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PATTERNS OF SUBSTANCE USE DISORDERS AND MENTAL HEALTH
SYMPTOMS AMONG INCARCERATED PEOPLE ENGAGED IN A NOVEL
TREATMENT PROGRAM

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ABSTRACT

The United States has one of the highest incarceration rates worldwide, with most incarcerated people experiencing substance use disorders and co-occurring mental health symptoms. Treatment for co-occurring disorders in incarcerated populations reduces reincarceration rates and substance use and increases support for successful community reintegration. However, many people in correctional settings experience significant barriers to receiving evidence-based treatment for co-occurring substance use and mental illness. Few studies have examined the rates of co-occurrence in incarcerated samples, information that can inform treatment efforts. Federal detainees are a group of people incarcerated who are completely underrepresented in the literature and face even more barriers than state and local inmates when attempting to access treatment. The current defense reviews the literature on the co-occurrence of substance use disorders and mental health symptoms in incarcerated individuals and the treatments empirically studied in this population. A novel treatment developed for the co-occurrence of substance use disorders and mental health symptoms for federally detained people is described. Additionally, a series of statistical analyses were performed to examine the patterns of co-occurring substance use disorders and mental health symptoms in a sample of 192 federally detained people (men and women) to inform treatment. Findings indicated that federally detained people are a unique population, different than other incarcerated populations. Federally detained people reported using opioids, cannabis, and cocaine more than other drugs. They reported low rates of mental health symptoms, with the exception of those with a severe cannabis use disorder. Based on the findings identified in this study, federally detained people with a severe cannabis use disorder would most benefit from co-occurring substance use and mental health treatment.

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CHAPTER 1: INTRODUCTION

The United States incarcerates people at a higher rate than any other developed country (The Sentencing Project, 2020). Drug-related crimes are associated with one-third of non-violent crimes, resulting in incarceration at both the state and federal levels (Sawyer & Wagner, 2020). An additional 18% of people incarcerated and sentenced for other crimes report committing their crimes to obtain money for drugs (Mumola & Karberg, 2006). Rates of substance use disorders (SUDs) are substantially higher among incarcerated individuals than those in the community. For example, in contrast to the estimates of nine percent of non-institutionalized US adults who meet the criteria for an SUD (Substance Abuse and Mental Health Services Administration [SAMHSA], 2020), up to 63% of people incarcerated in the United States have an SUD (Bronson et al., 2017). Of those incarcerated with an SUD, 75% struggle with co-occurring clinical levels of mental health symptoms (James & Glaze, 2006). Evidence-based treatments (EBTs) implemented during incarceration, including those focused solely on SUD treatment and those that incorporate treatment for both SUD and co-occurring mental health disorders, have a substantial, positive impact on individuals during incarceration and after they are released into the community (e.g., Evans et al., 2011; Peters et al., 2004). However, most incarcerated people do not receive treatment despite the high rates of SUD and co-occurring disorders (Chandler et al., 2004; De Andrade et al., 2018).

Federal detainees are a unique group of incarcerated people who face more significant barriers to receiving EBT than other incarcerated individuals. Federal detainees are individuals confined in a local correctional facility and charged with a federal crime. Federal detainees are awaiting trial, sentencing, or transfer to a federal

facility (US Department of Justice, 2020). Approximately 25% of federal detainees are released into the community following a sentence of community supervision or a suspended prison sentence (Motivans, 2019). To date, there have been no peer-reviewed, empirical articles published that focus on the mental health or substance use needs of federal detainees.

The current defense aims to further our understanding of the symptoms associated with SUD and co-occurring mental health challenges to inform treatment efforts in a sample of federal detainees who volunteered to participate in a novel treatment explicitly designed to address the needs of this population. First, I will discuss the role of substance use on mass incarceration in the United States. I will then review the empirical literature addressing SUD rates and co-occurring mental illness in incarcerated people and differences between men and women. Next, I will describe current EBTs used in prison and jail settings, including the effectiveness of these programs and reported outcomes. I will explain how federal detainees differ from other incarcerated people on factors related to supervision, detention, and treatment needs and will introduce the development of a novel treatment approach for SUDs and co-occurring mental illness among federal detainees to address those differences. Finally, I will present empirical findings examining SUD rates and symptoms of mental illness among these individuals.

1.1. The Substance Use to Prison Pipeline

The United States leads the world with regard to incarceration rates, with a 500 percent increase in incarcerated individuals from 1985 to 2018 (The Sentencing Project, 2020). Most experts agree that the War on Drugs first declared by Nixon in 1972 and re-declared by Reagan is one major factor responsible for the drastic increase in

incarceration rates (Blumstein, 1998). The War on Drugs has fueled policy initiatives responsible for mandatory minimum sentences (Bush-Baskette, 2000), recidivism policies leading to life sentences (Stevenson, 2011), and probation violations associated with drug and alcohol use (Phelps, 2013). Drug crimes are responsible for approximately 20% of all incarcerated people in the United States (Sawyer & Wagner, 2020). Federally, 47% of people incarcerated are convicted of drug crimes, and 37% of federal detained individuals are held on charges associated with drugs (Carson, 2020; Sawyer & Wagner, 2020). Thus, the high prevalence of addiction and mental health symptoms in US correctional facilities is rooted in the legal history of targeting drug use.

Despite this punitive approach attempting to reduce drug use in communities, these efforts do not appear to serve as a deterrent for use. Current estimates of illicit substance use are generally similar to those in the 1980s and heroin use rates have more than doubled since then (Office of National Drug Control Policy, 2020). Deaths attributed to drug overdoses increased exponentially as a result (Hedegaard et al., 2020). These policies have been ineffective at managing substance use in our communities and appear to be responsible for problematic changes to the prison systems themselves.

For example, a consequence of these policy initiatives is that the US prison system now houses a population in which the majority appear to meet criteria for any SUD (combining both alcohol and illicit SUDs) (Bronson et al., 2017). In comparison to the rates of SUD in correctional facilities, five to nine percent of non-institutionalized adults in the US meet diagnostic criteria for an alcohol use disorder (AUD), and two to seven percent meet diagnostic criteria for an illicit SUD (SAMHSA, 2020). In recent years, the ongoing opioid epidemic has put additional strain on correctional facilities.

Without medication support when first incarcerated, individuals using opioids are often forced to go through a challenging and painful withdrawal and detoxification (Aronowitz & Laurent, 2016), resulting in an increased risk of long-term harm from opioids (Brinkley-Rubinstein et al., 2018). In working towards a rehabilitative goal with individuals incarcerated, it is necessary to fully understand the types of SUDs and other mental illnesses these individuals are struggling with to inform treatment efforts.

1.2. Substance Use Disorders and Co-Occurring Mental Illness in Incarcerated Individuals

Prevalence rates of SUDs among incarcerated people are difficult to determine due to a lack of consistent and comprehensive assessment, as is conducted regularly by SAMHSA for community samples nationally. The most recent reports assessing substance use trends among incarcerated people occurred over ten years ago and estimated that up to 63% of people incarcerated were experiencing any SUD (Bronson et al., 2017). More recent studies in correctional facilities have had serious design limitations, such as small and non-representative samples (e.g., Proctor et al., 2019) and merging all illicit drug use into a single category as is asked in the Drug and Alcohol Screening Tool (DAST-10) that asks broadly about “any nonmedical use of drugs” defining “drugs” in an all-inclusive way (Skinner, 1982). To overcome these barriers in the literature, researchers will further collapse descriptions of all illicit drug use into a single category to make for simpler comparisons and extrapolations when describing and summarizing existing findings (e.g., Fazel et al., 2017). Studies that examine the rates of only one specific substance can cause further misunderstanding or underreporting of substance use rates among incarcerated individuals when combined and generalized in this way

(Proctor et al., 2019). Ultimately, these strategies omit valuable information and are problematic in better understanding nuances about this population that are imperative for informing treatment.

Age trends of rates of SUD appear to also differ among incarcerated individuals than is observed in the community. In incarcerated settings, age does not appear to predict rates of SUDs until individuals reach 55 and older, when rates of SUD significantly decline (Bronson et al., 2017). In the community, young adults (18 to 25 years of age) reported significantly higher rates of SUDs than all other age groups, though this gap was no longer significant in more recent years, and there were no significant differences between ages greater than 26 years (SAMHSA, 2020). However, it is impossible to compare these two data sets to determine if these are true differences between the samples as the incarcerated sample was collected from 2007 to 2009 and the community sample was collected from 2015 to 2019.

AUD is the most studied substance among incarcerated individuals and is estimated to be the most frequently observed SUD among those incarcerated. Studies report large ranges of reported AUD in incarcerated individuals, ranging from 10% to 74% (Fazel et al., 2017; Proctor et al., 2019). This wide range is indicative of reporting problems in the literature. One explanation for this wide range is gender differences. Incarcerated men are much more likely to report an AUD (estimates as high as 74%) than incarcerated women (estimates as high as 30%) (Fazel et al., 2017; Proctor et al., 2019). Other possible explanations are small sample sizes that are not truly representative of all incarcerated individuals (see Fazel et al., 2017) or the use of generalized screening tools that fail to accurately represent true prevalence rates of SUDs (Proctor et al., 2019).

These large discrepancies across studies among the most studied SUD in incarcerated individuals are representative of how little is actually known about this population.

Another problem in the literature is that there is a lack of recent studies examining a range of illicit SUDs in large samples representative of incarcerated individuals. Proctor and colleagues (2019) examined a range of SUDs in a small jail sample ($n = 200$). This study found that 87% of the sample experienced an SUD, and 65% of the sample experienced six or greater symptoms of an SUD, indicating a more severe presentation and worse prognosis than those with a mild to moderate SUD (Proctor et al., 2019). Of the illicit SUDs reported in this sample, they found that stimulant use disorder (43%) was the most prevalent, followed by cannabis use disorder (can-SUD; 39%), opioid use disorder (OUD; 31%), and cocaine use disorder (coc-SUD; 14%) (Proctor et al., 2019). These estimates are notably higher than the Bureau of Justice estimates in 2002 (Karberg & James, 2005) and may represent a trend of increasing SUDs among incarcerated individuals. Given the small sample size in only a jail setting, it is impossible to extrapolate the ways these findings can be generalized with all incarcerated individuals. Additionally, given the lack of studies examining prevalence rates and severity ratings of SUDs in a jail population, replication is needed to generalize these jail inmates' findings nationwide.

Mental health symptoms commonly co-occur with SUDs among people incarcerated in the United States. For example, it is estimated that up to 70% of all individuals incarcerated who meet diagnostic criteria for an SUD also report experiencing clinical levels of mental health symptoms such as anxiety, depression, or psychosis (Sung et al., 2010). Experiencing co-occurring substance use and mental illness is associated

with a worse prognosis (Bahorik et al., 2013). For those involved in the criminal justice symptom, this is associated with more disciplinary infractions during incarceration (Houser & Welsh, 2014), higher rates of recidivism and reincarceration (Messina et al., 2004), and difficulties with homelessness and lower rates of employment when returning to the community (Peters et al., 2008). Co-occurring substance use and mental illness are associated with difficulties accessing and engaging in EBT (Brady et al., 2004; Chandler et al., 2004). Drug and alcohol use are also known to exacerbate symptoms of mental illness (Drake & Brunette, 1998).

Important demographic factors may also contribute to the relationship between co-occurring SUD and mental health symptoms. Notably, significant gender differences in co-occurring disorders are observed with women experiencing more psychiatric comorbidity than men (Binswanger et al., 2011; Sung et al., 2010). Findings on specific differences between men and women indicate that incarcerated men are more likely to have symptoms associated with mania (Drapalski et al., 2009), whereas women are more likely to experience symptoms associated with depression, anxiety, and traumatic stress (Binswanger et al., 2011; Drapalski et al., 2009). Additionally, emerging and young adults report experiencing more SUDs and mental health symptoms than older adults (SAMHSA, 2020).

1.2.1. Patterns in Co-Occurring Disorders

In examining SUD rates and co-occurring mental illness, it appears likely that there is an association between the type of mental health symptoms and SUDs among incarcerated people. For example, studies have consistently found that depression symptoms are strongly associated with AUD (McHugh & Weiss, 2019). However, few

studies examine patterns of illicit SUDs across mental illnesses, and those that do often do not look at a range of mental illnesses with specificity. The studies that examine these patterns are typically in community or psychiatric populations. One study was identified that examined patterns of substance use in youth involved in the criminal justice system with psychotic symptoms (Degenhardt et al., 2015). Each study identified examining co-occurring SUD and mental illness is described in detail below.

Degenhardt and colleagues (2015) aimed to better understand the association between psychotic symptoms and substance use in criminally justice-involved youth. Data were collected from 515 girls and boys ages 13 to 21 who were serving a community-based or custodial sentence in Canada. They found that 13% of the total sample reported experiencing psychotic symptoms and that these symptoms were more commonly reported among girls than boys. Experiencing psychosis in this population was associated with daily cannabis and sedative use as compared to those who did not screen positive for psychosis. In addition, those experiencing psychosis were more likely to meet the criteria for amphetamine and sedative use disorder as measured by the Composite International Diagnostic Interview (Robins et al., 1988) than those who did not experience psychosis. There were no differences between groups on alcohol, cocaine, and opioid use.

Jones and McCance-Katz (2019) examined rates of co-occurring OUD and mental illness among a community sample of 170,300 adults who participated in the 2015 to 2017 National Surveys on Drug Use and Health conducted by SAMHSA. In this study, mental illness was dichotomized as any mental illness defined by any diagnosable mental disorder experienced in the past year as measured in the *DSM-IV*, and serious mental

illness defined as any diagnosable mental disorder in the past year that resulted in serious functional impairment. Jones and McCance-Katz (2019) found that among adults who met *DSM-IV* criteria for OUD, 64% reported experiencing any mental illness and 27% reported experiencing serious mental illness. Data is not presented with more specificity on the types of mental illness experienced by those with an OUD.

Dworkin and colleagues (2018) examined symptom profiles of post-traumatic stress disorder (PTSD) in 208 people participating in residential SUD treatment. All participants were screened for PTSD using the PTSD Checklist-Civilian Version (PCL-C; Weathers et al., 1993) and had a score greater than 44, indicating a high likelihood that they met *DSM-IV-TR* criteria for PTSD. They found that the types of symptoms experienced were associated with using different types of substances. Overall, avoidance symptoms were associated with AUD above and beyond other SUDs. Individuals with symptoms related to hypervigilance were much more likely to have a coc-SUD. In contrast, individuals with PTSD symptoms related to emotional detachment were more likely to have SUDs associated with sedatives, anxiolytics, and hypnotics.

