

THE EFFECT OF THE BRAIN DISEASE MODEL OF ADDICTION ON JUROR
PERCEPTIONS OF CULPABILITY

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ABSTRACT

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The role of the brain in drug and alcohol abuse has become an increasingly studied variable in the development of addiction. Regardless of the extensive research base supporting the perspective of addiction as a chronic relapsing disease of the brain, practitioners, the general public, and the criminal justice system alike only display partial support for this model. Research on endorsement of the brain disease model (BDM) of addiction is variable; however, several studies have reflected complete or partial participant acceptance of the BDM. Simultaneously, these same participants lack empathetic responses towards substance using individuals, often maintaining the belief addiction is a decision. Of particular interest is the effect this differentiation of the BDM and empathy has on perceptions of criminal culpability. The present study sought to examine the effect that expert testimony provided on the BDM had on assigned sentence lengths by mock jury members. Participants randomly assigned to an experimental group read a mock court transcript, either with expert testimony on the BDM or without, and then assigned a sentence length for the offender, ranging from six months to two years. It was hypothesized that the results would reflect a mitigating effect of the BDM in the condition in which it is provided on sentencing lengths, resulting in significantly shorter sentences for mock jurors exposed to the expert testimony. Results indicated that there was no significant difference between control and experimental groups, suggesting that mock jurors do not take contextual information into consideration when sentencing an offender on trial for drug-related crime.

KEY WORDS: Substance abuse, Jury decision making, Brain disease model of addiction

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CHAPTER I

Introduction

For several decades, researchers in the United States have contributed extensive literature on the nature of substance use disorders that has resulted in a shift in scientific mindset from viewing it as a moralistic and behaviorally based issue of character, to a medical issue of brain disease (Bell, Carter, Mathews, Gartner, Lucke & Hall, 2014). In 1997, Alan I. Leshner, then the director of the National Institute of Drug Addiction (NIDA), firmly and publicly affixed the official stance of the NIDA on drug addiction as a brain disease. In his 1997 paper, Leshner stated that over 20 years of research had supported the supposition that the brain plays a significant factor among individuals in the transition of recreational drug use to substance use disorders (SUDs). Additionally, he explained that such research unequivocally points to the need for policy reform with respect to stigma and treatment of such individuals. At this time, both the NIDA, and the American Society of Addiction Medicine (ASAM) support Leshner's perspective, and define drug and alcohol addiction as a chronic, relapsing disease of the brain (ASAM, 2011; NIDA, 2016). Irrespective of the fact that the evidence has provided substantial support for the brain disease model (BDM) of addiction for decades, public perspectives on individuals with SUDs, treatment of addiction, and the handling of drug-related crime have not necessarily responded in kind (Meurk et al., 2014; Meurk, Hall, Morphett, Carter & Lucke 2013; Spohn & Belenko, 2013; Spohn, Kim, Belenko & Brennan, 2014). The judicial system and practitioners alike have varying views on the importance of the BDM in the treatment of individuals with SUDs, as well as the responsibility assigned to the individual for drug-related offenses (Blum et al, 1989; Lussier, Perlman & Breen,

1997; Macdonald, Erickson & Allen, 1999; Meurk et al., 2014; Meurk et al., 2013; Spohn & Belenko, 2013; Spohn et al., 2014; Wild, Graham & Rehm, 1998). To this end, previous research has indicated that offenders with drug use histories, or whom are on trial for drug-related crime, are more likely to be given severe sentences due to their disposition as individuals with SUDs (Macdonald et al., 1999; Spohn & Belenko, 2013; Spohn et al., 2014). Although some of this research has included public perception on drug addict/drug-offender culpability, most has focused on documented sentencing histories, or opinions of active judges (Macdonald et al., 1999; Spohn & Belenko, 2013; Spohn et al., 2014). In 2013 and 2014, Meurk and colleagues examined public perception of the BDM of addiction and its effect on the endorsement of coercive drug treatment and the role of the brain in addiction after giving participants a brief BDM education. These researchers found that the general public tended to endorse the concept of the brain as a factor in addiction; however, this mindset did not seem to impact their perspective on the treatment of individuals with SUDs. The present research seeks to measure the relationship between brief BDM education and subsequent assignment of offender culpability in a courtroom setting by prospective jurors, extending the existing research.

