excessive occurrence of mental illness and substance abuse, it is important to note that specifically among incarcerated adults in jails, substance abuse within this vulnerable population is increasingly pervasive (Substance Abuse and Mental Health Services Administration [SAMHSA], 2012). Among jail inmates specifically, substance abuse criteria were met at seven times the rate than that of the general population (Teitelbaum & Hoffman, 2013; Substance Abuse and Mental Health Services Administration [SAMHSA], 2015).

Specific Aims

While there is evidence of exposure to the criminal justice system negatively affecting the health of individuals, there is a gap however in understanding the inter-relationships between mental health symptoms, specifically examining post-traumatic stress disorder, generalized anxiety disorder, and depression with the type of criminal history from a population of justice-involved adults experiencing homelessness has been overlooked. The association of this relationship between the type of criminal offense history and mental health history can help to address the barriers discussed previously to appropriate treatment. It is against this backdrop, the

need for further exploration into the multifaceted issue of incarceration and mental health will be explored. The purpose of this study is to examine the association between violent criminal history and mental health symptoms among recently incarcerated homeless adults.

METHODS

Study Design

This study is a cross-sectional analysis examining the relationship between violent criminal history and positive mental health screening, including post-traumatic stress disorder, depression, and generalized anxiety disorder.

Study Setting

The data utilized for this study was collected via an NIH funded study called "m-Health to Increase Service Utilization in Recently Incarcerated Homeless Adults" (Gonzalez et al., 2018). All permissions from the study investigators and IRB have been granted to utilize data for the thesis project. Original participant recruitment and data collection date began in the Spring of 2018 and recruitment for the study is projected to be completed in the Spring of 2022. Data being utilized for this thesis were available from participant recruitment that occurred between April 2018 and December 2019. The participants included in this study were all located at the Bridge Homeless Recovery Center in Dallas, Texas.

Study Participants

The study population consists of recently incarcerated homeless adults (N=230), having recently been released from Dallas County Jail within 60 days of enrollment in the study. Further inclusion criteria include participants be at least 18 years of age or older, have a 7th-grade reading level or above, must be able to read, understand, and speak English, and must be enrolled in The Bridges Homeless Recovery Program. Verification of prior incarceration was obtained by a Dallas County employee to confirm the participant was released from Dallas County Jail within 60 days prior to enrolling in the study. The Homeless Recovery Program entails participants being assigned a case manager (social worker) to aid them in recovering from homelessness by providing housing information and other transitional services. The recruitment of participants into the study was facilitated through informational flyers, direct recruitment by research team, and referrals from The Bridge Homeless Shelter staff. Participants were actively consented and reviewed a consent form in order to enter the study. This informed consent states refusal rights and provides full explanation of the study including data analysis, arrest data usage, and research team contact information.

Data Collection

Data was collected through self-reported questionnaires through Quality Data Services program facilitation on a computer utilizing ACASI, audio-computer-assisted self-interview. For the purposes of this analysis, only one study visit was required, and this visit lasted approximately 1-1.5 hours. Additional data were collected during this questionnaire for primary outcomes to be examined by the principal investigators of the original study. The data collected for this thesis study includes previous behavioral health diagnosis, criminal history, history of homelessness, and demographic information (age, gender, race/ethnicity, and education).

Participants' questionnaire data were stored using a SecureStore database online. To protect the confidentiality of participants, identifiers were removed prior to analysis.

Measures

Criminal History

The Brief Homelessness Questionnaire was adapted from the federal organization Substance Abuse and Mental Health Services Administration (SAMHSA). This tool includes 20 questions asking about the history of homelessness, mental health treatment, and criminal history.

Non-violent criminal history was measured using an adapted question from the SAMHSA questionnaire (2019), “have you ever been arrested or booking for:” offering “yes/no” responses for the following options: drug possession, manufacturing or selling drugs, driving under the influence of alcohol or drugs, disorderly conduct or public drunkenness, loitering, forgery or counterfeiting, larceny or theft, motor vehicle theft, arson, fraud, possession of stolen goods or vandalism, burglary, and prostitution.

Violent criminal history was measured using the same adapted question from the SAMHSA questionnaire (2019), “have you ever been arrested or booked for:” offering “yes/no” responses for the following options: domestic violence or child abuse, assault or battery, forcible rape, any other sexual offense that is not including rape or prostitution, robbery, weapons violation (carrying a concealed weapon), murder, homicide, or non-negligent manslaughter

The categorization of violent versus non-violent charges were obtained via the Federal Bureau of Investigation Uniform Crime Reporting Program (U.S. Department of Justice, 2018).

If the participant reported being arrested or booked for any of the above violent offenses in their lifetime, they were categorized as having a violent criminal history.

Mental Health

For the purposes of this study, post-traumatic stress disorder, depression, and generalized anxiety disorder were examined using the following clinical screening measures; PC-PTSD-4 (Primary Care Post-Traumatic Stress Disorder-4), PHQ-8 (Patient Health Questionnaire-8), and GAD-7 (Generalized Anxiety Disorder-7).