Maremmani and colleagues (2017) examined patterns of substance use among 240 adults experiencing homelessness and diagnosed with either bipolar disorder or schizophrenia as outlined in the *DSM-IV*. They found that those diagnosed with bipolar disorder were much more likely than those diagnosed with schizophrenia to use illicit drugs. Specifically, those with bipolar disorder reported using cocaine, amphetamines, opiates, hallucinogens, and cannabinoids significantly more than those with schizophrenia. There were no differences between either group on alcohol use.

The remaining study used *DSM-III* diagnostic criteria in a sample of 801 psychiatric patients to examine gender differences and alcohol and cannabis use patterns (Bahorik et al., 2013). They found that men with depression were more likely to use alcohol. Men with bipolar disorder were more likely to use cannabis. Women with bipolar disorder were more likely to use alcohol. There were no differences in the type of mental illness for women's cannabis use, which was reportedly low in this sample.

In sum, patterns of SUDS and co-occurring mental illness have been understudied despite the potential implications of co-occurring substance use and mental illness for addressing integrated treatment needs. Additionally, studies assessing whether these patterns are consistent in offender populations may inform treatment efforts and improve treatment outcomes within a limited resource system.

1.3. Evidence-Based Treatments for Co-Occurring Substance Use Disorders and Mental Health Treatment in Correctional Settings

Though this defense does not assess treatment outcomes, one primary aim of this dissertation is to inform the ongoing treatment of substance use and co-occurring mental health disorders of federal detainees. Thus, below the evidence on existing treatments is reviewed to provide context for how findings from this dissertation could inform treatment.

In 2006, only 11% of incarcerated adults with an active SUD in the US received SUD treatment (National Center on Addiction and Substance Abuse, 2010). Even fewer incarcerated adults received treatment for SUD and co-occurring mental illness (Chandler et al., 2004). While there is empirical support for several treatments for co-occurring SUD and mental illness, barriers have hindered the adaptation of these treatments for

correctional facilities. For example, EBTs for SUDs may utilize contingency management incentives to increase participation and abstinence (Higgins et al., 2014). It is difficult to obtain approval for contingency management in correctional facilities because it directly contrasts with the punitive disciplinary style used in correctional settings (Chandler et al., 2004). Pharmacological treatments are considered best practices in treating an OUD and can increase treatment retention, reduce illicit opioid use, and reduce the risk of fatal overdoses (Moore et al., 2019). However, in traditional abstinence-only treatment approaches, many providers hold negative beliefs about using pharmacological treatments, viewing medication-assisted treatment as prolonging the addiction or rewarding people for being addicted to drugs (Matusow et al., 2013). Consequently, policies remain in correctional settings that serve as barriers to accessing pharmacological treatments during incarceration (Bruce et al., 2007; Matusow et al., 2013).

Furthermore, coordinated treatment for SUD and mental illness requires collaboration between professionals from different disciplines and programs. Programs with varying funding sources may increase the difficulty of coordinating these services (Peters & Bekman, 2007). Consequently, treatment for SUD and mental illness often occurs either sequentially by different treatment providers or occurs parallel to one another (Hills, 2000), a practice that can be confusing for clients, especially when providers utilize conflicting theoretical orientations (Chandler et al., 2004). As a result, sequential and parallel treatment models are less effective than integrated treatment models (Drake et al., 2008). Additionally, SUD treatment and aftercare support are often

the first programs to be downsized or removed during budget cuts, as these programs are not federally required (Peters & Bekman, 2007).

Despite these barriers, shifts in perceptions of the importance of mental health and addiction treatment in corrections and perseverance among providers have led to the adaptation of treatments for incarcerated individuals. In 2002, a national survey identified twenty specialized treatment programs across thirteen states for incarcerated individuals with co-occurring disorders (Peters et al., 2004). However, little research has been conducted testing the effectiveness of these treatment efforts, and none of these treatment programs focus on the needs of federal detainees, specifically. Since no studies examine federal detainees' treatment efforts, and few studies examining treatment for SUD and co-occurring mental illness were conducted in incarcerated settings, the following section summarizes EBTs examined in the literature in both a prison and a jail setting and their associated outcomes.

1.3.1. Prison

Prisons are correctional facilities for individuals sentenced to a period of one or more years. Because people serve longer sentences in a prison, prisons can group individuals based on treatment needs and risk level. The most successful EBTs for co-occurring SUD and mental illness have been in prisons (Chandler et al., 2004). Intense therapeutic communities that utilize evidence-based Cognitive Behavioral Therapy (CBT) strategies in which clients participate in treatment for the majority of their day for about a year through individual treatment, psychiatric support, group treatment, case management, and social support groups are cited as the gold-standard for treatment in a prison setting (Doyle et al., 2019). Brief CBT groups ranging in length from eight to

sixteen weeks have also been found to reduce symptoms of both SUD and symptoms of mental illness, including PTSD, depression, and anxiety (Lanza et al., 2014; Zlotnick et al., 2009). Acceptance and Commitment Therapy (ACT) has been studied less in a prison setting than CBT, though ACT groups have also been found to be associated with reductions in substance use and mental health symptoms (Lanza et al., 2014).

However, minimal research has evaluated the effectiveness of treatments for individuals with co-occurring SUD and mental illness in a prison setting (Woodhouse et al., 2016). To date, only five studies have examined outcomes associated with treatment for co-occurring SUD and mental illness in a prison. Of the minimal research that has been done, the best predictor of sustained treatment effects among those returning to the community were programs that offered wrap-around services, including both transition and after-care support (Messina et al., 2010; Sacks et al., 2004). In contrast to prisons, jails manage the needs of a more heterogeneous and transient population. Thus, treatment programs for co-occurring substance use and mental illness in a jail have different treatment goals than in prisons.

1.3.2. Jail

Jails manage the care for all individuals upon arrest while awaiting trial or serving short sentences. Consequently, the jail population is more fluid than in prison, with many more individuals cycling through a jail setting than is observed in a prison setting (Toman et al., 2018). This transient nature is associated with additional barriers to implementing evidence-based, integrated treatment for SUD and co-occurring mental illness in a jail setting (Chandler et al., 2004) and results in different treatment goals at the jail level than at the prison level (Peters & Bekman, 2007). In addition, jails are typically managed at

the local town or county level and are subject to more political pressure and limited budgets than state prisons (Taxman et al., 2007). These unique factors make providing treatment in jail settings more challenging than in a prison setting. In response to these barriers, the primary goals of jails are to meet the inmates' immediate and basic needs and provide short-term treatment while collaborating with community providers to enhance continuity of care after release into the community (Peters & Bekman, 2007). These barriers also impact the ability to conduct research within a jail setting resulting in only two studies that have examined treatment for co-occurring SUD and mental illness in a jail. In both studies, the programs described utilized assessments to match treatment modality to inmate needs and addressed substance use, mental health symptoms, and criminogenic needs in an integrated and multi-disciplinary team format (Miller et al., 2019; Rothbard et al., 2009). CBT principles were utilized to inform treatment during incarceration and case management informed transition and aftercare support.

Part of this defense focuses on describing the development of a novel treatment program for federal detainees. The above-described treatment studies provide valuable insight into components of EBTs beneficial to incorporate into a treatment program for federal detainees in a unified prison and jail setting.

1.4. Federal Detainees

Due to a lack of empirical studies, little is known about the unique needs of federal detainees. Federal detainees are individuals under the supervision of the US Marshals Service (USMS) and are in custody awaiting trial, sentencing, or transfer to a federal correctional facility (US Department of Justice, 2020). Federal detainees are charged with breaking federal law and are typically deemed too risky to await trial in the

community. The USMS contracts with local jails and prisons, private correctional facilities, and the Bureau of Prisons to house federal detainees (US Department of Justice, 2020). In addition to the previously discussed treatment barriers, federal detainees also face frequent transfers between facilities to manage population size in local facilities while awaiting trial or sentencing. The disruption in their mental health and medical care resulting from transfer leads to primary treatment efforts focusing only on stabilization and medication management without ongoing care.

Additionally, as a necessity to protect the facility and transport team's safety, correctional facilities rarely disclose when a detainee is being transferred. It is also typically unknown by the jail staff when or where the federal detainees will be transferred, as this is managed externally by the USMS. Importantly, EBTs are underutilized for federal detainees with co-occurring substance use and mental illness. Thus, there is a need to improve our understanding of drug use patterns and mental health symptoms among this vulnerable population. A better understanding of these patterns can inform the adaptation and use of EBTs for co-occurring substance use and mental illness. The current study addressed the drug use patterns and co-occurring mental health symptoms of federal detainees. A novel treatment to address the needs of federal detainees was conducted and is described below.

1.5. The Development of a Novel Treatment for Co-Occurring Substance Use and Mental Illness in Federal Detainees

At the request of the Federal Judiciary and Vermont's Department of Corrections, Vermont Psychological Services (VPS) developed the Vermont Correctional Addictions Treatment Program (VCAP). VPS is a training clinic for doctoral-level clinicians at the

University of Vermont. In developing the program, the goal was to address a gap in treatment services for federal detainees in a rural, New England correctional facility that operates as a unified prison and jail system. To better understand the unique needs of federal detainees, close collaboration was established between VPS and the Department of Corrections, the Federal Judiciary, US Probation services, and the USMS. The VCAP team developed a brief treatment protocol for federal detainees, utilizing evidence-based practices adapted for a correctional facility setting. Initially, treatment was implemented only in a male facility due to the higher need for services. There are significantly more men incarcerated as federal detainees. In this rural state's unified system, men have access to fewer treatment opportunities than the women held on federal charges. After implementation at the men's facility, services were later adapted for the women's facility.

The Early Recovery treatment protocol was designed specifically to consider federal detainees' fluid nature for both the group and individual treatments. Clinicians often found that clients were transferred to a different facility out of state after only one or two treatment sessions. To provide the best possible care, sessions needed to be impactful in a brief treatment format and not require additional follow-up support in the event of a client transfer. In line with best practices at the jail level (Peters & Bekman, 2007), the primary goal of treatment was to increase motivation for change and treatment participation. Motivational Interviewing (MI) is a brief, EBT that utilizes relationship and interviewing techniques to facilitate changes in behavior and has been found effective in treating SUDs and with individuals who are incarcerated (Miller & Rollnick, 2013; Stinson & Clark, 2017). MI was utilized from the initial intake appointment and throughout additional treatment sessions.

1.5.1. Early Recovery Treatment

The Early Recovery treatment protocol was designed to target symptoms of mental illness, SUD, and criminal behaviors and cognitions in a brief format: weekly one-hour sessions over eight to twelve weeks. Initial treatment efforts utilized the “Early Recovery Skills Group” as outlined by the *Matrix Model for Criminal Justice Settings* (Matrix Institute, 2014), an intense substance use treatment specifically for incarcerated people. Clinicians quickly observed through intake interviews and throughout treatment that many clients were struggling with symptoms of mental illness above and beyond substance use. In response, treatment was swiftly adapted to integrate treatment for substance use and mental health as outlined in best practices for treating co-occurring disorders (Hills, 2000). The Early Recovery treatment protocol was developed by incorporating aspects from The Matrix Model (Matrix Institute, 2014) with evidenced-based principles from CBT (Beck, 2011), ACT (Hayes et al., 2012), and MI (Miller & Rollnick, 2013). CBT has proven effective in treating a wide array of mental health disorders, including SUD (Beck, 2011), and has been successfully implemented in correctional settings (Chandler, 2004). ACT is a strength-based treatment approach that encourages psychological flexibility and emphasizes life's meaning through values-oriented actions (Hayes et al., 2012). Outcomes associated with using ACT in incarcerated individuals have been shown to have longer-lasting outcomes than CBT alone (Lanza et al., 2014).

The treatment protocol was flexible in that modules could be added, changed, or moved around to accommodate participant needs. Clinicians also incorporated additional modules (e.g., communication strategies) in response to client feedback and/or

assessments conducted throughout treatment. Assessment of substance use and cravings, mental health symptoms, and coping strategies occurred three times throughout the twelve weeks to inform treatment. All groups were closed groups in that new participants did not join the group after it started. The reason for closed groups was to help foster trust between the participants who were in an especially sensitive position with the courts due to their detainee status and allow clinicians to build on material from previous weeks. Client feedback was also strongly encouraged. At the end of each group or individual treatment session, participants were encouraged to describe something they liked from the session and something they were uncertain about or would change. They were encouraged to request topics they might want to be discussed during treatment. In the women's facility, Early Recovery was administered only in an individual setting due to fewer women federal detainees. Recommended treatment modules are described in detail.

1.5.1.1. Group Introduction and Introduction to the Cognitive Model.

Participants were encouraged to introduce themselves and discuss their treatment goals at the start of the first session. Facilitators then introduced the group's format, specifically the introduction, practice, and review of skills. Group members were encouraged to generate rules regarding group involvement to start a precedent of engagement and discussion while maintaining the "spirit" of MI. Facilitators always emphasized confidentiality and respect as essential rules.

To lay the groundwork for later skills, facilitators encouraged participants to explore the relationship between their thoughts, feelings, and behaviors (i.e., the cognitive model; Beck, 2011) regarding situations of the participant's choosing. In other words, these situations could be related to emotional distress, substance use, criminogenic

behaviors, or emotionally-neutral scenarios. Participants were asked to record an event from the week and document their associated thoughts, feelings, and behaviors as practice during the week.

1.5.1.2. Values Identification. This module was rooted in ACT principles and was introduced in this module with the philosophy carried throughout treatment. Facilitators supported participants in identifying the values important to them (e.g., family, children, friendships; Hayes et al., 2012) utilizing an MI approach. Values identification often led to a discussion of changes needed to live a values-oriented lifestyle. These themes were discussed throughout the treatment. Participants used a worksheet outside of the session to help them continue to identify and operationalize their values.

1.5.1.3. Decisional Balance. A group-led (or individual-led) decisional balance session helped participants explore ambivalence towards change and potential barriers to change while simultaneously leveraging motivation to change that aligns with their values (Miller & Rollnick, 2013). Participants were asked to identify both the pros and cons of continuing to use and the pros and cons of not using alcohol or drugs. Often, this activity was started in session and completed as participants practiced over the week.