Brain Disease Model of Addiction

For the purpose of this study, it is important to clearly define the difference between the terminology of “substance-use disorder” and “addiction”. In 2016, Volkow, Koob and McLellan wrote that “addiction” is only used interchangeably with “substance-use disorder” (SUD) when the severity of the SUD meets the diagnostic criteria for a “severe” SUD on a range of mild (2-3 symptoms), moderate (4-5 symptoms), or severe (6 or more symptoms). This is defined by the diagnostic criteria set forth by the 5th edition

of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The DSM-5 identifies the primary characteristics of SUDs as in-taking the substance more often or in a higher volume than intended, an inability to cut-down or discontinue use despite efforts to do so, a preoccupation with obtaining or using the substance, craving of the substance, social impairment, withdrawal, and tolerance (American Psychiatric Association, 2013). Due to this differentiation in the terminology, the current study will refer to “addiction” as meaning a SUD meeting the criteria of the severe specifier.

In treatment, public policy, and the justice system, there are two distinct perspectives on drug addiction; the brain disease model and the moral weakness model (Blum, Roman & Bennett, 1989; Lawrence, Rasinski, Yoon & Curlin, 2013; Meurk, Carter, Partridge, Lucke & Hall, 2014). The latter model focuses on the personal characteristics of the individual, attributing their drug use to poor decision making and a lack of moral structure, leading them into a degenerative lifestyle of addiction. Proponents of this model often refer to the individual’s decision to first use the drug, believing that regardless of physical dependence that may later follow the social or recreational use, the individual is entirely at fault for engaging in use of the illicit substance, and that continuing to use the drug is a conscious, moral choice. From this point of view, addicted individuals are solely responsible for their addiction as well as abstaining from drug use. This model posits that individuals with SUDs continue to use drugs because they are unmotivated to change (Kloss & Lisman, 2003). In contrast, the BDM of addiction is rooted in the understanding that chronic drug use leads to neurological changes in the brain at the molecular, cellular, functional, and structural levels that are not immediately reversible and affect multiple aspects of an individual’s

ability (or lack thereof) to return to a sober lifestyle (Leshner, 1997; NIDA, 2016; Volkow et al., 2016).

The range of abusable substances is vast, and each substance contains properties that may exert unique effects on the consumer, yet nearly all substances affect the same pathway within the brain; the mesolimbic reward system (Leshner, 1997). This pathway sits deep within the brain and is responsible for the assessment of reward and punishment, as well as the release of the “feel good” neurotransmitter dopamine (ASAM, 2011; Koob & Volkow, 2010; Leshner, 1997; NIDA, 2016; Taber, Black, Porrino & Hurley, 2012; Volkow et al. 2016). Other key structures of the brain that play a role in addiction are the anterior cingulate cortex, basal forebrain, hippocampus, orbitofrontal cortex, and the amygdala (Fowler, Volkow, Kassed & Chang, 2007; Koob & Volkow, 2010; Volkow et al., 2016). Previous literature has described the cycle of addiction in three phases, with each phase activating different neurobiological circuits: binge/intoxication, withdrawal/negative affect, and preoccupation/anticipation (Koob & Volkow, 2010; Taber et al., 2012; Volkow et al., 2016).

The first phase, binge/intoxication, is associated with a sharp increase of activity in the dopaminergic pathways in the brain caused by the consumption of a drug of abuse. This substance activates the dopamine receptors in the brain that are connected with associative learning to repeated use of the substance in the same context or environment. This learning causes the brain to eventually respond (release dopamine) to the environment in which the individual is using, rather than the substance itself, causing the individual to crave the drug due to the environmental setting being paired with rewarding sensations (Volkow et al., 2016). Additionally, this reward system within the

brain is designed to stop producing dopamine once the craving is satiated (e.g., when hunger desists upon eating); however, the processing of dopamine eliciting substances does not cue the dopaminergic pathway to discontinue firing. Therefore, drugs cause a persistent and abnormal volume of dopamine within the brain, in turn creating an unusually rewarding experience (ASAM, 2011; NIDA, 2016; Taber et al., 2012; Volkow et al., 2016). During this phase, the individual experiences what is deemed positive reinforcement; that is, behavior motivated by the addition of positive rewards, e.g., flooding of dopamine (Koob & Volkow, 2010). At this phase, individuals who abuse substances show symptoms of impulse control disorders, characterized by arousal prior to committing an anticipated act, and later deriving pleasure and rewarding experience from committing the behavior. Impulsive disorders are typically driven by positive reinforcement (Koob & Volkow, 2010)