Post-traumatic stress disorder screening was conducted using the Primary Care Post-Traumatic Stress Disorder (PC-PTSD) tool. The PC-PTSD (Prins, Ouimette, & Kimerling, 2003) is a 4-question screen that was designed for use in primary care and other medical settings and is currently used to screen for PTSD in veterans and uses previous lifetime measures. The screen includes an introductory sentence to cue respondents to traumatic events. The authors suggest that in most circumstances, the results of the PC-PTSD should be considered "positive" if a patient answer "yes" to any three items (Prins, Ouimette, & Kimerling, 2003).

Depression screening was measured via the Patient Health Questionnaire (PHQ-8) (Spitzer, Kroenke, & Williams, 1999), a self-administered diagnostic instrument. The survey consists of 8 questions asking how often participants felt during the previous 2 weeks prior to the interview. This is calculated by assigning scores of 0, 1, 2, and 3 to the response categories of "not at all", "several days", "more than half the days", and "nearly every day" respectively. PHQ-8 total score for the eight items ranges from 0 to 24. Scores of 5, 10, 15, and 20 represent cut-points for mild, moderate, moderately severe and severe depression, respectively (Spitzer, Kroenke, & Williams, 1999).

Generalized anxiety disorder was measured via the Generalized Anxiety Disorder-7 (GAD-7) screening tool. The GAD-7 measures anxiety symptoms on a scale of 0-7 based on the previous two weeks prior to the interview. The score for probable generalized anxiety disorder is calculated by assigning scores of 0, 1, 2, and 3, to the response categories of "not at all" (0), "several days" (1), "more than half the days" (2), nearly every day" (3). The total score for the seven items ranges from 0 to 21. The authors of the clinical screening tool recommended cut-point for probable generalized anxiety disorder is a score of 10 or higher (Prins et al., 2015.

Demographics

Covariates included age, gender (Male and Female/Other) race/ethnicity(White/Non-Hispanic, Black/Non-Hispanic, Other/More than one, and Hispanic), two or more years of homelessness, any substance use within 90 days before to entering the study, and completion of high school diploma/GED completion. Additionally, social connectedness was measured using the Lubben Social Network Scale. This scale is an equally weighted sum of six questions asking the participant their frequency of social engagement with family or friends (Lubben, 1984). Responses to each question included how many friends/relatives the participants engages with on a monthly basis and the answers are scored: none = 0, one = 1, two = 2, three or four = 3, five thru eight = 4, nine or more = 5. The survey continues with questions that ask how often they engage with these friends and family, 0 = less than monthly, 1 = monthly, 2 = few times a month, 3 = weekly, 4 = few times a week, 5 = daily. The measure outputs a score that ranges 0-30, with scores of 12 or lower identifying those with high levels of social isolation, while a score of 13 or higher is considered not at risk for social isolation (Lubben, 1984).

Data Analysis

Frequencies (with percentages) and means (with standard deviations) were utilized to describe categorical and continuous variables, respectively. Comparisons between categorical

variables were performed using contingency tests (Chi-square). Distribution of continuous variables crossed with PC-PTSD-4 scores and GAD-7 scores were performed using Students *t*-test and distribution of continuous variables crossed with PHQ-8 scores were performed using one-way ANOVA. An *a priori* alpha of 0.05 was selected; therefore, any *p*-value of less than 0.05 was considered statistically significant.

A model-building strategy was utilized to include all relevant covariates from results of contingency tests while including exposure of violent criminal history. Bivariate logistic regression models were utilized to identify statistically significant covariates. For post-traumatic stress disorder and generalized anxiety disorder positive screenings, Students *t*-test was used to detmine statistical significance for the continuous variable age and chi-squared tests were used to determine statistical significane for all categorical variables (gender, race/ethnicity, duration of homelessness, illicit drug use, Lubben Social Network score, and criminal history). All variable distributions were examined via histograms and line plots prior to multivariate analysis. The covariates included in logistic regression models were age, race/ethnicity (White/Non-Hispanic as reference group, Black/Non-Hispanic, Other/More than one, and Hispanic), years of homelessness (< 2 years of homelessness used as a reference group), illicit drug use within 90 days prior to interview (no reported drug use was used as the reference group), and criminal history (no violent criminal history used as the reference group) due to significant *p*-values. The main exposure variable (violent criminal history) was included in all models.

Additionally, a multinomial logistic regression model was used to assess the relationship between depression and violent criminal history. For the multinomial logistic regression, depression scores from Patient Health Questionnaire-8 screening were categorized into the normal range (score = 0-4), probable mild depression (score = 5-9), probable moderate

depression (score = 10-14), probable moderate-severe depression (score = 15-24) for multivariate modeling. Participants that were in the 'normal' depression range were used as a base outcome for the multinomial logistic regression. Similarly, covariates of age, race (White/Non-Hispanic as reference group, Black/Non-Hispanic, Other/More than one race, and Hispanic), years of homelessness (< 2 years of homelessness used as a reference group), illicit drug use within 90 days prior to interview (no reported drug use was used as the reference group) due to significant *p*-values in univariate models. Contingency tests were utilized to determine stistically significant covariates among depression screenings; one-way ANOVA was used to determine statistical significance for the continuous variable age with depression categories and chi-squared tests were used to determine statistical significance for all categorical variables (gender, race/ethnicity, duration of homelessness, illicit drug use, Lubben Social Network score, and criminal history) with depression categories. The main exposure variable (violent criminal history) was included in all models as well.