1.5.1.4. Triggers Associated with Use. Drawn from The Matrix Model (Matrix Institute, 2014), participants identified triggers, both internal and external, associated with use. These are identified as “antecedents” to using, or using behaviors. Participants led discussions to support each other in identifying these triggers. They would also support each other in problem-solving strategies to avoid using substances when faced with these triggers.

1.5.1.5. Functional Analysis. This module continued to draw on the cognitive model and triggers associated with use. Participants were introduced to an in-depth method of analyzing their behavior (i.e., antecedent-behavior-consequence; Beck, 2011). Participants were encouraged to think through the contrasting outcomes associated with short-term reinforcement of the behavior (e.g., using drugs made the pain go away) and longer-term outcomes (e.g., using drugs resulted in a probation violation). Clients continued to practice functional analysis during the week using ongoing situations or examples from their past.

1.5.1.6. Cognitive Restructuring/Diffusion. Participants were introduced to the skills of identifying and challenging automatic thoughts that may be unhelpful and associated with distressing emotional states and/or harmful behaviors (Beck, 2011). This module was often divided into several sessions. Participants first practiced identifying their automatic thoughts and patterns associated with common cognitive distortions (e.g., all-or-nothing thinking; Beck, 2011). Participants were then introduced to challenging and restructuring these thoughts using Socratic questioning (Beck, 2011). For cognitions that were difficult to change or restructure, cognitive diffusion techniques were utilized (Hayes et al., 2012). Participants started to incorporate material learned over the course of several sessions into their practice outside of session using thought diaries to practice these skills.

1.5.1.7. Social Support. The importance of peer and family support was discussed, including the use of support groups such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA; Matrix Institute, 2014). Group-led discussions included problem-solving and identifying prosocial supports, especially when members of their

current support system served as triggers for using substances. Other discussions involved identifying ways to find support in a correctional facility.

1.5.1.8. Treatment Review and Certificates of Attendance. In the final session of the Early Recovery group, each topic was briefly reviewed by the facilitators drawing upon examples from the participants. Clients received a Certificate of Attendance to celebrate their hard work and were simultaneously encouraged to continue treatment through VCAP or with other providers after sentencing.

1.6. Study Aims

In this study, I examined rates of SUDs and mental health symptoms in a group of federal detainees who participated in a voluntary, brief treatment for substance use and co-occurring mental illness.

Aim 1: Examine the frequency of different types of SUDs and symptoms of mental illness among the sample, including describing differences observed across men and women.

- a) Based on the prior literature, I hypothesized that AUD, can-SUD, and OUD will be the most commonly observed SUDs.
- b) I hypothesized that a clinical level of symptoms will be observed in the Depression, Anxiety, Interpersonal-Sensitivity, and Paranoid Ideation scales as measured by the Brief Symptom Inventory (BSI).

Aim 2: An exploratory analysis to examine the association between mental health symptoms and SUD symptoms, with and without age as a covariate.

- a) I hypothesized that polysubstance use disorder (poly-SUD; the presence of more than one SUD) will be associated with an increased likelihood of

experiencing a co-occurring mental illness, as measured by the BSI, than the presence of one SUD.

- b) Based on prior empirical studies, I hypothesized that the presence of an AUD or OUD would be associated with higher scores on the Depression scale as measured by the BSI. I hypothesized that the presence of a stimulant use disorder will be associated with higher scores on the Hostility and Paranoid Ideation scales as measured by the BSI. Finally, I hypothesized that the presence of a stimulant use disorder or a can-SUD would be associated with higher scores on the Psychoticism scale as measured by the BSI.
- c) Additional exploratory analyses were utilized to understand the relationship between the severity of SUD and symptoms of mental illness. I hypothesized that the more symptoms of an SUD reported (indicating greater severity), the more likely to experience clinical levels of co-occurring mental illness. Due to a lack of empirical studies, I did not have specific hypotheses regarding types of SUDs and mental illness.

CHAPTER 2: METHOD

2.1. Participants

Participants are 192 federal detainees (men: 88.5%; women: 11.5%) who participated in the VCAP treatment protocol in two rural New England jails. Demographic information is restricted to data in participants' clinical files and will only include age at intake and gender. All of the participants spoke English fluently as this is a requirement of participating in the treatment. Before initiating treatment, all interested

participants took part in a brief, two-hour intake session that included a semi-structured developmental interview, incorporated a brief MI session, and the completion of two assessment measures to assess for SUDs and co-occurring mental illnesses. This intake session's primary purpose was to determine eligibility for treatment and treatment placement, either group or individual. Decisions on group or individual treatment were decided based on availability, client preference, treatment needs, and safety.

2.2. Measures

2.2.1. DSM-5 Substance Use Disorder Checklist (*American Psychiatric Association, 2013*)

The *DSM-5* SUD Checklist is a semi-structured interview that assesses the use of both licit and illicit substances in the past year (or the year prior to incarceration). The participant's preferred substance of choice is identified, as well as any additional substances used. For each substance, clinicians indicate which of the eleven *DSM-5* symptoms the participant reports experiencing in the past year (or the year prior to incarceration) due to each substance used in that year. Severity of each SUD is also documented, in-line with the *DSM-5*, such that mild severity is the presence of two to three symptoms, moderate severity is the presence of four to five symptoms, and severe severity is the presence of six or more symptoms. The checklist includes a reference list of all *DSM-5* criteria and allows for easy documentation to identify the number of SUDs and severity of SUD (i.e., mild, moderate, severe).

2.2.2. Brief Symptom Inventory (*BSI; Derogatis & Spencer, 1993*)

The BSI is a 53-item global self-report assessment of psychiatric symptoms (e.g., depression, anxiety, aggression) as experienced in the last two weeks. Participants

completed the BSI independently. The clinician did remain in the room while participants completed the BSI and was available for questions if needed.

The BSI consists of nine subscales. The Somatization scale reflects distress associated with physiological distress. The Obsessive Compulsive scale reflects a pattern of unwanted and intrusive thoughts and impulses. The Interpersonal-Sensitivity scale reflects feelings and beliefs of inadequacy and inferiority. The Depression scale is a range of thoughts and feelings indicative of clinical depression. The Anxiety scale is a range of symptoms associated with nervousness and tension. The Hostility scale reflects the thoughts, feelings, and behaviors that are indicative of problematic anger. The Phobic Anxiety scale is associated with a persistent fear response targeted toward specific stimuli. The Paranoid Ideation scale reflects the feelings and beliefs of disordered, paranoid thinking. The Psychoticism scale reflects delusional beliefs characteristic of schizophrenia or schizoid personality. Three indices of general distress are also computed. The Global Severity Index (GSI) is an average of all items endorsed. The Positive Symptom Total (PST) is a count of all items endorsed. The Positive Symptom Distress Index (PSDI) is calculated by adding the total score of all items and dividing that score by the PST.

T-scores were calculated based on age and gender norms. *T*-scores greater than or equal to 63 are considered clinically significant. The BSI has been normed with both psychiatric and community patients. For this study, I used community patient norms since our sample is more consistent with community patients; all participants were in general population (i.e., they were not part of the psychiatric jail population) and volunteered for treatment.

2.3. Procedures

Data were collected from the clinical files of the VCAP treatment program. All relevant intake data was photocopied and de-identified by a graduate research assistant. Files are considered eligible for this file review if the federally detained person was under the age of 65 and did not participate in any other research studies conducted by the VCAP team. The local institutional review board approved these procedures.

2.4. Data Diagnostics

Data were entered directly into SPSS twice by two doctorate-level graduate students. Discrepancies were compared and corrected by examining the hard copies. Upon the completion of data entry, frequencies of substance use reporting and symptom reporting were examined. No outliers were identified, and no data appeared inconsistent with the measures. Thus, all data entered was included for analyses.

Of note, the majority of the BSI scales were severely, positively skewed, with the exception of the PST and PSDI scales. This indicates that, overall, the sample endorsed less distress related to mental health symptoms as portrayed in the BSI. To account for the skew, all BSI variables that were not normally distributed underwent both a log transformation and a square root transformation. The transformed variable used in analyses was the transformation that resulted in a normal distribution or if both a log and square root transformation resulted in a normal distribution, the variable with a skew that was closest to zero (Field, 2013).

There were patterns of missing data including missed items on the BSI, missing BSI measures ($n = 17$), and missing *DSM-5* SUD checklists ($n = 10$). Data were considered missing at random (MAR), and multiple imputation was utilized to address

the missing data. Multiple imputation generates multiple copies of a data set and uses a regression-based procedure to estimate the missing values (Enders, 2010). For this data set, ten copies of imputed data were requested for all missing data with the exception of the *DSM-5* checklist, in which multiple imputation was used to estimate missing values for the first three drugs reported (out of seven total drugs reported) due to the majority of the sample not reporting using more than three drugs (70%). Categorical variables were rounded in the estimated data sets.

2.5. Data Analytic Plan

All analyses were conducted using IBM SPSS Statistics (Version 27). To account for patterns of missing data across study variables, multiple imputation was utilized, and all analyses were conducted using the pooled data when possible (Enders, 2010). To address the study's first aim, frequencies were calculated of endorsed substances with two or more *DSM-5* symptoms experienced in the past year. Additionally, frequencies were calculated examining only the preferred drug of choice and the associated symptoms to 1) identify the self-report drug of choice and, 2) determine the frequency for which the primary drug of choice also meets the criteria for an SUD (i.e., is associated with a clinically relevant number of symptoms) as outlined in the *DSM-5*. Frequencies were calculated with all BSI subscales and global indices that met clinical significance.

Several analyses were conducted to address the study's second aim, to identify patterns of mental health symptoms based on SUD status. Throughout the analyses, SUD status was the independent variable (IV), and BSI subscale scores were the dependent variable (DV). All analyses were first conducted as a contingency table chi-square analysis with dichotomized SUD categories (presence vs. absence) as the IV and

clinically significant (dichotomized) BSI subscales and indices as the DVs. These analyses were then conducted as a logistic regression with dichotomized SUD categories as the IV, clinically significant (dichotomized) BSI subscales and indices as the DVs, and age as a covariate. Second, analyses were completed as *t*-tests comparing differences in means on continuous BSI scales and indices across dichotomized SUD categories. These analyses were then conducted as an analysis of covariance (ANCOVA) with dichotomized SUD categories as the IV, continuous BSI scales and indices as the DVs, and age as a covariate. Finally, sensitivity analyses examining severity ratings of SUDs were conducted using an analysis of variance (ANOVA) to examine the differences in means on continuous BSI scales and indices based on group membership of SUD. These analyses were also replicated as an ANCOVA with age as a covariate. All analyses were completed in the total sample and also isolating the sample of men.

SUD was examined in several ways. First, the preferred drug of choice was used as the IV to test whether or not the frequency (dichotomized) and severity (continuous) of the BSI subscales differed across types of substances participants self-reported as their preferred drug. If the preferred substance of choice did not meet clinical SUD criteria, it was still used as the IV. The second set of analyses was conducted with a dichotomous IV for presence versus absence of poly-SUD, as defined as the presence of two or more SUDs to test whether or not the frequency and severity of the BSI subscales differed depending on the presence of one SUD or multiple SUDs. The third set of analyses examined each SUD reported (e.g., separate analyses for each SUD) with a dichotomized variable indicating the presence of the selected SUD (e.g., OUD, present or not present) as the IV. The fourth set of analyses were completed by examining SUD severity ratings

(i.e., mild, moderate, and severe) with two additional groups: one who used the drug but did not report sufficient symptoms to meet the threshold for an SUD as defined by the *DSM-5*, and one who did not use the substance.

Due to the low frequency of women in this sample, examining statistical differences between men and women was not feasible. For all analyses, findings are presented for the total sample (including men and women) and the sample of men only.

CHAPTER 3: RESULTS

3.1. First Aim

The first aim was focused on better understanding rates and types of SUDs and symptoms of mental illness in a sample of federal detainees, including describing differences observed across men and women.

Prior to examining rates of SUDs specifically, AUD, can-SUD and OUD were hypothesized to be the most commonly observed in this population. This hypothesis was partially supported. The three most common SUDs reported were opioids ($n = 118$), cocaine ($n = 100$), and cannabis ($n = 77$). Contrary to our hypotheses, AUD was the fourth most common SUD reported in the total sample ($n = 70$). This trend remained consistent for the sample of men, with OUD being the most commonly reported ($n = 100$), followed by cocaine ($n = 86$), cannabis ($n = 77$), and alcohol ($n = 69$). Women reported primarily experiencing OUD ($n = 18$) and coc-SUD ($n = 14$). Rates of reported SUDs are presented in Table 1. It is noteworthy that two individuals denied having used any drugs or alcohol in the year prior to incarceration.

Frequencies of the preferred drug of choice were analyzed separately from all reported drugs used (see Table 2). Similar to the trends observed across all SUDs

reported, opioids were the most commonly reported as the preferred drug of choice ($n = 83$), followed by cannabis ($n = 35$), and cocaine ($n = 34$) with similar trends observed when examined separately by gender. Six individuals denied having more than one symptom associated with substance use associated with their preferred drug of choice, not meeting the threshold for an SUD for their preferred drug of choice.

It was hypothesized that a clinical level of symptoms would be observed on the following BSI scales: Depression, Anxiety, Interpersonal-Sensitivity, and Paranoid Ideation. Overall, BSI scales indicated low frequencies of clinically significant scores (see Table 3). Contrary to the hypotheses, the three scales with the highest frequency of clinically significant scores were Somatization ($n = 30$), Paranoid Ideation ($n = 21$), and Phobic Anxiety ($n = 19$). This trend was consistent when examining rates of clinically significant scores among men (Somatization [$n = 29$], Paranoid Ideation [$n = 19$], and Phobic Anxiety [$n = 15$]). When examining rates among women, Phobic Anxiety had the highest frequency of clinically significant scores ($n = 4$) See Table 4 for univariate statistics describing the BSI scales and indices by gender.

3.2. Second Aim

The second aim was to explore statistical associations between SUDs and symptoms of mental health as measured by the BSI.

3.2.1. *Polysubstance Use Disorder*

It was hypothesized that individuals who reported the presence of more than one SUD, or poly-SUD, would have an increased likelihood of experiencing a co-occurring mental illness as measured by the BSI than those who reported one SUD. This hypothesis was not supported. First, contingency chi-square tables were examined looking at

differences in clinical or non-clinical scores on all of the BSI scales and global indices between those with poly-SUD and those with one SUD. Contingency chi-square tables were not considered valid for interpretation for the Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, and Hostility scales as well as the PSDI due to a frequency of less than five in more than one cell. Subsequently, results are not presented for those scales. There were a number of significant findings, though in the opposite direction as hypothesized.