The second phase, withdrawal and negative affect, occurs when ordinary, primary rewards lose their positive impact on the individual's brain; thus, the motivation to obtain these normal rewards is significantly diminished (Volkow et al., 2016). It has been observed in the brain of individuals with SUDs that sensitivity to reward decreases the production of dopamine, leading to severe states of depression and displeasure (Taber et al., 2012; Volkow et al., 2016). This withdrawal experience is typical in the cycle of relapse, as an effective method of relieving the depression associated with discontinued use is to consume the drug again (Koob & Volkow, 2010; Volkow et al., 2016).

However, lower dopamine levels than previously exhibited during drug intake is indicative of addiction; thus, chronic use ultimately causes diminished production of dopamine. The interaction of the increased tolerance to rewarding stimuli and the

decrease in production of dopamine during consumption results in use of the drug to simply feel “normal,” and no longer produces an effective “high” (Taber et al., 2012; Volkow et al., 2016). According to Volkow and colleagues in 2016, the chronic use of dopamine enhancing substances leads to alterations in the synaptic connections in the amygdala, while these specific connections increase the individual’s vulnerability to respond poorly to stressful events, thus causing negative emotions. The American Society of Addiction Medicine (2011) states that intoxication is different from addiction in that anyone who uses drugs recreationally experiences only the positive effect of intoxication, the pleasurable increase in dopamine. However, the negative affect, susceptibility to stressful events, and the physical withdrawal symptoms are only associated with the addiction or physical dependence on the substance

Preoccupation and anticipation constitute the third phase, and is what characterizes the chronic relapse associated with addiction (Koob & Volkow, 2010). In this phase, the effect of the decrease in availability of dopamine on the prefrontal cortex becomes apparent (Taber, et al., 2012). The prefrontal cortex is primarily responsible for executive functioning, decision making, assessment of error, difference of gratification and self-control (ASAM, 2011). Animal studies have suggested that relapse during this stage occurs either from the presence of stimuli paired with drug use, or drug-seeking behaviors are activated by stressful events (e.g. withdrawal), which as previously mentioned, are likely to be evaluated more negatively by an individual with an SUD than by a “non-addict” (Koob & Volkow, 2012). According to Volkow and colleagues (2016), the down-regulation in the sensitivity to dopamine is located near the prefrontal regions of the brain, as well as reduced signaling of glutamate. The disruption in

signaling of both dopamine and glutamate ultimately weakens an individual's ability to make rational decisions, such as discontinuing use of the addictive substance (Volkow et al., 2016). The latter two phases are related to a shift from impulsive behaviors, to compulsive behaviors. Compulsive behavior disorders are characterized by negative emotionality, such as anxiety or fear, prior to committing an anticipated act. Once the individual commits the anticipated behavior, they derive relief from these negative experiences. For instance, the individual no longer feels dysphoria due to the sensitivity to stress and down-regulation of dopamine (Koob & Volkow, 2010).

The BDM is characterized by the three phases of addiction that primarily affect an individual's dopaminergic pathways, causing alterations in the structure and function of the brain that are not immediately reversible when not under the influence of the drug. These alterations may take some months to years to recover, although the various neurological effects listed here are only a small scale of what occurs within the brain of an individual with an SUD (Spohn & Belenko, 2013; Volkow et al., 2016).