Finally, adjusted multivariable logistic regression models were fit to test the association between post-traumatic stress disorder and generalized anxiety disorder. These models included all covariates that were significant in bivariate analyses. These covariates included for adjustment are race/ethncity (White/Non-Hispanic as reference group, Black/Non-Hispanic, Other/More than one, and Hispanic), years of homelessness (< 2 years of homelessness used as a reference group), and illicit drug use within 90 days prior to interview (no reported drug use was used as the reference group).. The main exposure variable (violent criminal history) was included in all models as well. Additionally, an adjusted multinomial model was fit to include all significant covariates from bivariate analyses. All analyses were performed using Stata 16 (College Station, TX).

Results

A description of the study sample is provided in Table 1. Of the 230 recently incarcerated adults experiencing homelessness included in this study, 194 (84%) were male. The average age of participants was 41 years (SD=11). The majority of participants, 131 (57%), identified as non-Hispanic White, 45 (20%) identified as non-Hispanic Black, 25 (11%) identified as non-Hispanic Other or more than one race, and 29 (13%) identified as Hispanic. More than one hundred (109; 47%) participants were homeless for two years or more. Two-thirds (157 or 68%) of participants obtained a high school diploma or GED, and one-third (31%) of participants reported using one or more illicit substances within 90 days prior to entering the study. A large portion of participants scored positively from the Lubben Social Network Scale for being at-risk for social isolation. There were 103 (45%) of participants that reported any violent criminal history.

Table 1. Sample description of recently incarcerated adults between March 2018 and December 2019 in Dallas County, (n=230)

	N (%) or Mean (SD)[1]
Demographics	
Age (mean (SD))	41 (11)
Gender, male (N (%))	194 (84)
Race (N (%))	
White, Non-Hispanic	131 (57)
Black, Non-Hispanic	45 (20)
Other/More than one	25 (11)
Hispanic	29 (13)
≥ 2 Years Experiencing Homelessness (N (%))	109 (47)
Completed High School Diploma/GED (N (%))	157 (68)
Used one or more illicit substance in past 90 days (N (%))	71 (31)
At risk for social isolation[2] (N (%))	172 (74)
Violent Criminal History (N (%))	103 (45)
Mental Health	
Probable Post-Traumatic Stress Disorder (N (%))	106 (46)
Probable Generalized Anxiety Disorder (N (%))	80 (35)
PHQ-8 Depression Scale Scoring (N (%))	
No probable depression, 0-4	74 (32)
Mild probable depression, 5-10	69 (30)
Moderate probable depression, 11-15	46 (20)
Moderate-severe or severe probable depression, 16-24	41 (18)

[1]Mean, SD (Standard Deviation) used for normal continuous variables
[2]Positive Lubben Social Network Scale Score delineates participant is at-risk for social isolation
PHQ-8 = Patient Health Questionnaire 8 Depression Scoring

In terms of mental health, 106 (46%) screened positive for probable post-traumatic stress disorder and 80 (36%) screened positive for probable generalized anxiety disorder. Additionally, 74 (32%) screened in the 'normal' range for depression, 69 (30%) screened as having mild probable depression, 46 (20%) screened positive for moderate probable depression, and finally 41 (18%) screened positive for moderate-severe or severe probable depression.

Table 2A. Bivariate analysis of demographics and post-traumatic stress disorder scores among recently incarcerated adults between March 2018 and December 2019 in Dallas County, (n=230)

	Screened Negative N (%) (n= 124)	**Screened Positive N (%) (n= 106)**	***p*-value[1]**
Demographics			
Age	42 (1.0)	39 (1.0)	0.041*
Gender, male (N (%))	109 (88)	85 (80)	0.108
Race (N (%))			0.382
White, Non-Hispanic	22 (18)	23 (22)	
Black, Non-Hispanic	77 (62)	54 (51)	
Other/More than one	11 (9)	14 (13)	
Hispanic	14 (11)	15 (14)	
≥ 2 Years Experiencing Homelessness (N (%))	71 (57)	38 (35)	<0.001***
Completed High School Diploma/GED (N (%))	84 (68)	73 (69)	0.855
Used one or more illicit substance in past 90 days (N (%))	27 (22)	44 (42)	0.001***
At risk for social isolation[2] (N (%))	91 (73)	81 (76)	0.598
Violent Criminal History (N (%))	65 (50)	41 (39)	0.085

*p-value<0.05; **p-value<0.01; ***p-value<0.001
[1]Chi-squared value used for variables with categorical output; P-value from t-test used for variables with continuous output
[2]Positive Lubben Social Network Scale Score delineates participant is at-risk for social isolation
SD= Standard Deviation