First, there was a significant effect of SUD classification (poly vs. one SUD) on Somatization in both the total sample, $\chi^2(1, 189) = 3.07-8.19, p = .028^1$, and the sample of men, $\chi^2(1, 168) = 2.43-7.68, p = .034$. Examination of the cross-tabulation tables indicated that those with one SUD (total sample: 25.7%; sample of men: 27.6%) were more likely than those with poly-SUD (total sample: 12.3%, sample of men: 13.5%) to have a clinical score on Somatization.

There was a significant effect of SUD classification on Phobic Anxiety in both the total sample, $\chi^2(1, 189) = 4.18-6.37, p = .017$, and the sample of men, $\chi^2(1, 168) = 3.32-6.56, p = .029$. Examination of the cross-tabulation tables indicated that those with one SUD (total sample: 18.6%; sample of men: 17.0%) were more likely than those with poly-SUD (total sample: 6.9%, sample of men: 6.0%) to have a clinical score on Phobic Anxiety.

Finally, there was a significant effect of SUD classification on the GSI in both the total sample, $\chi^2(1, 189) = 5.04-5.67, p = .017$, and the sample of men, $\chi^2(1, 168) = 4.13-$

¹ χ^2 coefficients are provided as a range reflecting the minimum and maximum coefficients provided from the imputed data sets, whereas p -values presented as the median across the imputed data sets as recommended by Eekhout and colleagues (2017).

5.82, $p = .029$. Examination of the cross-tabulation tables indicated that those with one SUD (total sample: 17.8%; sample of men: 16.1%) were more likely than those with poly-SUD (total sample: 6.5%, sample of men: 5.6%) to have a clinical score on the GSI. See Table 5 for a summary of the findings.

Second, logistic regressions were conducted to test if the relationship between poly and single SUD and clinically significant BSI scores remained when controlling for age. This test was only done on the BSI scales and indices that had valid results in the contingency chi-square test, namely Somatization, Phobic Anxiety, Paranoid Ideation, Psychoticism, GSI, and PST. In looking at the total sample, the model examining clinically significant scores for the GSI remained statistically significant when adjusting for age, $\chi^2(2) = 4.75-6.84, p = .045$. In the sample of men only, the effects of group membership on clinically significant GSI scores were no longer significant when adjusting for age, $\chi^2(2) = 3.70-5.13, p = .117$. In the total sample, no other dichotomized BSI scores were associated with significant findings when adjusting for the effects of age (see Table 5). In the sample of men, clinical scores on Somatization as a DV remained significant when adjusting for age, $\chi^2(2) = 3.62-8.49, p = .037$. No other dichotomized BSI scores were associated with significant findings when adjusting for the effects of age (see Table 5).

Results examining differences between those with poly and single SUDs on BSI scores were also conducted with BSI scores as a continuous variable. *T*-tests were first conducted to ascertain differences across SUD group between the means on all of the BSI scales and indices with both the total sample and the sample of men. There was a significant difference between the poly and single SUD groups in the total sample for

Somatization, $t(15927) = 2.38, p = .017$. However, this was in the opposite direction as hypothesized with the single SUD group reporting a higher average ($m = 0.90$), than the poly-SUD group ($m = 0.70$). In addition, this effect was no longer significant when looking at men only, $t(8,014) = 1.72, p = .086$. No other significant effects were identified (see Table 6 for a summary of findings).

Finally, a series of one-way ANCOVAs were conducted to control for age in examining statistical differences between poly and single SUD groups on BSI scores. Findings were similar as to when examining t -tests. In the total sample, there was still a significant effect of SUD group on Somatization when controlling for age, $F(1,186) = 3.16-4.81, p = .036$ such that those with one SUD had higher scores on the Somatization scale than those with poly-SUD. This was effect was small, explaining only 2% of the variance in Somatization. In addition, when looking at only men, this effect was no longer significant, $F(1,164) = 0.76-2.13, p = .204$. There were no other significant effects in the total sample or men-only sample of SUD group on BSI scales or indices (see Table 6 for a summary of findings).

3.2.2. Individual SUDs

To examine associations between specific types of SUDs and mental health symptoms, the preferred drug of choice was first examined followed by all analyses examining all SUDs reported. It was hypothesized that AUD and OUD would be associated with more symptoms of depression and that stimulant use disorders, including cocaine and other stimulants, would be associated with more symptoms of hostility, paranoid ideation, and psychotic symptoms. It was also hypothesized that can-SUD would be associated with psychotic symptoms. These hypotheses were largely

unsupported. Analyses followed the same structure as above with dichotomized scores endorsing if each specific SUD reported was endorsed or not as the IV and examining the effects of endorsing that SUD on each of the BSI scales in both the total sample and in the sample of men. The series of analyses for OUD, coc-SUD, can-SUD, and AUD are listed below. Participants did endorse use disorders associated with other hallucinogens, sedatives, other stimulants, and phencyclidines, though at such a low frequency that the resulting analyses would not be valid and, subsequently, analyses examining differences in BSI scales and indices were not conducted.

3.1.2.1. Preferred Drug of Choice. Due to the small sample size, it was not possible to examine the preferred drug of choice with dichotomized BSI scores. Analyses examining outcomes associated with continuous BSI scores were conducted with only opioid use, cocaine use, cannabis use, and alcohol use due to a low frequency of participants reporting other substances as their preferred drug of choice (see Table 2). There were no significant differences between participants' preferred drug of choice (opioid, cocaine, cannabis, and alcohol) on any continuous BSI score in either the total sample or the sample of men only. See Table 7 for a summary of ANOVA findings and a summary of ANCOVA findings with age as a covariate.

3.2.2.2. Opioid Use Disorder. First, contingency chi-square tables were examined looking at differences in clinical or non-clinical scores on all of the BSI scales and global indices between those who did or did not endorse OUD. Contingency chi-square tables were not considered valid for the Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, and Hostility scales as well as the PSDI due to a frequency of less than five in at least one cell. Subsequently, results are not presented for

those scales. In the total sample, there was a significant effect only for GSI, $\chi^2(1, 189) = 4.06-4.49, p = .039$. Examination of the cross-tabulation tables indicated that those who did not have an OUD in the total sample (14.9%) were more likely than those with an OUD (5.9%) to have a clinical score on the GSI. There were no other significant findings in either the total sample or sample of men (see Table 8 for a summary of findings). In the sample of men, in addition to the BSI scales and indices not analyzed in the total sample due to a low frequency, results were also considered invalid for the Psychoticism scale and GSI due to frequencies of less than five in at least one cell.

Logistic regressions were conducted to ascertain the effects of age on the relationship between group membership (i.e., OUD versus not-OUD) and the likelihood of reporting a clinically significant score on the BSI. This test was only done on the BSI scales and indices that had valid results in the contingency chi-square test. Whether or not an individual had an OUD did not have an effect on whether or not they had a clinically significant score on any BSI scale or index when controlling for age in both the total sample and when looking at men only. See Table 9 for a summary of findings.

T-tests were conducted to ascertain differences between the means on all of the BSI scales and indices as continuous variables with both the total sample and the sample of men. There were no significant effects indicating that there were no differences between the means on any BSI scale or index based on the presence or absence of OUD (see Table 10). Finally, a series of one-way ANCOVAs were conducted to control for age in examining statistical differences between OUD and not-OUD groups on BSI scores. There were no significant effects of group in the total sample or men-only sample on BSI scales or indices. See Table 11 for a summary of findings.

3.2.2.3. Cocaine Use Disorder. First, contingency chi-square tables were examined looking at differences in clinical or non-clinical scores on all of the BSI scales and global indices between those who endorsed coc-SUD and those who did not. Contingency chi-square tables were not valid for the Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, and Hostility scales as well as the PSDI due to a frequency of less than five in at least one cell. In the sample of men, results were also invalid for the Phobic Anxiety scale and GSI due to frequencies of less than five in each cell. Subsequently, results are not presented for those scales. There were no significant findings in either the total sample or the men-only sample when examining group differences on clinically significant BSI scales and indices (see Table 8). Logistic regressions conducted to ascertain the effects of age on the relationship between group membership and the likelihood of reporting a clinically significant score on the BSI were not significant in both the total sample and the sample of men (see Table 9).

Examining the effects of group membership on the continuous scores of the BSI scales and indices also did not indicate that the presence or not of a coc-SUD had any effect on mental health symptoms. *T*-tests were conducted to ascertain differences between the means on all of the BSI scales and indices as continuous variables with both the total sample and the sample of men. There were no significant effects indicating that there were no differences between the means on any BSI scale or index based on the presence or absence of coc-SUD (see Table 10). A series of one-way ANCOVAs to control for age in examining statistical differences between those with coc-SUD and those without on BSI scores also did not indicate any significant effects in the total sample or the sample of men (see Table 11).

3.2.2.4. Cannabis Use Disorder. First, contingency chi-square tables were examined looking at differences in clinical or non-clinical scores on all of the BSI scales and global indices between those who did and did not endorse can-SUD. Contingency chi-square tables were not considered valid for the Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, and Hostility scales as well as the PSDI due to a frequency of less than five in one or more cells. Subsequently, results are not presented for those scales/indices. In the total sample, there was a significant effect for Paranoid Ideation, $\chi^2(1, 192) = 6.93-11.41, p = .004$. Examination of the cross-tabulation tables for the total sample indicated that those with can-SUD (18.6%) were more likely than those who did not have a can-SUD (5.4%) to have a clinical score on Paranoid Ideation. In the sample of men, the Paranoid Ideation analysis was invalid due to a frequency less than 5 in at least one cell. There were no other significant findings in either the total sample or men only sample (see Table 8 for a summary of findings). In the sample of men, results were also invalid for the Phobic Anxiety scale due to less than 5 in each cell in addition to the other BSI scales and indices that were also invalid for the total sample.

Logistic regressions were conducted to ascertain the effects of age on the relationship between group membership and the likelihood of reporting a clinically significant score on the BSI. This test was only done on the BSI scales and indices that had valid results in the contingency chi-square test. In the total sample, the model examining clinically significant scores for Paranoid Ideation remained statistically significant when adjusting for age, $\chi^2(2) = 8.22-11.36, p = .011$. No other models were significant when controlling for age in both the total sample and when looking at men only (see Table 9).

T-tests were conducted to ascertain differences between the means on all of the BSI scales and indices as continuous variables for those with and without can-SUD. These analyses were also conducted with both the total sample and the sample of men. There was a significant difference between those with and without can-SUD on Paranoid Ideation in both the total sample, $t(2091) = -2.13, p = .034$, and in the sample of men, $t(3004) = -2.17, p = .030$. Those with can-SUD reported an average score that was significantly higher (Total: $m = 0.36$; Men: $m = 0.36$), than those without can-SUD (Total: $m = 0.31$; Men: $m = 0.30$). There were no other significant effects when comparing means for any other BSI scale or index (see Table 10). Finally, a series of one-way ANCOVAs were conducted to control for age in examining statistical differences between those with and without can-SUD on BSI scores with consistent findings as compared to the *t*-tests. There was a significant effect of the presence of a can-SUD on Paranoid Ideation when controlling for age in both the total sample, $F(1,189) = 2.98-5.73, p = .035$, and in the sample of men, $F(1,167) = 3.75-6.46, p = .022$ such that those with can-SUD indicated higher average scores on Paranoid Ideation than those without can-SUD, even when considering the variance associated with age. The effect size for both models was small, explaining 2% of the variance in Paranoid Ideation in the total sample and 3% in the sample of men. There were no other significant effects in the either sample (see Table 11).

3.2.2.5. Alcohol Use Disorder. Contingency chi-square tables used to examine differences in clinical or non-clinical scores on all of the BSI scales and global indices between those who endorsed AUD and those who did not indicated that there were no significant differences between the groups in both the total sample and in the sample of

men (see Table 8). Contingency chi-square tables were not valid for the Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, Phobic Anxiety, and Hostility scales as well as the PSDI due to a frequency less than five in more than one cell in both samples. Subsequently, results are not presented for those scales. Logistic regressions conducted to ascertain the effects of age on the relationship between group membership and the likelihood of reporting a clinically significant score on the BSI were also not significant in both the total sample and the sample of men (see Table 9).

T-tests were conducted to ascertain differences between the means on all of the BSI scales and indices as continuous variables for those with and without AUD. These analyses were also conducted with both the total sample and the sample of men. There was a significant difference between those with and without AUD on Paranoid Ideation in both the total sample, $t(10303) = -2.75, p = .006$, and in the sample of men, $t(15823) = -2.64, p = .008$. Those with AUD reported an average score that was significantly higher (Total: $m = 0.37$; Men: $m = 0.37$), than those without AUD (Total: $m = 0.30$; Men: $m = 0.30$). There were no other significant effects when comparing means for any other BSI scale or index (see Table 10). Finally, a series of one-way ANCOVAs were conducted to control for age in examining statistical differences between those with and without AUD on BSI scores. There was a significant effect of the presence of an AUD on Paranoid Ideation when controlling for age in both the total sample, $F(1,189) = 6.16-8.74, p = .006$, and in the sample of men, $F(1,167) = 5.68-7.87, p = .009$. The effect size for both models was small, explaining 4% of the variance in Paranoid Ideation in both samples. In the sample of men, there was also a marginally significant effect of the presence of an AUD while controlling for age on Hostility, $F(1, 167) = 1.45-4.11, p = .050$, explaining

1% of the variance in Hostility. There were no other significant effects in either sample (see Table 11).

3.2.3. Substance Use Disorder Sensitivity Analysis

A final set of analyses to examine the relationship between the severity of SUD and mental health symptoms was conducted. Due to a small sample, it was not possible to conduct sensitivity analyses examining the impact of individual symptoms of SUD on BSI scores. Additionally, only continuous BSI scores were examined due to the low frequency of clinically significant BSI scores in this sample. To examine the relationship of SUD severity on mental health, a series of ANOVAs were conducted in both the total sample and in the sample of men further distinguishing SUD groupings from disorder present or not present into *DSM-5* severity ratings of mild, moderate, and severe and additional categories of used with no disorder present, and substance not used. Each analysis was also conducted as an ANCOVA with age as a covariate.