Collectively, addiction is a chronic, relapsing disease of the brain's reward system that is characterized by compulsive drug seeking regardless of negative impacts and harmful consequences, such as incarceration (ASAM, 2011; NIDA, 2016). The BDM of addiction is often deemed the "medicalization of addiction", referring to the perspective that medical interventions, including psychological treatment, are necessary to effectively treat addiction (Bell et al., 2014). The medicalization comprises several goals, including: reducing the stigma surrounding addiction, increasing funding for treatment of addiction through the medical field, and increasing public acceptance of addiction as a medical disease, resulting in a favored perspective that addiction should be treated through

medical services rather than punished in the criminal justice system (Bell et al., 2014; Meurk et al., 2014). Opponents of the disease model believe that it negates the responsibility of the individual to change their behavior, take accountability for the illicit behaviors, and to become more fatalistic in their perception of their own sense of agency (Bell et al., 2014; Meurk et al., 2014). In this way, it is conceptualized that individuals with SUDs tend to engage in learned helplessness and may no longer strive to obtain complete sobriety as they do not believe they can ever be completely cured of their addiction (Bell et al., 2014). Additionally, it is of concern that the BDM of addiction normalizes the notion that individuals with SUDs have no self-control and must be coerced into treatment, especially when engaged in the criminal justice system (Szott, 2015).

Public Perceptions of Addiction

There is an overarching impression that the BDM has been accepted by researchers and helping professionals, yet studies have demonstrated that this is not always the case for the general public (Blum et al, 1989; Meurk et al., 2014; Meurk et al., 2013). Public perception of the BDM tends to be convoluted. In general, public opinion aligns with the concept of addiction as an “illness”, but endorsement of addiction in this context does not necessarily change opinions on how individuals with SUDs should be treated (Blum et al., 1989). When Blum and colleagues (1989) examined the position of 524 Georgia adults on alcoholism and cocaine addiction, they found that 92-97% of participants agreed that cocaine addiction and alcoholism (respectively) can be treated successfully, and that 81-89% of participants believe cocaine addiction and alcoholism (respectively) should be viewed as an “illness”; however, participants were three and a

half times as likely to believe individuals who use cocaine should be treated as criminals (31%) when compared to “alcoholics” (8%). This same study found that less than half of the participants (41%) accepted the disease model of addiction while simultaneously rejecting the role of moral weakness in the addiction process (Blum et al., 1989). A later study comprising 1,263 Australian participants examining public attitudes towards individuals addicted to either heroin or alcohol concluded that 71% of participants believed individuals who use heroin should be mandated to receive treatment, but that those who abuse alcohol should not. Likewise, 31.7% of participants agreed that individuals who use heroin should be imprisoned. Participants who held the perspective that addiction is primarily due to personal characteristics were 2.3 times more likely to suggest imprisonment, although only borderline significant, endorsement of the disease model predicted lower support for the imprisonment of individuals who use heroin (Meurk et al., 2014). Meurk and colleagues (2014) observed that neither participants’ own experience with drugs, nor the drug experiences of others close to them, had any significant impact on endorsement of coerced treatment. Not surprisingly, this same study found significantly higher stigma scores associated with heroin addiction than alcohol addiction, suggesting that individuals who use heroin are viewed more negatively than those with alcohol addiction (Meurk et al., 2014). Nonetheless, Meurk and colleagues (2013) conducted 55 qualitative interviews on an Australian sample of participants to assess acceptance of the disease model, finding that 51% of participants identified the brain as a significant factor in the cause of addiction. After participants were presented with a statement about the BDM, an additional 4% agreed the brain played a significant role, while a further 38% agreed that the BDM was a plausible explanation for addiction.

Overall, 93% of participants accepted the brain plays some role in the development of addiction. Interestingly, endorsement of the importance of the brain did not translate into support for addiction as a disease, with most participants contesting the term “disease” itself, suggesting the public’s perception of “disease” and “brain illness” as mutually exclusive. Ambivalence about the disease model was reflected in participants’ perspective on the treatment of individuals with SUDs, with 58% believing knowledge of the BDM would influence their views on individuals with SUDs. Regardless, this belief was unrelated to their expression of empathy towards these same persons, suggesting the acceptance of the brain as important and empathic responses towards individuals with SUDs were inconsistent, representing an overall disharmony among public perceptions of the disease model, importance of the brain in addiction, and public empathy for those that abuse substances.