Bivariate analyses assessing the association between violent criminal history and covariates with post-traumatic stress disorder scores from the Primary Care Post-Traumatic Stress Disorder-4 screening results can be found in Table 2A. Age was significantly associated with post-traumatic stress disorder screening result (p=0.041), with older participants more likely to screen negative. However, gender, race/ethnicity, social support, and educational attainment were not significantly associated with post-traumatic stress disorder. A significant relationship between increased duration of homelessness and PTSD status was also detected, with those who were homeless longer than two years more likely to screen negative for PTSD. Participants who screened positive for PTSD were significantly more likely to report having used one or more

illicit drugs in the 90 days prior to entering the study (p=0.001). Violent criminal history was not significantly associated with post-traumatic stress disorder (p=0.085) positive screens.

Table 2B. Bivariate analysis of demographics and generalized anxiety disorder scores among recently incarcerated adults between March 2018 and December 2019 in Dallas County, (n=230)

	Screened Negative N (%) (n= 150)	**Screened Positive N (%) (n= 180)**	***p*-value[1]**
Demographics			
Age (mean (SD))	41 (0.93)	39 (1.1)	0.090
Gender, male (N (%))	130 (87)	64 (80)	0.185
Race (N (%))			0.029*
White, Non-Hispanic	90 (14)	41 (30)	
Black, Non-Hispanic	21 (60)	24 (51)	
Other/More than one	19 (13)	6 (8)	
Hispanic	20 (13)	9 (11)	
≥ 2 Years Experiencing Homelessness (N (%))	79 (53)	30 (38)	0.028*
Completed High School Diploma/GED (N (%))	107 (71)	50 (63)	0.170
Used one or more illicit substance in past 90 days (N (%))	32 (21)	39 (49)	0.001***
At risk for social isolation[2] (N (%))	116 (77)	56 (70)	0.223
Violent Criminal History (N (%))	72 (70)	31 (30)	0.179

*p-value<0.05; **p-value<0.01; ***p-value<0.001
[1]Chi-squared value used for variables with categorical output; P-value from t-test used for variables with continuous output
[2]Positive Lubben Social Network Scale Score delineates participant is at-risk for social isolation
SD= Standard Deviation

The bivariate analyses assessing the association between violent criminal history and covariates with generalized anxiety disorder scores from the Generalized Anxiety Disorder-7 screening results are found in Table 2B. There was no significant bivariate relationship found between age, educational attainment, or social support and generalized anxiety disorder. However, race/ethnicity was found to be statistically significant with generalized anxiety disorder (p=0.029); more Non-Hispanic Black participants screening for generalized anxiety disorder (53%) as opposed to those that screened negative (47%). Additionally, participants that had experienced greater than or equal to 2 years of homelessness were found to be significantly

associated with positive generalized anxiety disorder screening. Additionally, participants that reported to using illicit drugs 90 days prior to entering the study were more likely to screen positive for generalized anxiety disorder (p=0.001). Violent criminal history was also not found to be significantly associated with generalized anxiety disorder positive screening (p=0.179).

Table 2C. Bivariate analysis of demographics and probable depression scores from PHQ-8 screening among risk factors in recently incarcerated homeless adults, (n=230)

	Normal (n=74)	**Mild (n= 69)**	**Moderate (n= 46)**	**Moderate-Severe (n= 41)**	***p*-value[1]**
Demographics					
Age (mean (SD))	40 (11)	41 (12)	39 (10)	41 (11)	0.941
Gender, male (N (%))	65 (88)	60 (87)	38 (83)	31 (76)	0.093
Race (N (%))					0.218
White, Non-Hispanic	11 (15)	9 (13)	13 (28)	12 (29)	
Black, Non-Hispanic	45 (61)	42 (61)	21 (46)	23 (56)	
Other/More than one	8 (11)	9 (13)	7 (15)	1 (2)	
Hispanic	13 (10)	9 (13)	5 (11)	5 (12)	
≥ 2 Years Experiencing Homelessness (N (%))	44 (59)	28 (41)	20 (43)	17 (41)	0.091
Completed High School Diploma/GED (N (%))	54 (73)	49 (71)	27 (59)	27 (66)	0.384
Used one or more illicit substance in past 90 days (N (%))	14 (19)	19 (27)	19 (41)	19 (46)	0.007**
At risk for social isolation[2] (N (%))	57 (77)	54 (78)	30 (65)	31 (76)	0.409
Violent Criminal History (N (%))	38 (51)	27 (39)	18 (39)	20 (49)	0.385

*p-value<0.05; **p-value<0.01; ***p-value<0.001
[1]ANOVA test was used for continuous variables to determine F-statistic; Chi-Sqared test used for categorical variables to determine p-value; Fischer's Exact test used for categorical variables with cell sizes less than 5 to determine p-value
[2]Positive Lubben Social Network Scale Score delineates participant is at-risk for social isolation
PHQ-8=Patient Health Questionnaire-8
SD= Standard Deviation

The bivariate analyses assessing relationship between violent criminal history and covariates with depression scores from Patient Health Questionnaire-8 screening can be found in Table 2C. Age, gender, educational attainment, and social networks were not significantly associated with depression screening. However, race/ethnicity was found to be statistically significant with depression (p=0.028). The use of one or more illicit substances was found to have the highest significant association with positive depression scoring (p=0.001). Additionally,

although not statistically significant, participants that reported experiencing homelessness longer than two years were more likely to score higher for depression (p=0.029) as compared to those that experienced homelessness for less than two years. Violent criminal history was not significantly associated with positive depression scores (p=0.179).