3.2.3.1. Opioid Use Disorder. A series of one-way ANOVAs were conducted examining differences between groups distinguished by OUD severity rating (i.e., mild, moderate, and severe), those who used opioids and did not report symptoms consistent with an OUD, and those who did not use opioids on BSI scores in both the total sample and in the sample of men. Results indicated there were no significant differences on average scores based on OUD groups in either sample. See Table 12 for a summary of results. Analyses were also conducted as an ANCOVA controlling for the effects of age in both the total sample and the sample of men only. These analyses were consistent and did not indicate any significant differences between groups, even when considering the variance associated with age. See Table 13 for a summary of results.

3.2.3.2. Cocaine Use Disorder. A series of one-way ANOVAs were conducted examining differences between groups distinguished by coc-SUD severity rating (i.e., mild, moderate, and severe), those who used cocaine and did not report symptoms consistent with an SUD, and those who did not use cocaine on BSI scores in both the total sample and in the sample of men. Results indicated there were no significant differences on average scores based on OUD groups in either sample (see Table 12). Analyses were also conducted as an ANCOVA controlling for the effects of age in both the total sample and the sample of men. These analyses were consistent and did not indicate any significant differences between groups when adjusting for age (see Table 13).

3.2.3.3. Cannabis Use Disorder. A series of one-way ANOVAs were conducted examining differences between groups distinguished by can-SUD severity rating (i.e., mild, moderate, and severe), those who used cannabis and did not report symptoms consistent with an SUD, and those who did not use cannabis on BSI scores in both the total sample and in the sample of men. There were several significant results in this analysis summarized below with non-significant results presented in Table 12. There was a significant effect on the Obsessive Compulsive scale, $F(4,187) = 2.37-3.22, p = .026$, with a medium effect size explaining 6% of the variance in the Obsessive Compulsive scale. This was consistent in the sample of only men, $F(4,165) = 2.42-3.25, p = .023, \eta^2 = .07$. Tukey's post-hoc comparisons indicated that, in both samples, the group with a mild can-SUD had a significantly lower average (Total sample: $m = 0.22$; Men: $m = 0.22$) than the group with a severe can-SUD (Total sample: $m = 0.39, p = .012$; Men: $m = 0.39, p = .012$). There were no other significant differences between the other groups.

There was a significant effect on the Interpersonal-Sensitivity scale, $F(4,187) = 2.41-3.26, p = .025$, with a medium effect size explaining 6% of the variance in the Interpersonal-Sensitivity scale. This was consistent with the sample of men, $F(4,165) = 2.58-3.46, p = .016, \eta^2 = .07$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in both samples (Total sample: $m = 0.45$; Men: $m = 0.45$) than the group with a severe can-SUD (Total sample: $m = 0.97, p = .015$; Men: $m = 0.96, p = .013$). There were no other significant differences between the other groups.

There was a significant effect on the Hostility scale, $F(4,187) = 2.78-3.55, p = .019$, with a medium effect size explaining 6% of the variance in the Hostility scale. This was consistent with the sample of men, $F(4,165) = 2.83-3.81, p = .017, \eta^2 = .07$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in both samples (Total sample: $m = 0.54$; Men: $m = 0.54$) than the group with a severe can-SUD (Total sample: $m = 0.98, p = .008$; Men: $m = 0.98, p = .009$). There were no other significant differences between the other groups.

There was a significant effect on the Phobic Anxiety scale, $F(4,187) = 2.91-4.28, p = .008$, with a medium effect size explaining 7% of the variance in the Interpersonal-Sensitivity scale. This was consistent with the sample of men, $F(4,165) = 2.89-4.44, p = .008, \eta^2 = .08$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in both samples (Total sample: $m = 0.24$; Men: $m = 0.24$) than the group with a severe can-SUD (Total sample: $m = 0.81, p = .008$; Men: $m = 0.81, p = .007$). There were no other significant differences between the other groups.

There was a significant effect on the Paranoid Ideation scale, $F(4,187) = 4.19-6.11, p < .001$, with a medium effect size explaining 10% of the variance in the Paranoid Ideation scale. This was consistent with the sample of men, $F(4,165) = 4.29-6.21, p < .001, \eta^2 = .11$. Tukey's post-hoc comparisons indicated that the group who did not endorse cannabis use had a significantly lower average in both samples (Total sample: $m = 0.30$; Men: $m = 0.30$) than the group with a severe can-SUD (Total sample: $m = 0.42, p = .003$; Men: $m = 0.42, p = .003$). Additionally, the group with a mild can-SUD also had a significantly lower average in both samples (Total sample: $m = 0.23$; Men: $m = 0.23$) than the group with a severe can-SUD (Total sample: $p = .001$; Men: $p = .001$). There were no other significant differences between the other groups.

There was a significant effect on the Psychoticism scale, $F(4,187) = 2.89-3.96, p = .009$, with a medium effect size explaining 7% of the variance in the Psychoticism scale. This was consistent with the sample of men, $F(4,165) = 2.79-4.12, p = .009, \eta^2 = .08$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in both samples (Total sample: $m = 0.17$; Men: $m = 0.17$) than the group with a severe can-SUD (Total sample: $m = 0.39, p = .003$; Men: $m = 0.35, p = .003$). There were no other significant differences between the other groups.

There was a significant effect on the GSI, $F(4,187) = 2.71-3.44, p = .014$, with a medium effect size explaining 6% of the variance in the GSI. This was consistent with the sample of men, $F(4,165) = 2.61-3.48, p = .015, \eta^2 = .07$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in both samples (Total sample: $m = 0.19$; Men: $m = 0.19$) than the group with a

severe can-SUD (Total sample: $m = 0.34$, $p = .006$; Men: $m = 0.34$, $p = .006$). There were no other significant differences between the other groups.

There was a significant effect on the PST, $F(4,187) = 3.02-4.07$, $p = .007$, with a medium effect size explaining 7% of the variance in the PST. This was consistent with the sample of men, $F(4,165) = 3.02-4.16$, $p = .006$, $\eta^2 = .08$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in both samples (Total sample: $m = 18.81$; Men: $m = 18.81$) than the group with a severe can-SUD (Total sample: $m = 33.65$, $p = .004$; Men: $m = 33.60$, $p = .004$). There were no other significant differences between the other groups.

There was a significant effect on the PSDI, $F(4,187) = 2.48-3.04$, $p = .027$, with a medium effect size explaining 6% of the variance in the PSDI. This was consistent with the sample of men, $F(4,165) = 2.20-2.68$, $p = .047$, $\eta^2 = .06$. Tukey's post-hoc comparisons indicated that the group with a mild can-SUD had a significantly lower average in the total sample ($m = 1.56$) than the group that did not use cannabis ($m = 2.00$, $p = .031$). In the sample of men, post-hoc comparisons did not indicate any significant differences between groups. There were no other significant differences between the other groups in the total sample.

Analyses were also conducted as an ANCOVA controlling for the effects of age in both the total sample and the sample of men only. These analyses were consistent with the set of ANOVA analyses in that there were several significant findings for the same set of scales and indices as were significant in the ANOVA analyses for both the total sample and the sample of men. Age was not significant in any of the models, indicating

that the effects of can-SUD severity on BSI scales and indices were not due to the variance associated with age. Results are summarized in Table 13.

3.2.3.4. Alcohol Use Disorder. A series of one-way ANOVAs were conducted examining differences between groups distinguished by AUD severity rating (i.e., mild, moderate, and severe), those who used alcohol and did not report symptoms consistent with AUD, and those who did not use alcohol on BSI scores in both the total sample and in the sample of men. There was a significant effect on the Hostility scale, $F(4,187) = 1.79-3.20, p = .042$, with a medium effect size explaining 5% of the variance in the Hostility scale. This was consistent in the sample of only men, $F(4,165) = 1.73-3.20, p = .048, \eta^2 = .06$. Tukey's post-hoc comparisons indicated that, in both samples, there were no significant differences between the groups. There were no other significant findings associated with any other BSI scale or index when examining levels of AUD severity (see Table 12).

Finally, a series of one-way ANCOVAs were conducted to control for age in examining statistical differences of AUD severity on BSI scores. There was a significant effect of AUD severity on Hostility when controlling for age in both the total sample, $F(4,186) = 1.76-3.07, p = .042$, and in the sample of men, $F(4,164) = 1.72-3.09, p = .047$. The effect size for both models was medium, explaining 5% of the variance in Hostility in the total sample and 6% of the variance in the sample of men. See Table 13 for a summary of findings.

CHAPTER 4: DISCUSSION

The current study indicated several surprising findings, some consistent with prior work and with hypotheses, though many of the findings were contrary to the hypotheses.

Overall, the aims of this study were generally exploratory as this is the first empirical study examining SUDs and mental illness in a sample of federal detainees.

The first aim of the study was to examine the frequencies of SUDs and symptoms of mental illness endorsed by a group of federal detainees volunteering to participate in a novel treatment program designed to target symptoms of co-occurring substance use and mental illness. The participants in the study reported a range of substances used in the year prior to the interview (or the year prior to incarceration). As hypothesized, opioids and cannabis were the most frequently used, consistent with prior studies that identified both as common substances used by incarcerated individuals (Karberg & James, 2005; Proctor et al., 2019). High rates of alcohol use were also observed among these participants, also consistent with prior literature (Fazel et al., 2017). It was not hypothesized that cocaine would be as prevalent as was observed in this sample. Participants in this study reported rates of cocaine use that were more than double what has been observed in other incarcerated samples (Karberg & James, 2005; Proctor et al., 2019). While overall national trends have exhibited a decline in cocaine use over the past twenty years (SAMHSA, 2020), a slight increase of cocaine use in the general population (not in an incarcerated sample) has been observed since 2011 (Cano et al., 2020). Additionally, up to 50% of those reporting cocaine use in recent years in the community also reported opioid misuse (Cano et al., 2020). In this sample, 67% with Coc-SUD, also had a co-occurring OUD. The high rates of cocaine use in this sample may be representative of different substance use trends experienced by federal detainees, or this may reflect an upward trend of cocaine use in those incarcerated. The high co-occurrence of OUD and Coc-SUD in this sample is concerning as this indicates this group is at the

highest risk of drug overdose and death (Nolan et al., 2019) and federal detainees have difficulty accessing treatment resources despite a high treatment need during and after incarceration.

Examination of mental health symptoms in this sample revealed surprising results. Many participants had scores on the BSI that did not meet the clinical threshold and were in the low average range on BSI scales overall. Consequently, the hypotheses that participants would report high levels on the Depression, Anxiety, and Interpersonal-Sensitivity scales were not supported. Participants reported minimal symptoms on these scales. This is contrary to prior studies examining mental health symptoms in incarcerated samples which have found that incarcerated people experience a high number of clinically relevant mental health symptoms (Edwards & Potter, 2004; Powell et al., 1997). One study conducted in a similar rural setting found that there were differences between the prison population and jail population on rates of PTSD, mania, and schizoaffective disorder indicating higher occurrences among those in prison (Powell et al., 1997). It is notable that federal detainees are more similar to a jail population in that they are detained while awaiting adjudication and may not experience the level of mental health distress as those sentenced and serving longer sentences. Other studies have found that length of time incarcerated is associated with more overall symptoms of mental illness (Porter & DeMarco, 2017). The length of incarceration is unknown for this sample of federal detainees, though past averages indicate that federal detainees in this region are incarcerated for an average of 255 days prior to adjudication and sentencing (Administrative Office of the U.S. Courts, 2016). Based on these averages, the participants in this study have likely been incarcerated for less than a year and may not be

experiencing significant mental health symptoms. The studies completed by Powell and colleagues (1997) and Porter & Demarco (2017) could provide an explanation for the low levels of mental health symptoms observed in this sample of federal detainees.

Another possibility is that this sample under-reported mental health symptoms. Potential under-reporting of mental health symptoms may be due to the way in which the BSI was administered. The BSI was completed by participants with minimal clinician support. It is uncertain if this impacted accuracy of reporting. For example, participants may not have read items fully prior to responding, impacting the legitimacy of their responses. In this study, reading level is unknown. For some participant's, difficulties associated with reading comprehension (e.g., learning disorders) could have impacted comprehension of items resulting in inaccurate reporting of symptoms. Participant's may also have felt uncomfortable being truthful. Despite reviewing confidentiality with each federal detainee at the start of their intake session, participants may still have held concerns that correctional staff could access their documents or that their documents could be used in court. This could have skewed their responses, especially on sensitive items such as items asking about suicidal ideation. Additionally, in some samples, the BSI has been associated with lower accuracy of screening for a clinical level of mental health symptoms than more structured clinical interviews (Recklitis et al., 2017). Future studies would benefit from incorporating a structured clinical interview or administering the BSI (or other screening tool) verbally to account for any of the above concerns.

It also must be considered that the findings from the BSI may be accurate for this population. Federal detainees have never been empirically studied as a separate population before. It is possible that individuals involved in organized crimes at the

federal level (e.g., crimes of conspiracy) may be managing personality characteristics associated with antisocial personality disorder and psychopathy that are more prevalent for this population than other mental health symptoms. It would be beneficial to assess for personality characteristics and crimes participants are charged with to determine if there is an association between type of crime, personality traits, and mental health symptoms.

In examining the BSI scores, the hypothesis that participants would report clinical levels of Paranoid Ideation was supported with 11% of participants indicating clinical scores on Paranoid Ideation. This is not surprising given that participants were all incarcerated for crimes that they had not yet been adjudicated for. It is reasonable that federal detainees would struggle to trust others, feel as though they are being watched, and worry that other people are “out to get them” or will take advantage of them. Participants were also most likely to score in the clinical range on Somatization (distress associated with perceptions of physiological pain or sensations) and Phobic Anxiety (fear targeted towards external stimuli). While there were no specific hypotheses related to Somatization in this study, there is a small body of literature focused on understanding the underlying neurocircuitry of SUDs and associations with physiological sensations and chronic pain (Egli et al., 2012), with some evidence to suggest that those with a range of SUDs are more likely to have co-occurring psychosomatic complaints (Hasin & Katz, 2007; Hassan & Ali, 2011). Similar to Paranoid Ideation, examination of the Phobic Anxiety scale indicated that targeted fear towards “open spaces,” “crowds,” or “being alone,” or feeling the need to avoid certain people, places, or activities, are common beliefs individuals who are newly detained are likely to hold onto.

4.1. Substance Use and Mental Health Symptoms

The second aim of this study was to examine the relationship between substance use and mental health symptoms. This was accomplished by examining SUD in three ways. First, differences were examined between those with more than one SUD (poly-SUD) and those presenting with one SUD. Next, the relationship between each individual SUD and mental health symptoms was examined. Last, differences were examined for mental health reporting based on the severity ratings of each individual SUD reported. Results were overall surprising, and hypotheses were generally not supported. One key aspect that likely contributed to these findings is the low self-report of mental health symptoms in this sample. The restricted range of mental health symptoms in this sample must be considered as a possibility for null findings or surprising findings, while other potential theories for findings are presented throughout. As indicated above, it remains unclear if low reporting of mental health symptoms is due to measurement failure to capture symptoms experienced in this population, if this is an accurate representation of mental health in federal detainees, or if findings associated with the BSI are invalid due to the nature of administration in this study. The low endorsement of mental health symptoms in this sample certainly impacts the remainder of the analyses discussed and is a major limitation in this study.

It was first hypothesized that those with poly-SUD would be more likely to experience more mental health symptoms than those with one SUD as the presence of poly-SUD is believed to be indicative of more emotional distress and has been associated with more serious mental illness (Bhalla et al., 2017). In this sample, poly-SUD was not associated with more mental health symptoms than those reporting a single SUD. In fact,

those with a single SUD were more likely to report a clinical score on the Somatization and Phobic Anxiety scales and the GSI. In addition, those with one SUD reported significantly higher averages on Somatization than those with poly-SUD. While initially unexpected, this could be due to the range of SUDs reported in this sample, some associated with mental health symptoms more than others. For example, OUD and coc-SUD were not associated with mental health symptoms in this study, and those with poly-SUD were more likely to have an OUD or a coc-SUD. Another possibility is that those with poly-SUD were managing such serious substance use related symptoms, that they were still using drugs during incarceration and this drug use was suppressing mental health symptoms. Substance use during treatment was collected for this sample on a voluntary basis, though data was only available for less than 30% of the sample. With the small sample size, it was not possible to incorporate this data into analyses. Substance use during incarceration is widely known to be common, though grossly understudied (Clarke et al., 2001; Inciardi et al., 1993). To better understand treatment effectiveness and substance use behaviors for federal detainees during their period of incarceration, it is essential to assess substance use behaviors during incarceration and while participating in treatment.

Examination of each SUD endorsed did not support hypotheses, though there were some interesting findings. When looking at the presence of each SUD individually, those with can-SUD reported more clinically significant scores and higher averages of paranoid ideation than those without can-SUD. While this was not originally hypothesized, this is not surprising. Paranoia is a common side effect of regular cannabis use (Milani et al., 2005). Inconsistent with hypotheses, there were no significant

differences on BSI clinical scores or averages on symptoms of psychosis. Prior research that found this association also indicated that those with Can-SUD who experienced symptoms of psychosis also reported experiencing a co-occurring sedative use disorder (Degenhardt et al., 2015), which was not observed in this sample. In addition, participants in this study did not endorse many symptoms of psychosis, consistent with incarcerated people who live in the general population and likely not experiencing ongoing symptoms of serious mental illness.

Inconsistent with hypotheses, there were no differences on symptoms of depression between those with and without AUD. It is uncertain why depression was not associated with AUD in this sample. Symptoms of depression have been consistently associated with alcohol use in the literature (e.g., McHugh & Weiss, 2019). One possibility for this surprising finding is that this group may have less access to alcohol due to incarceration and not currently consuming alcohol. Another possibility is that participants may have been hesitant to endorse certain items on the Depression scale (e.g., “thoughts of ending your life,” or “feeling hopeless about the future”) for fear that endorsing these items could result in suicide safety checks by correctional staff. These findings could also be reflective of this group of federally detained people, indicating the need to better understand this unique population. Also inconsistent with hypotheses was that there were no significant differences between those with and without AUD on the Hostility scale, though there was a small effect explaining 1% of the variance in hostility in the sample of men when controlling for age. This hypothesis was generated because there is a strong association with AUD and aggressive behavior (Bushman & Cooper, 1990). However, the association between alcohol use and aggression is more likely

associated with the effects of using alcohol (Hoaken & Stewart, 2003), and less likely associated with characteristics of those with an AUD. One study utilizing the BSI in a sample of adults receiving alcohol detox treatment found that there were no statistical differences between those receiving alcohol detox and a non-patient community sample without an AUD diagnosis on the Hostility scale (Johnson et al., 2007). The finding associated with the sample of men when adjusting for age could indicate that there is an association with AUD and hostility in men, or that this finding is more associated with a younger age than the presence of an AUD. One finding of the current study that was not hypothesized was that those with AUD reported higher averages of Paranoid Ideation than those without AUD, though there were no differences on Paranoid Ideation clinical scores indicating that they were reporting higher averages of paranoia that did not meet the threshold of being considered clinically significant. Similar findings were also observed in the study examining BSI subscales of those receiving treatment for alcohol detox (Johnson et al., 2007).

Findings associated with OUD indicated the opposite of what was initially hypothesized in terms of the BSI clinical scales. Those with OUD were less likely to report clinical scores on the GSI than those without OUD, though this was no longer significant after adjusting for age. There were no other differences on any of the BSI scales or indices. The co-occurrence of OUD and mental health symptoms has been well documented (e.g., Jones & McCance-Katz, 2019; Sullivan et al., 2006). One possibility for the findings in this study is that the BSI is not able to capture all of the complex mental health concerns faced by those using opioids. For example, the BSI does not assess for symptoms related to PTSD. Of note, it is surprising that participants with OUD

would not endorse higher averages of somatic complaints as physiological distress is common for those managing an OUD (Sullivan et al., 2006). Without access to current substance use in this sample, it is unknown if these findings are a result of participants continuing to use and numbing the physiological or mental health symptoms that would be expected. Another possibility for these findings is that those who did not endorse an OUD, did have other SUDs present that were more strongly associated with somatic symptoms. It would be helpful for future studies to incorporate a control group who do not have an SUD to better understand mental health symptoms for the OUD group specifically.

Finally, the presence of a coc-SUD was not associated with mental health symptoms in this study. Participants with a coc-SUD did not have any differences on scores meeting the threshold for clinical relevance when compared to those without a coc-SUD, and there were no differences between those with and without a coc-SUD when looking at averages of BSI scales and indices. It is not clear if those who use cocaine are less likely to experience mental health symptoms than individuals using other substances, or if those without coc-SUD were more likely to endorse an SUD that was associated with mental health symptoms that nullified any potential findings. Future studies should plan to take into account types of co-occurring SUDs to determine if variability across poly-SUD among those who use cocaine are impacting statistical associations with mental health symptoms.

As hypothesized, those with a greater severity of SUD, specifically among those using cannabis, also reported more mental health symptoms. Overall, those with a severe cann-SUD (reporting six or more symptoms as described in the *DSM-V*), reported higher

averages on the Obsessive-Compulsive, Interpersonal-Sensitivity, Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism, GSI, PST, and PSDI scales and indices than those with a mild use disorder. There were no other differences between groups based on severity rating, with the exception of Paranoid Ideation. Those with a severe can-SUD also reported significantly higher scores than those who denied cannabis use in the prior year on the Paranoid Ideation scale. This indicates that those with a severe can-SUD are managing a range of mental health symptoms, while a mild can-SUD is not associated with mental health symptoms as one may theorize. It is noteworthy that those who did not use or did not report symptoms of a can-SUD did not have significantly lower averages on BSI scales (with the exception of Paranoid Ideation). This is likely a consequence of the presence of other SUDs, though surprising given the described results above indicating little mental health reporting in those endorsing other substances used. While co-occurring substance use is important to study and better understand, the co-occurring use of various substances in this sample are also likely a confounding factor and difficult to parse apart and interpret without a larger sample size.

Surprisingly, there were no other significant findings when looking at severity ratings of individual SUDs. There was a significant association between severity rating of AUD and Hostility, though post-hoc comparisons did not indicate that there were any significant differences between specific groups. This could be due to low reporting of mental health symptoms as addressed above, or a nullifying effect of comparing the different SUD groups to each other.

4.2. Limitations

There were significant limitations in this data set. As a file review, data were restricted to information collected for the purposes of treatment and not for research. Consequently, there was a large amount of missing data, and measure administration was not conducted with a focus on item reliability. In addition, relevant information that could support the interpretation of these findings and could serve as possible covariates was not available. Future studies should consider including important demographic factors such as race and ethnicity, as well as information regarding the crime participants are charged with, past criminal history, and current substance use.

The sample in this study was small, and this limited the range of analyses that could be conducted in a sample that reported a large range of types of substances used. A larger sample size would be beneficial to consider the role of poly-SUD more fully, including the many possibilities of co-occurring drugs. Additionally, obtaining a larger sample would allow for more variability across reported substance use to be examined. In this study, the small sample size limited analyses to examining opioids, cocaine, cannabis, and alcohol, the substances used with the highest frequency. Additionally, so few women in the sample made it impossible to examine the effects of gender on findings. Prior research has indicated that incarcerated women are different from incarcerated men on factors related to mental health and have unique treatment needs compared to men (Binswanger et al., 2011). Future studies would benefit from working on over-sampling federally detained people incarcerated in facilities for women to better understand this especially under-represented population.

A major limitation of this study was that mental health symptoms were assessed using a single measure that was completed independently by participants. It is impossible to determine the accuracy of those findings and if this is a true representation of federally detained people or if this sample underreported mental health symptoms. This can only be addressed by conducting a more thorough examination of mental health symptoms in future studies while incorporating additional measures associated with distress such as emotion regulation, past traumatic experiences, and personality factors.

4.3. Clinical Implications

Despite limitations, there are some interesting findings that may contribute to treatment efforts. Of note, federally detained people with a severe can-SUD are reporting a range of distress associated with mental health concerns above and beyond their cannabis and non-cannabis using peers. As states move towards legalization of cannabis and distribution of medical marijuana, mental health, medical providers, and correctional staff should be diligent in assessing symptoms of can-SUD to provide adequate treatment for those reporting severe symptoms of can-SUD among federally detained people. This group would especially benefit from work that utilizes a unified treatment approach targeting substance use and mental health treatment. For those managing cocaine and/or opioid use, this group has the highest likelihood of overdose (Nolan et al., 2019) and would benefit from more structured SUD treatment that incorporates harm reduction strategies.

4.4. Future Directions

It is important for this study to be replicated and expanded to continue work toward better understanding federally detained people. Due to the COVID pandemic,

treatment with this population was paused in an effort to reduce the risk of COVID transmission. As treatment providers resume work in the facilities, this is a unique opportunity to restructure data collection to address the limitations in this study and to facilitate treatment approaches that are better matched to individual needs.

Table 1*Frequencies of Substances Reported and Severity Ratings*

	Mild	Moderate	Severe	Used, Disorder Not Present	Did Not Use
Opioids	10 (5.2%) 10 (5.9%)	14 (7.3%) 13 (7.6%)	94 (49.0%) 77 (45.3%)	4 (2.1%) 4 (2.4%)	70 (36.5%) 66 (38.8%)
Cocaine	13 (6.8%) 13 (7.6%)	17 (8.9%) 14 (8.2%)	70 (36.5%) 59 (34.7%)	13 (6.8%) 10 (5.9%)	79 (41.1%) 74 (43.5%)
Cannabis	17 (8.9%) 17 (10.0%)	21 (10.9%) 21 (12.4%)	39 (20.3%) 39 (22.9%)	28 (14.6%) 27 (15.9%)	87 (45.3%) 66 (38.8%)
Alcohol	10 (5.2%) 10 (5.9%)	9 (4.7%) 9 (5.3%)	51 (26.6%) 50 (29.4%)	25 (13.0%) 25 (14.7%)	97 (50.5%) 76 (44.7%)
Other	7 (3.6%)	4 (2.1%)	14 (7.3%)	10 (5.2%)	157 (81.8%)
Hallucinogen	7 (4.1%)	4 (2.4%)	14 (8.2%)	8 (4.7%)	137 (80.6%)
Sedatives	3 (1.6%) 3 (1.8%)	1 (0.5%) 1 (0.6%)	9 (4.7%) 8 (4.7%)	3 (1.6%) 3 (1.8%)	176 (91.7%) 155 (91.2%)
Stimulants	3 (1.6%) 3 (1.8%)	1 (0.5%) 1 (0.6%)	9 (4.7%) 7 (4.1%)	3 (1.0%) 3 (1.8%)	176 (91.7%) 156 (91.8%)
Phencyclidine		2 (1.0%) 2 (1.2%)	4 (2.1%) 4 (2.4%)	2 (1.0%) 2 (1.2%)	184 (95.8%) 162 (95.3%)
Other			7 (3.6%) 6 (3.5%)	2 (1.0%) 2 (1.2%)	183 (95.3%) 162 (95.3%)

Note. Data presented in gray rows and bolded reflect the total sample; results from the men are presented below. Blank cells indicate that no participants endorsed that item.

Total sample: $n = 192$, sample of men: $n = 170$.

Two participants denied any substance use in the total sample (men: $n = 1$).

Table 2*Frequencies of Preferred Drug of Choice by DSM-5 Substance Use Disorder Severity**Rating*

	Mild	Moderate	Severe	Used, Disorder Not Present
Opioids	4 (2.1%) 4 (2.4%)	7 (3.6%) 7 (4.1%)	71 (37.0%) 58 (34.1%)	1 (0.5%) 1 (0.6%)
Cannabis	6 (3.1%) 6 (3.5%)	9 (4.7%) 9 (5.3%)	18 (9.4%) 18 (10.6%)	2 (1.0%) 2 (1.2%)
Cocaine	2 (1.0%) 2 (1.2%)	6 (3.1%) 5 (2.9%)	25 (13.0%) 20 (11.8%)	1 (0.5%) 1 (0.6%)
Alcohol	1 (0.5%) 1 (0.6%)	1 (0.5%) 1 (0.6%)	15 (7.8%) 14 (8.2%)	1 (0.5%) 1 (0.6%)
Other		2 (1.0%)	7 (3.6%)	1 (0.5%)
Hallucinogens		2 (1.2%)	7 (4.1%)	1 (0.6%)
Sedatives			2 (1.0%) 2 (1.2%)	
Phencyclidine			2 (1.0%) 2 (1.2%)	

Note. Data presented in gray rows and bolded reflect the total sample; results from the men are presented below. Blank cells indicate that no participants endorsed that item.