Table 3. Unadjusted logistic regression analysis testing the association between risk factors on mental health disorders among recently incarcerated homeless adults, (n= 230)

	Post-Traumatic Stress Disorder OR [95% CI]	**Generalized Anxiety Disorder** OR [95% CI]
Demographics		
Age	0.98 [0.96-1.00]	0.98 [0.96-1.01]
Race		
White, Non-Hispanic	Ref	Ref
Black, Non-Hispanic	0.67 [0.34-1.32]	0.40 [0.20-0.80]***
Other/More than one	1.22 [0.46-3.25]	0.28 [0.09- 0.82]**
Hispanic	1.02 [0.40-2.61]	0.39 [0.15-1.05]
Years Homeless		
<2 Years	Ref	Ref
≥2 Years	0.42 [0.24-0.71]***	0.54 [0.31-0.94]**
Illicit Drug Use within the Past 90 Days		
No	Ref	Ref
Yes	2.55 [1.43-4.53]***	3.51 [1.94-6.31]***
Criminal History		
Non-Violent	Ref	Ref
Violent	0.63 [0.37-1.07]	0.69 [0.39-1.19]

*p-value<0.05; **p-value<0.01; ***p-value<0.001
OR= Odds Ratio; CI= Confidence Interval

Table 3 details the unadjusted relationship between violent criminal history, covariates and post-traumatic stress disorder and generalized anxiety disorder. Any covariates that were not associated with PTSD or GAD in the initial bivariate models were excluded from further analysis to maximize statistical power. These models suggest that non-Hispanic Black, Other/Multi-

racial, and Hispanic individuals were significantly less likely to screen positive for probable anxiety compared to non-Hispanic Whites. Participants who were homeless for two years or more were 58% less likely to screen positive for probable PTSD (OR= 0.42; 95% CI= 0.24, 0.71) and 45% less likely to screen positive for an anxiety disorder to compared to those who were homeless for less than two years (OR = 0.54; 95% CI= 0.31, 0.94). The odds of having post-traumatic stress disorder were 2.55 times higher (95% CI= 1.43, 4.53) among those that report illicit drug use compared to those with no illicit drug use in the 90 days prior to the interview. Results also suggested that the odds of screening positive for generalized anxiety disorder were 3.51 times higher (95% CI= 1.94, 6.31) among those that report illicit drug use of having compared to those with no illicit drug use in the 90 days prior to the interview.

Table 4. Unadjusted multinomial logistic regression examining probable depression score severity from PHQ-8 screening among risk factors in recently incarcerated homeless adults, (n= 230)[1]

	Mild (n= 69)	**Moderate (n= 46)**	**Moderate-Severe (n= 41)**
	RRR [95% CI]	RRR [95% CI]	RRR [95% CI]
Demographics			
Age	1.01 [0.98-1.04]	0.99 [0.95-1.02]	1.01 [0.97-1.04]
Race			
White, Non-Hispanic	Ref	Ref	Ref
Black, Non-Hispanic	1.14 [0.43-3.03]	0.39 [0.15-1.03]	0.47 [0.18-1.22]
Other/More than one	1.38 [0.38-5.03]	0.74 [0.20-2.70]	0.11 [0.01-.1.07]
Hispanic	1.10 [0.31-3.88]	0.42 [0.11-1.62]	0.46 [0.12-1.77]
Years Homeless			
>2 Years	Ref	Ref	Ref
≥2 Years	0.47 [0.24-0.91]**	0.52 [0.25-1.10]	0.48 [0.22-1.04]
Illicit Drug Use within the Past 90 Days			
No	Ref	Ref	Ref
Yes	1.63 [0.74-3.57]	3.02 [1.32-6.89]***	3.70 [1.59-8.62]***
Criminal History			
Non-Violent	Ref	Ref	Ref
Violent	0.61 [0.31-1.18]	0.61 [0.29-1.29]	0.90 [0.42-1.94]

*p-value<0.05; **p-value<0.01; ***p-value<0.001
PHQ-8=Patient Health Questionnaire-8
RRR= Relative Risk Ratio; CI= Confidence Interval
[1]Scores of 0-4 (n=74) were used as base outcome for multinomial logistic regression model