Total sample: $n = 192$, sample of men: $n = 170$.

Two participants denied any substance use in the total sample (men: $n = 1$).

Table 3*Univariate Statistics of Brief Symptom Inventory Scales and Indices in the Total Sample*

	<i>M (SD)</i>	Range	Percentage of Clinical Scores	Skew (<i>SE</i>)	Cronbach's α
Somatization	0.89 (0.91)	0.00-3.29	15.6%	.82 (.18)	.84
Obsessive- Compulsive	1.31 (0.97)	0.00-3.83	4.7%	.47 (.18)	.86
Interpersonal- Sensitivity	0.89 (0.91)	0.00-4.00	3.7%	1.08 (.18)	.80
Depression	1.26 (0.90)	0.00-3.83	2.1%	.52 (.18)	.85
Anxiety	1.10 (0.93)	0.00-4.00	4.7%	.73 (.18)	.87
Hostility	0.86 (0.76)	0.00-4.00	3.7%	1.12 (.18)	.80
Phobic Anxiety	0.73 (0.88)	0.00-3.80	9.9%	1.19 (.18)	.84
Paranoid Ideation	1.31 (0.90)	0.00-3.60	10.9%	.47 (.18)	.77
Psychoticism	1.10 (0.82)	0.00-3.40	7.8%	.55 (.18)	.72
GSI	1.08 (0.73)	0.00-3.21	9.4%	.57 (.18)	.97
PST	27.81 (14.71)	0.00-53.00	17.4%	-.14 (.18)	.96
PSDI	1.91 (0.56)	0.00-3.43	4.7%	.32 (.18)	.91

Note: GSI = Global Severity Index; PST = Positive Symptom Total; PSDI = Positive Symptom Distress Index.

Due to a restriction for calculating *t*-scores for raw scores above 52 for adult psychiatric outpatient men on the PST (Derogatis & Spencer, 1993), *n* = 1 is missing from the PST.

There is also a restriction for calculating *t*-scores for raw scores above 3.92 for adult psychiatric outpatient men and 3.72 for adult psychiatric outpatient women on the PSDI (Derogatis & Spencer, 1993) resulting in *n* = 2 missing from the PSDI.

Table 4*Univariate Statistics of Brief Symptom Inventory Scales and Indices by Gender*

	Men (<i>n</i> = 170)		Women (<i>n</i> = 22)	
	<i>M</i> (<i>SD</i>)	Percentage of Clinical Scores	<i>M</i> (<i>SD</i>)	Percentage of Clinical Scores
Somatization	0.78 (0.76)	17.1%	1.07 (0.82)	4.6%
Obsessive-Compulsive	1.31 (0.97)	4.7%	1.34 (1.01)	4.6%
Interpersonal-Sensitivity	0.86 (0.88)	2.9%	1.17 (1.12)	9.1%
Depression	1.20 (0.86)	1.2%	1.73 (1.07)	9.1%
Anxiety	1.08 (0.91)	4.7%	1.31 (1.04)	4.6%
Hostility	0.84 (0.77)	4.1%	1.03 (0.65)	0.0%
Phobic Anxiety	0.69 (0.84)	8.8%	1.01 (1.08)	18.2%
Paranoid Ideation	1.31 (0.84)	11.2%	1.28 (0.91)	9.1%
Psychoticism	1.08 (0.82)	7.7%	1.25 (0.80)	9.1%
GSI	1.05 (0.72)	8.2%	1.29 (0.79)	18.2%
PST	27.44 (14.76)	16.7%	30.59 (14.29)	22.7%
PSDI	1.88 (0.56)	4.1%	2.16 (0.53)	9.1%

Note: GSI = Global Severity Index; PST = Positive Symptom Total; PSDI = Positive Symptom Distress Index.

Due to a restriction for calculating *t*-scores for raw scores above 52 for adult psychiatric outpatient men on the PST (Derogatis & Spencer, 1993), *n* = 1 is missing from the PST. There is also a restriction for calculating *t*-scores for raw scores above 3.92 for adult psychiatric outpatient men and 3.72 for adult psychiatric outpatient women (Derogatis & Spencer, 1993) resulting in *n* = 2 missing from the PSDI in the sample of men. There is no missing data for the sample of women.

Table 5

Results of Substance Use Disorder (SUD) Group, Poly and Single SUD, on Clinically Significant Scores from the Brief Symptom Inventory

	<i>n</i>	Chi-Square		Logistic Regression	
		χ^2 range	<i>p</i>	χ^2 range	<i>p</i>
Somatization	189	3.07-8.19	.028	3.41-8.07	.058
	168	2.43-7.68	.034	3.62-8.49	.037
Phobic Anxiety	189	4.18-6.37	.017	3.96-7.03	.067
	168	3.32-6.56	.029	3.94-5.85	.104
Paranoid Ideation	189	0.37-1.65	.360	1.05-5.18	.226
	168	0.23-1.38	.426	0.37-3.74	.403
Psychoticism	189	0.28-2.49	.529	0.27-3.70	.752
	168	0.11-2.15	.656	0.19-2.70	.801
GSI	189	5.04-5.67	.017	4.75-6.84	.045
	168	4.13-5.82	.029	3.70-5.13	.117
PST	188	0.52-3.24	.274	1.19-5.01	.268
	167	0.19-2.47	.403	0.35-2.33	.642

Note: GSI = Global Severity Index; PST = Positive Symptom Total.

Results are not considered valid and thus, not presented, for the Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, and Hostility scales and the Positive Symptom Distress Index.

Data presented in gray rows and bolded reflect the total sample with results from the men presented below.

Table 6*Effects of Substance Use Disorder (SUD) Group, Poly and Single SUD, on the Brief**Symptom Inventory Scales and Indices as Continuous Variables*

	t-test			ANCOVA		
	<i>t</i>	<i>p</i>	<i>df</i>	<i>F</i> range	<i>p</i>	<i>df</i>
Somatization	2.38	.017	15927	3.16-4.81	.036	1,189
	1.72	.086	8014	0.76-2.13	.204	1,164
Obsessive-Compulsive	-0.31	.760	10700	0.05-0.25	.708	1,189
	-0.44	.663	10377	0.17-0.71	.521	1,164
Interpersonal-Sensitivity	-0.12	.902	10700	<0.01-0.06	.899	1,189
	-0.61	.542	17948	0.27-0.86	.471	1,164
Depression	0.40	.693	12691	0.03-0.53	.691	1,189
	0.08	.938	21368	<0.01-0.08	.922	1,164
Anxiety	1.40	.161	23595	1.18-2.02	.199	1,189
	1.30	.193	33754	0.73-1.33	.297	1,164
Hostility	-0.58	.564	10242	0.01-0.24	.791	1,189
	-0.57	.569	15112	0.04-0.32	.706	1,164
Phobic Anxiety	0.93	.351	6254	0.22-1.00	.418	1,189
	0.51	.609	8305	<0.01-0.11	.873	1,164
Paranoid Ideation	-0.74	.462	6458	0.19-0.81	.490	1,189
	-0.79	.427	31041	0.60-1.39	.351	1,164
Psychoticism	-0.25	.807	2072	<0.01-0.37	.844	1,189
	-0.37	.714	2282	0.11-0.93	.621	1,164
GSI	0.59	.557	94300	0.16-0.48	.606	1,189
	0.30	.764	115856	<0.01-0.03	.932	1,164
PST	0.03	.980	250978	<0.01-0.05	.966	1,189
	-0.29	.775	58331	0.22-0.69	.581	1,164
PSDI	1.64	.102	16540	1.90-3.06	.103	1,189
	1.42	.154	37970	1.25-2.03	.180	1,164

Note: ANCOVA = Analysis of Covariance; GSI = Global Severity Index; PST = Positive

Symptom Total; PSDI = Positive Symptom Distress Index.

Data presented in gray rows and bolded reflect the total sample with results from the men presented below.

Total sample: $n = 189$, sample of men: $n = 168$.

Table 7*Effects of Preferred Drug of Choice (Opioid, Cocaine, Cannabis, and Alcohol only) on**the Brief Symptom Inventory Scales and Indices as Continuous Variables*

	ANOVA			ANCOVA		
	<i>F</i> range	<i>p</i>	<i>df</i>	<i>F</i> range	<i>p</i>	<i>df</i>
Somatization	0.19-0.54	.760	3,165	0.22-0.73	.723	3,164
	0.06-0.35	.887	3,145	0.06-0.58	.816	3,144
Obsessive-Compulsive	0.12-0.38	.854	3,165	0.11-0.38	.855	3,164
	0.15-0.42	.840	3,145	0.13-0.41	.850	3,144
Interpersonal-Sensitivity	0.17-0.63	.815	3,165	0.18-0.66	.805	3,164
	0.11-0.53	.836	3,145	0.11-0.54	.841	3,144
Depression	0.37-1.18	.481	3,165	0.39-1.23	.456	3,164
	0.16-0.71	.714	3,145	0.16-0.70	.714	3,144
Anxiety	0.68-0.95	.504	3,165	0.67-0.94	.508	3,164
	0.51-0.76	.603	3,145	0.51-0.78	.598	3,144
Hostility	0.36-1.22	.632	3,165	0.55-1.39	.496	3,164
	0.32-1.11	.722	3,145	0.42-1.24	.620	3,144
Phobic Anxiety	0.31-0.61	.729	3,165	0.32-0.61	.738	3,164
	0.39-0.88	.594	3,145	0.32-0.79	.652	3,144
Paranoid Ideation	0.68-1.08	.482	3,165	0.78-1.09	.447	3,164
	0.60-1.05	.506	3,145	0.60-1.05	.513	3,144
Psychoticism	0.26-0.99	.534	3,165	0.28-1.04	.531	3,164
	0.35-1.16	.478	3,145	0.26-1.07	.549	3,144
GSI	0.21-0.55	.792	3,165	0.22-0.57	.789	3,164
	0.09-0.41	.865	3,145	0.07-0.38	.886	3,144
PST	0.14-0.47	.878	3,165	0.13-0.48	.875	3,164
	0.19-0.70	.791	3,145	0.13-0.62	.825	3,144
PSDI	0.38-0.79	.616	3,165	0.36-0.80	.614	3,164
	0.39-0.72	.663	3,145	0.38-0.70	.659	3,144

Note: ANOVA = Analysis of Variance; ANCOVA = Analysis of Covariance; GSI =

Global Severity Index; PST = Positive Symptom Total; PSDI = Positive Symptom

Distress Index.

Data presented in gray rows and bolded reflect the total sample with results from the men presented below.

Total sample: $n = 169$; sample of men: $n = 149$.

Table 8*Contingency Table Chi-Square Results Between the Presence or Absence of Substance**Use Disorders and Clinically Significant Scores from the Brief Symptom Inventory*

	Opioid		Cocaine		Cannabis		Alcohol	
	χ^2 range	<i>p</i>	χ^2 range	<i>p</i>	χ^2 range	<i>p</i>	χ^2 range	<i>p</i>
SOM	0.06-1.22	.531	0.51-2.54	.327	0.07-0.83	.567	<0.01-0.76	.735
	<0.01-0.94	.695	0.11-1.40	.480	0.49-2.53	.340	<0.01-0.82	.760
PHOB	0.29-1.77	.306	0.45-1.50	.279	0.20-2.12	.508		
	0.49-2.41	.220						
PAR	0.43-1.51	.151	2.14-3.32	.106	6.93-11.41	.004	<0.01-0.21	.866
	0.63-1.95	.190	1.88-3.49	.122			<0.01-0.18	.871
PSY	0.45-4.35	.143	<0.01-0.41	.874	<0.01-1.09	.690	<0.01-0.74	.780
			<0.01-0.68	.799	<0.01-1.39	.716	<0.01-0.63	.837
GSI	4.06-4.49	.039	0.35-0.53	.496	0.12-0.20	.693	0.44-0.80	.422
					0.51-0.96	.359	0.06-0.25	.698
PST	0.14-1.16	.404	<0.01-0.82	.731	<0.01-0.58	.621	0.03-1.45	.597
	0.31-1.55	.431	<0.01-0.97	.681	0.01-1.46	.524	<0.01-0.70	.657

Note: SOM = Somatization; PHOB = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism; GSI = Global Severity Index; PST = Positive Symptom Total.

Data presented in gray rows and bolded reflect the total sample with results from the men presented below.

Results were not calculated for the following scales or indices due to a frequency of less than five in at least one cell: Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, Positive Symptom Distress Index. Blank cells indicate that results were not calculated due to a frequency of less than five in at least one cell.

Total sample: $n = 192$; sample of men: $n = 170$.

Table 9

Logistic Regression Results Examining the Relationship Between the Presence or Absence of Substance Use Disorders and Clinically Significant Scores on the Brief Symptom Inventory Controlling for Age

	Opioid		Cocaine		Cannabis		Alcohol	
	χ^2 range	<i>p</i>	χ^2 range	<i>p</i>	χ^2 range	<i>p</i>	χ^2 range	<i>p</i>
SOM	1.04-2.88	.306	1.68-4.80	.278	1.34-2.94	.326	1.26-2.90	.315
	1.84-5.17	.213	1.97-5.67	.204	2.44-5.70	.184	1.99-5.09	.217
PHOB	0.32-2.07	.587	0.46-1.80	.521	0.45-2.27	.749		
	0.64-4.18	.460						
PAR	1.88-3.79	.199	3.17-6.04	.102	8.22-11.36	.011	0.45-3.06	.432
	1.97-3.29	.235	2.54-5.44	.138			0.11-2.22	.638
PSY	0.47-5.47	.294	<0.01-0.92	.815	0.09-1.33	.832	0.11-0.99	.823
			<0.01-0.92	.784	0.01-1.71	.804	0.03-0.84	.824
GSI	4.22-5.59	.088	0.48-1.30	.643	0.20-0.80	.779	0.53-1.46	.609
					0.62-1.78	.633	0.07-0.63	.896
PST	0.61-3.60	.480	0.02-2.94	.638	0.25-2.77	.685	0.29-3.14	.578
	0.39-1.58	.639	0.11-1.16	.812	0.11-1.81	.729	<0.01-0.89	.844

Note: SOM = Somatization; PHOB = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism; GSI = GSI = Global Severity Index; PST = Positive Symptom Total.

Data presented in gray rows and bolded reflect the total sample with results from the men presented below.