The unadjusted relationship between violent criminal history and covariates with depression can be found in Table 4. Any covariates that were not associated with depression in the initial bivariate model was excluded from further analysis to maximize statistical power. This model showed that age was not found to have a significant relationship with depression severity. Although not statistically significant, the odds for moderate depression were 61% less likely (RRR=0.39; 95% CI=0.15, 1.03) among non-Hispanic Black individuals compared to non-Hispanic White individuals. The likelihood of developing mild depression among participants

who were homeless for two years or more was 53% lower (RRR=0.47; 95% CI = 0.24, 0.91) compared to those that were homeless for less than two years. Results also suggested that the rate of screening positive for moderate depression was three times higher (RRR=3.02; 95% CI= 1.32, 6.89) among those that reported illicit drug use compared with those with no illicit drug use in the 90 days prior to the interview. Similarly, the results suggested that the risk of screening for moderate-severe or severe depression was 3.70 times higher (95% CI=1.59, 8.62) for those who reported illicit drug use compared with those that did not use illicit drugs 90 days prior to the interview. Violent crime was not found to have a significant relationship with mild (RRR=0.61; 95% CI=0.31, 1.18), moderate (RRR=0.61; 95% CI=0.29, 1.29), and moderate-severe/severe (RRR=0.90; 95% CI=0.42, 1.94) depression.

Table 5. Adjusted multivariate logistic regression analysis testing the association between violent criminal history and mental health disorders among recently incarcerated homeless adults, (n= 230)

	Post-Traumatic Stress Disorder AOR [95% CI]	**Generalized Anxiety Disorder** AOR [95% CI]
Demographics		
Race		
White, Non-Hispanic	Ref	Ref
Black, Non-Hispanic	0.57 [0.28-1.20]	0.33 [0.16-0.71]**
Other/More than one	1.23 [0.43-3.53]	0.26 [0.08-0.83]*
Hispanic	0.95 [0.35-2.57]	0.36 [0.13-1.04]
Years Homeless		
<2 Years	Ref	Ref
≥2 Years	0.40 [0.23-0.71]**	0.46 [0.25-0.84]**
Illicit Drug Use within the Past 90 Days		
No	Ref	Ref
Yes	2.58 [1.41-4.73]**	3.23 [1.75-5.97]***
Criminal History		
Non-Violent	Ref	Ref
Violent	0.64 [0.37-1.13]	0.70 [0.38-1.27]

*p-value<0.05; **p-value<0.01; ***p-value<0.001
AOR= Adjusted Odds Ratio; CI= Confidence Interval

The relationship between violent criminal history and probable post-traumatic stress disorder and probable generalized anxiety disorder, adjusted for covariates significant in bivariate analyses can be found in Table 5. Results from the fully adjusted model suggests that longer duration of homelessness (2+ years; AOR=0.40; 95% 0.23, 0.71) was associated with 60% lower odds of a PTSD positive screen. Illicit drug use in the past 90 days was associated with a 150% increase in the odds of screening positive for post-traumatic stress disorder (AOR=2.58; 95% CI=1.41, 4.73). No association between violent criminal history and positive PTSD screens were detected.

For generalized anxiety disorder, all racial and ethnic groups had significantly reduced odds of a generalized anxiety positive screen compared to Whites. Longer duration of homelessness (2+ years; AOR= 0.46; 95% 0.25, 0.84) was associated with 54% lower odds of a PTSD positive screen, and those who used illicit drugs in the 90 days prior to the interview had more than three times the odds of a positive GAD screen compared to Whites (AOR=3.23; 95% CI=1.75, 5.97). Violent criminal history was not significantly associated with probable generalized anxiety disorder (AOR=0.70; 95% CI=0.38, 1.27) in adjusted models.

Table 6. Adjusted multinomial logistic regression examining probable depression score severity from PHQ-8 screening among risk factors in recently incarcerated homeless adults, (n= 230)[1]

	Mild (n= 69)	**Moderate (n= 46)**	**Moderate-Severe (n= 41)**
	RRR [95% CI]	RRR [95% CI]	RRR [95% CI]
Demographics			
Race			
White, Non-Hispanic	Ref	Ref	Ref
Black, Non-Hispanic	0.99 [0.37-2.72]	0.35 [0.13-0.96]*	0.41 [0.15-1.12]
Other/More than one	1.26 [0.33-4.81]	0.75 [0.19-2.93]	0.11 [0.01-1.10]
Hispanic	0.91 [0.25-3.32]	0.39 [0.10-1.58]	0.46 [0.11-1.88]
Years Homeless			
> 2 Years	Ref	Ref	Ref
≥ 2 Years	0.48 [0.24-0.95]*	0.48 [0.22-1.05]	0.43 [0.19-0.98]*
Illicit Drug Use within the Past 90 Days			
No	Ref	Ref	Ref
Yes	1.56 [0.70-3.49]	2.85 [1.22-6.69]**	3.31 [1.39-7.88]**
Criminal History			
Non-Violent	Ref	Ref	Ref
Violent	0.60 [0.30-1.19]	0.61 [0.28-1.34]	0.96 [0.43-2.14]

*p-value<0.05; **p-value<0.01; ***p-value<0.001
PHQ-8=Patient Health Questionnaire-8
RRR= Relative Risk Ratio; CI= Confidence Interval
[1]Scores of 0-4 (n=74) were used as base outcome for multinomial logistic regression model