Results were not calculated for the following scales or indices due to a frequency of less than five in at least one cell: Obsessive-Compulsive, Interpersonal-Sensitivity, Depression, Anxiety, Positive Symptom Distress Index. Blank cells indicate that results were not calculated due to a frequency of less than five in at least one cell.

Total sample: *n* = 192; sample of men: *n* = 170.

Table 10*T-tests Examining Differences between Means on the Brief Symptom Inventory Scales**and Indices for Individual Substance Use Disorders*

	Opioid			Cocaine			Cannabis			Alcohol		
	<i>t</i>	<i>p</i>	<i>df</i>	<i>t</i>	<i>p</i>	<i>df</i>	<i>t</i>	<i>p</i>	<i>df</i>	<i>t</i>	<i>p</i>	<i>df</i>
SOM	-0.17	.242	980	0.21	.837	1635	1.06	.288	1682	-0.25	.803	1189
	-0.89	.374	1169	0.08	.934	1192	0.67	.506	2284	-0.75	.453	1838
OC	-0.13	.898	1851	-0.29	.772	1362	-0.38	.705	5905	-0.68	.499	794
	-0.29	.771	3983	-0.58	.563	767	-0.45	.654	4058	-0.81	.418	1877
IS	-0.94	.346	1701	-0.04	.971	6780	-0.34	.735	1052	-1.30	.194	6210
	-0.74	.461	1346	-0.55	.582	2096	-0.69	.489	1086	-1.51	.131	3382
DEP	-0.50	.615	2337	0.17	.867	2451	0.86	.390	649	-0.24	.811	4098
	-0.24	.811	1908	0.16	.875	1324	0.19	.849	490	-0.68	.497	1345
ANX	-0.49	.626	6667	-0.25	.806	5727	1.41	.158	9847	0.03	.977	4075
	-0.55	.582	6646	-0.25	.807	2386	1.16	.247	15047	-0.15	.878	9008
HOS	0.24	.814	808	-1.26	.210	809	-0.59	.552	1320	-1.52	.129	354
	0.15	.885	857	-1.06	.290	478	-1.05	.293	1039	-1.86	.064	321
PHOB	0.52	.603	417	0.64	.520	7217	0.72	.473	933	0.08	.937	3733
	0.78	.437	392	0.17	.864	2936	0.41	.679	803	-0.42	.671	4729
PAR	1.41	.159	3086	0.26	.797	4984	-2.13	.034	2091	-2.75	.006	10303
	1.26	.208	4977	-0.14	.893	1396	-2.17	.030	3004	-2.64	.008	15823
PSY	0.60	.546	271	-0.17	.868	3039	-0.07	.946	1741	-1.36	.173	610
	0.80	.426	356	-0.40	.691	1037	-0.39	.700	928	-1.67	.095	1160
GSI	-0.19	.846	1568	0.04	.967	8140	0.28	.779	5897	-0.81	.416	5533
	-0.13	.899	1968	0.13	.893	2066	-0.15	.879	4294	-1.16	.244	9224
PST	-0.19	.848	1234	-0.66	.511	3686	-0.16	.875	4106	-1.41	.159	2428
	-0.03	.978	1457	-1.10	.274	1982	-0.45	.653	3722	-1.74	.082	4170
PSDI	-0.14	.887	3179	1.10	.273	9058	1.04	.297	1443	0.41	.685	13927
	-0.26	.795	4276	1.48	.139	2156	0.45	.655	1257	0.04	.969	3960

Note: SOM = Somatization; OC = Obsessive-Compulsive; IS = Interpersonal-Sensitivity;

DEP = Depression; ANX = Anxiety; HOS = Hostility; PHOB = Phobic Anxiety; PAR =

Paranoid Ideation; PSY = Psychoticism; GSI = Global Severity Index; PST = Positive

Symptom Total; PSDI = Positive Symptom Distress Index.

Data presented in gray rows and bolded reflect the total sample, results from the men are below.

Total sample: $n = 192$; sample of men: $n = 170$.

Table 11*Analysis of Covariance Examining the Effects of Substance Use Disorders on the Brief**Symptom Inventory Scales and Indices as Continuous Variables Controlling for Age*

	Opioid		Cocaine		Cannabis		Alcohol	
	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>
SOM	1.32-3.84	.140	<0.01-0.26	.841	0.26-1.76	.388	<0.01-0.31	.844
	1.11-3.17	.188	0.01-0.29	.809	<0.01-0.43	.680	0.19-1.22	.459
OC	<0.01-0.22	.921	0.02-0.32	.761	0.04-0.45	.741	0.13-1.35	.522
	0.03-0.52	.682	0.01-0.99	.468	0.09-0.70	.582	0.25-1.36	.451
IS	0.46-1.81	.407	<0.01-0.10	.928	0.01-0.28	.706	1.19-2.46	.195
	0.37-1.64	.496	0.02-0.56	.539	0.11-1.06	.428	1.74-3.52	.132
DEP	0.04-0.65	.594	<0.01-0.16	.823	0.50-1.99	.423	<0.01-0.21	.810
	<0.01-0.41	.676	0.02-0.11	.835	<0.01-0.37	.954	0.13-1.18	.501
ANX	0.09-0.70	.522	<0.01-0.20	.756	1.37-2.36	.176	<0.01-0.13	.930
	0.24-1.05	.437	<0.01-0.42	.663	0.77-1.61	.314	<0.01-0.20	.889
HOS	0.01-0.95	.598	0.57-2.46	.223	<0.01-0.38	.713	1.45-4.11	.110
	<0.01-0.68	.727	0.14-1.83	.350	0.30-1.51	.382	2.38-5.63	.050
PHOB	<0.01-1.19	.613	0.20-0.67	.553	0.03-0.92	.445	<0.01-0.10	.877
	<0.01-1.15	.633	<0.01-0.07	.854	<0.01-0.25	.792	0.03-0.42	.687
PAR	1.76-3.39	.130	0.02-0.41	.755	2.98-5.73	.035	6.16-8.74	.006
	0.97-2.16	.223	0.02-0.13	.802	3.75-6.46	.022	5.68-7.87	.009
PSY	0.04- 1.33	.462	<0.01-0.09	.845	<0.01-0.13	.883	0.96-2.99	.139
	0.09-1.53	.504	<0.01-0.52	.563	<0.01-0.80	.622	1.66-4.04	.074
GSI	<0.01-0.36	.836	<0.01-0.15	.971	0.01-0.36	.796	0.36-1.11	.415
	<0.01-0.46	.743	0.05-0.23	.780	<0.01-0.27	.790	0.90-1.89	.233
PST	<0.01-0.51	.861	0.10-0.86	.487	<0.01-0.23	.848	1.51-3.13	.153
	<0.01-0.52	.857	0.67-2.49	.200	0.06-0.88	.562	2.35-4.40	.082
PSDI	<0.01-0.21	.863	0.68-1.82	.252	0.63-2.36	.263	0.04-0.32	.679
	<0.01-0.40	.779	1.44-3.78	.140	0.02-0.78	.630	<0.01-0.08	.887

Note: SOM = Somatization; OC = Obsessive-Compulsive; IS = Interpersonal-Sensitivity;

DEP = Depression; ANX = Anxiety; HOS = Hostility; PHOB = Phobic Anxiety; PAR =

Paranoid Ideation; PSY = Psychoticism; GSI = Global Severity Index; PST = Positive

Symptom Total; PSDI = Positive Symptom Distress Index.

Data presented in gray rows and bolded reflect the total sample, results from the men are below.

Total sample: $n = 192$; sample of men: $n = 170$.

Table 12

Analysis of Variance Examining the Effects of Substance Use Disorder Severity on the Brief Symptom Inventory Scales and Indices as Continuous Variables

	Opioid		Cocaine		Cannabis		Alcohol	
	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>
SOM	0.41-1.24	.599	0.17-0.31	.920	1.70-2.72	.098	0.68-1.32	.391
	0.27-0.81	.798	0.21-0.48	.857	1.47-2.23	.128	0.81-1.69	.253
OC	1.05-1.62	.237	0.89-1.42	.322	2.37-3.22	.026	0.33-0.83	.751
	1.01-1.54	.267	1.24-1.90	.174	2.42-3.25	.023	0.44-0.89	.699
IS	1.73-2.37	.091	1.42-1.97	.164	2.41-3.26	.025	0.80-1.34	.297
	1.50-2.26	.115	1.33-2.07	.155	2.58-3.46	.016	0.87-1.63	.262
DEP	0.60-1.30	.493	0.14-0.47	.815	1.51-1.94	.147	0.29-0.71	.741
	0.42-0.99	.673	0.61-1.18	.445	1.19-1.88	.178	0.20-0.71	.824
ANX	0.31-0.87	.632	0.35-0.52	.793	1.99-2.31	.079	0.16-0.35	.924
	0.26-0.73	.724	0.35-0.65	.782	1.79-2.15	.121	0.11-0.29	.961
HOS	0.54-0.85	.627	1.78-2.44	.081	2.78-3.55	.019	1.79-3.20	.042
	0.44-0.64	.740	1.56-2.27	.109	2.83-3.81	.017	1.73-3.20	.048
PHOB	0.49-1.52	.449	0.48-0.80	.590	2.91-4.28	.008	0.62-1.14	.486
	0.52-1.58	.488	0.74-1.01	.439	2.89-4.44	.008	0.69-1.20	.479
PAR	0.99-1.75	.286	0.33-0.76	.758	4.19-6.11	<.001	1.71-2.39	.081
	0.91-1.61	.347	0.34-0.86	.670	4.29-6.21	<.001	1.58-2.16	.102
PSY	1.09-2.25	.201	0.03-0.14	.983	2.89-3.96	.009	0.58-1.20	.475
	0.87-2.03	.261	0.15-0.39	.892	2.79-4.12	.009	0.64-1.29	.405
GSI	0.88-1.38	.372	0.53-0.82	.548	2.71-3.44	.014	0.49-0.94	.590
	0.69-1.11	.506	0.72-1.06	.451	2.61-3.48	.015	0.52-0.98	.547
PST	0.86-1.22	.398	0.31-0.56	.762	3.02-4.07	.007	1.09-1.88	.212
	0.67-0.98	.528	0.66-1.07	.459	3.02-4.16	.006	1.32-2.16	.151
PSDI	0.83-1.35	.448	0.89-1.34	.316	2.48-3.04	.027	1.18-1.50	.278
	0.68-1.08	.556	0.98-1.49	.297	2.20-2.68	.047	0.68-1.01	.473

Note: SOM = Somatization; OC = Obsessive-Compulsive; IS = Interpersonal-Sensitivity; DEP = Depression; ANX = Anxiety; HOS = Hostility; PHOB = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism; GSI = Global Severity Index; PST = Positive Symptom Total; PSDI = Positive Symptom Distress Index.

Data presented in gray rows and bolded reflect the total sample with results from the men presented below.

Total sample: $n = 192$; sample of men: $n = 170$.

Table 13

Analysis of Covariance Examining the Effects of Substance Use Disorder Severity on the Brief Symptom Inventory Scales and Indices as Continuous Variables Controlling for Age

	Opioid		Cocaine		Cannabis		Alcohol	
	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>	<i>F</i> range	<i>p</i>
SOM	0.47-1.37	.531	0.18-0.35	.912	1.55-2.69	.133	0.62-1.28	.417
	0.33-1.01	.681	0.26-0.69	.779	1.33-2.17	.174	0.71-1.48	.286
OC	1.14-1.68	.227	0.88-1.38	.323	2.35-3.14	.027	0.34-0.83	.750
	0.98-1.50	.297	1.30-1.96	.142	2.49-3.34	.021	0.42-0.86	.713
IS	1.77-2.44	.084	1.41-1.93	.170	2.37-3.19	.026	0.81-1.36	.302
	1.48-2.23	.123	1.41-2.08	.147	2.58-3.45	.016	0.86-1.59	.265
DEP	0.64-1.34	.503	0.14-0.47	.806	1.49-1.94	.151	0.29-0.71	.748
	0.41-0.94	.704	0.68-1.22	.433	1.19-1.87	.170	0.20-0.69	.821
ANX	0.29-0.85	.644	0.35-0.54	.767	1.94-2.26	.083	0.15-0.36	.919
	0.26-0.72	.728	0.41-0.78	.700	1.74-2.07	.126	0.10-0.32	.950
HOS	0.85-1.36	.402	1.57-2.15	.119	2.62-3.44	.024	1.76-3.07	.042
	0.62-0.98	.567	1.45-1.99	.145	2.64-3.67	.021	1.72-3.09	.047
PHOB	0.50-1.49	.487	0.48-0.80	.584	2.87-4.26	.008	0.64-1.14	.484
	0.32-1.21	.620	0.83-1.15	.372	2.94-4.57	.009	0.70-1.24	.480
PAR	1.19-2.03	.227	0.32-0.72	.764	4.00-5.86	<.001	1.69-2.33	.083
	0.84-1.59	.377	0.35-0.86	.652	4.43-6.31	<.001	1.58-2.18	.104
PSY	1.23-2.48	.181	0.02-0.13	.987	2.85-3.89	.010	0.54-1.19	.479
	0.85-1.98	.333	0.16-0.44	.866	2.26-4.18	.008	0.63-1.33	.405
GSI	0.85-1.41	.374	0.53-0.84	.549	2.69-3.42	.015	0.49-0.94	.593
	0.58-0.99	.576	0.79-1.16	.399	2.67-3.58	.014	0.51-1.02	.557
PST	0.84-1.25	.403	0.31-0.60	.760	2.99-4.06	.007	1.09-1.87	.210
	0.58-0.87	.580	0.82-1.24	.382	3.08-4.29	.005	1.27-2.19	.160
PSDI	0.88-1.39	.437	0.89-1.33	.315	2.45-3.02	.028	1.13-1.50	.277
	0.66-1.08	.564	0.98-1.46	.298	2.20-2.67	.048	0.71-1.03	.463

Note: SOM = Somatization; OC = Obsessive-Compulsive; IS = Interpersonal-Sensitivity; DEP = Depression; ANX = Anxiety; HOS = Hostility; PHOB = Phobic Anxiety; PAR = Paranoid Ideation; PSY = Psychoticism; GSI = Global Severity Index; PST = Positive Symptom Total; PSDI = Positive Symptom Distress Index.

Data presented in gray rows and bolded reflect the total sample, results from the men are below.

Total sample: $n = 192$; sample of men: $n = 170$.

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