Adjusted regression models examining the association between probable depression and violent criminal history when adjusting for relevant covariates can be found in Table 6. Participants identifying as non-Hispanic, Black had 65% lower odds of screening positive for probable moderate depression (RRR=0.35; 95% CI=0.13, 0.96), compared to those identifying as non-Hispanic, White after controlling for relevant covariates. Also, among those with 2 or more years experiencing homelessness were found to have 52% lower odds (RRR=0.48; 95% CI= 0.24, 0.95) of screening positive for mild depression than those with less than 2 years experiencing homelessness, after adjusting for significant covariates. Additionally, those with 2 or more years experiencing homelessness were found to have 57% lower odds (RRR=0.43; 95% CI= 0.19, 0.98) of screening positive for moderate to severe depression than those with less than 2 years experiencing homelessness, after adjusting for significant covariates. There was found among those reporting illicit drug use to have 2.85 increased odds (95% CI= 1.22, 6.69) of screening positive for mild depression than those with less than 2 years experiencing homelessness, after adjusting for significant covariates. However, the association between violent criminal history and probable depression at level of severity was not statistically significant after adjusting for significant covariates.

Discussion

This study explored the association between violent criminal history and mental health symptoms among recently incarcerated homeless adults in Dallas, Texas. We hypothesized that there was an association between incarceration and positive mental health screenings while adjusting for significant covariates. Specifically, we expected there to be significant relationships between violent criminal history and positive mental health screenings among post-traumatic stress disorder, generalized anxiety disorder, and depression. Our findings provided some support in terms of significant relationships between covariates, such as race/ethnicity, length of homelessness, and illicit drug use 90 days prior to entering the study. The prevalence of violent criminal history and positive mental health screenings had consisted of 39% of all participants with violent criminal history screened positive for post-traumatic stress disorder, 30% of participants with violent criminal history screened positive for generalized anxiety. This prevalence rate of violent criminal history and positive mental health screenings is supportive of previous research finding similar relationships among homeless adults with violent criminal history and mental health diagnoses of post-traumatic stress disorder and generalized anxiety disorder compared to participants with no violent criminal history (Deck & Platt, 2015; Miller, 2012). Despite this prevalence, there was no evidence of a statistically significant direct relationship between violent criminal history and positive mental health screenings. Recent similar studies have found similar results, showing no significant relationship between violent criminal history and positive mental health screenings (Alevizopoulos & Igoumenou, 2016;) This is an important finding from our study as it contributes to counteracting stigma that violence is attributed to adverse mental health conditions (Mcginty, Goldman, Pescosolido, & Barry, 2018; Torrey, 2012).

This study detected a discrepancy between race/ethnicity, and mental health of people who were recently released from jail. For example, non-Hispanic, Black participants had lower rates of positive mental health screenings for post-traumatic stress disorder and generalized anxiety disorder compared to non-Hispanic, White participants. Additionally, increased severity of depression was less likely for non-Hispanic, Black participants than non-Hispanic, White participants. Research into the intersection of mental health symptomology and racial/ethnic disparities have reported similar results, particularly among samples with majority of participants identifying as males (Appel, Stephens, Shadravan, Key, & Ochoa, 2020; Prins, Osher, Steadman, Robbins, & Case, 2019). Since the majority of the sample was male, findings from previous studies additionally support these results of non-Hispanic, Black males reporting negative for mental health screenings among depression, anxiety disorders, and post-traumatic stress disorder due to increased stigma towards mental health acknowledgement leading to decreased reporting of mental health symptoms (Appel, et al., 2020; Hahm et al., 2015; Cook, Trinh, Li, Hou, & Progovac, 2017).

Among significant covariates found in association with mental health, the duration of homelessness was highly relevant. The results from this study showed the longer an individual was homeless (two years or greater), they were less likely to be screened positive for all mental health screenings as compared with individuals with shorter duration of homelessness (less than two years). A possible explanation could be a result of increased exposure to social services provided by the homeless shelter located at the study site, The Bridge Homeless Recovery Center. As stated in the inclusion criteria for entry into the present study, participants must have been enrolled in The Bridge Homeless Recovery Center program, meaning they must be in contact with a social worker at the time study enrollment. There is evidence in existing literature

examining staying or having repeated exposure to homeless shelter social care services, such as access to personal hygiene services, nutrition, and access to medical services, compared to homeless adults staying in public locations outside with less exposure to homeless shelter social care services, showing significant decrease in mental health positive screenings (Cockersell, 2011; Fischer, Shinn, Shrout, & Tsemberis, 2008; Stergiopoulus & Rouleau, 2007). These results highlight the increased need for collaborative care services found at homeless shelters (Parsell, Have, Denton, & Walter, 2018; Stergiopoulus & Rouleau, 2007). This is an important finding and emphasizes the need for additional analyses to examine the impact of homeless shelter social care services and mental health.

Furthermore, the rate of illicit drug use 90 days prior to entering the present study (31%) was nearly double that of the Texas state average previously noted (Substance Abuse and Mental Health Services Administration [SAMHSA], 2015). Overall, there was found to be a strong relationship between illicit drug use 90 days prior to entering the study and positive mental health screenings for post-traumatic stress disorder, generalized anxiety disorder, and depression. This overall association between illicit drug use and mental health symptomology has been reported in prior studies among incarcerated populations, particularly for post-traumatic stress disorder (Barrett, Teesson, & Mills, 2014; Kim, Ford, Howard, & Bradford, 2010). Results from similar studies showed individuals with recent illicit drug use were almost three times more likely to screen positive for post-traumatic stress disorder, compared to those with no illicit drug use, and two times more likely to screen positive for generalized anxiety disorder, compared to those with no recent illicit drug use (Narvaez et al., 2014; Fovet et al., 2020). Additionally, consistent with the literature on adults experiencing homelessness (Coohey & Easton, 2016; Thompson, Mcmanus, & Voss, 2006), the present study also found an increased association

among illicit drug use and increasing severity of depression compared to homeless individuals reporting no illicit drug use. Reasonings as to why increased positive mental health screenings among those reporting recent illicit drug use (90 days prior) compared to those not reporting illicit drug use (90 days prior), can be attributed to the effects of drug intoxication or withdrawal exacerbates and mirrors positive mental health symptoms, such as depression and stress (Kessler et al., 2012; Narvaez et al., 2014). Additionally, since this study was examining participants recently released from jail as inclusion criteria for entering the study, a higher percentage could be attributed to the nature of illicit substance abuse and increased encounters with criminal justice system due to the legality of illicit drug use and elevated risk of recidivism (Clark, Dolan, & Farabee, 2017; Prendergast, McCollister, & Warda, 2017; Fovet et al., 2020).

Research on mental health and homelessness is critical for several reasons. As previous literature has shown, social stigma towards persons with mental health conditions are misplaced and exacerbate the notion of violence (Choe, Teplin, & Abram, 2008). The implications of this research show the importance of assessment for substance use disorders and housing stability with potential linkages to treatment for homeless adults in jails. Future research is needed to establish a clear temporal relationship between criminal history and mental health to determine effects of incarceration, especially through housing. Individuals with felony convictions often face housing restrictions due to criminal justice involvement (Keene, Rosenberg, Schlesinger, Guo, & Blankenship, 2017). Additionally, future studies should include more females in order to assess the differential experiences of men and women who are homeless, and how criminal histories of varying types impact mental health symptoms. It is also important to highlight including co-occurring mental health disorders when paired with criminal history to gain a clearer understanding of specific treatment needs, such as encouraging dispersion towards

community based treatment, utilization of specialty diversion courts, and increasing collaborative care amongst homeless adults, in decreasing mass incarceration (Cloud, Parsons, & Delany-Brumsey, 2014; Gicquelais, et. al., 2019).

Limitations

Results from this study should be interpreted in light of several limitations. The sample was based in one city (Dallas, Texas) where study participants were required to speak/read/write in English, visit a single homeless shelter, have access to a care manager, and read at the 7th grade level or above, thus limiting the generalizability of the results to other shelters and homeless populations. Further, most participants were male as well (n= 194), limiting generalizability to primarily male homeless populations in Dallas. However, this is comparable to national data showing that 71% of individuals experiencing homelessness are male in Texas (Janosko & Homelessness Research Institute, 2019). Additionally, all data were self-reported by those participating in the study, causing reliability biases among participants' responses. Finally, as this was a cross-sectional study, no temporality can be established between criminal history and mental health.

Strengths

This study had several strengths. First, the specificity of the study sample is unique in that the population consisted of adults experiencing both homelessness and recent incarceration not commonly studied in tandem. Previous literature utilizing self-reporting methods among a similar population of recently incarcerates homeless adults resulted in the same conclusion of no violent criminal history among positive mental health screenings (Clark & Flatley, 2019). This

study also included diverse measures to examine social connectivity among adults experiencing homelessness, which may influence criminal history and mental health.

Conclusion

The findings from this study have several implications for public health and vulnerable populations within the criminal justice system. These results suggest that there was no difference between those with violent criminal history and positive screenings for mental health disorders among post-traumatic stress disorder, generalized anxiety disorder, and depression, therefore contributing to the rhetoric of unjust prejudice against those with adverse mental health conditions and a propensity for violent crime. Illicit drug use was highly significant with all positive mental health screenings. It could be avertable if policymakers utilize specialty court diversion programs to facilitate proper mental health treatment for those reporting illicit drug use. However, results also showed the longer the length of homelessness, the less likely of screening positive for mental health symptoms suggesting the need for increased collaborative care and further research into the efficacy of homeless shelter social care services. Those involved with the criminal justice system, such as lawmakers and judicial officials, should take these results into consideration when sentencing homeless adults to better facilitate transition upon release. This research represents an important first step toward developing informative treatment plans for those incarcerated, such as increased mental health treatment and improved collaborative care to further prevent adverse mental health conditions upon release.

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