In concert with the general public, there are relative inconsistencies among helping professionals with respect to their endorsement of the disease model. For instance, in 2013, Lawrence and colleagues demonstrated that the moral model of addiction tends to persist in both psychiatrists and primary care physicians (PCPs), with a combined 11% believing moral failings play a significant role in the development of addiction. Between psychiatrists and PCPs, there are also significant differences in perspective and approach of addicted clients, with psychiatrists being more likely to believe addiction is a disease than their PCP counterparts (64% versus 56%). Psychiatrists were more likely to give priority to the disease model when treating patients than PCPs, although psychiatrists were still less likely to endorse the disease model to drug addiction than alcohol addiction (36% versus 48%). Similarly, in a study of

Australian clinicians and neuroscientists, one-third of the combined participants strongly supported the BDM, while the remaining two-thirds of the participants expressed either a negative, or a mixture of positive and negative perspectives on the BDM (Bell et al., 2014). Interestingly, clinicians were more likely to express skepticism of the BDM than were the neuroscientists, regardless of the fact that clinicians would have more direct contact and experience with addicted clients than would the neuroscientists (Bell et al., 2014). Regardless, all but one participant reported using the BDM as a partial explanation of addiction to their clients, suggesting a general acceptance of the role of the brain in addiction. Contrary to the findings by Bell and colleagues (2014) who examined practitioners at the doctoral level, a study conducted in 1996 demonstrated that among substance abuse treatment staff, higher education was negatively correlated with endorsement of the BDM (Humphreys, Noke & Moos, 1996). In 2003, Kloss and Lisman demonstrated a moderate to high endorsement of the disease model by both mental health clinicians (MHCs) and addiction clinicians (ACs), finding attributions of blame (the responsibility for causing their problem) for mentally ill-chemically addicted patients was much higher for MHCs than ACs. This underscores previous findings from Meurk and colleagues in 2013 that endorsement of the BDM does not automatically translate into participants responding to individuals with SUD's in an empathetic manner; rather, they continue attribute an individual's SUD to moral failings and personal choice.

Addiction and the Criminal Justice System

In 2010, it was estimated by state and local agencies that 1,336,500 offenders were arrested for drug possession or use; an 80% increase since 1990 (Snyder, 2012). More importantly, it is estimated that 53% of state and 45% of federal inmates meet

DSM-IV criteria for either drug dependence or abuse (DSM-5 criteria for SUDs on a range of mild to severe), while one-third of state inmates report being under the influence at the time of the crime (Mumola & Karberg, 2004). State property offenders were the most likely to be dependent on or abusing drugs, while 68% of burglary offenders used drugs during the last month prior to the offense (Mumola & Karberg, 2004).

In previous studies, attribution of culpability and sentence lengths have varied based on drug use, drug history, drug type, and form of drug offense (e.g., trafficking versus possession), with a tendency for these variables to aggravate the sentencing, resulting in longer sentences (Lussier et al., 1977; Macdonald et al., 1999; Spohn & Belenko, 2013; Spohn et al., 2014; Wild et al., 1998). In 2013, Spohn and Belenko demonstrated that drug use had both a direct and indirect effect on sentencing lengths, finding that offenders who were required to remain in custody prior to trial had larger sentences imposed than offenders that were allowed to make bail. Simultaneously, offenders who were using “hard” drugs (e.g., not marijuana) at the time of the crime were more than two times as likely to be mandated to pre-trial detention (Spohn & Belenko, 2013; Spohn et al., 2014). Interestingly, although individuals who use methamphetamine were less likely to be detained prior to trial, use of methamphetamine or cocaine resulted in significantly larger sentences than use of other drugs (Spohn & Belenko, 2013; Spohn et al., 2014). Research also demonstrated that for defendants with previous drug charges on trial for drug trafficking, a trial by judge and jury yielded higher rates of punishment and attribution of responsibility than by a judge alone, suggesting juries may be more likely to assign culpability to drug offenders than judges are (Lussier et al., 1977). Likewise, Macdonald and colleagues (1999) learned that Canadian judges were

significantly more likely to increase sentence severity based on drug history, and the most likely to hand down punitive sentences for offenders with longstanding histories of drug use. However, this same study identified that treatment seeking behavior presented as a mitigating factor in sentencing of offenders with a history of use, especially when the offender had already sought treatment in the past, suggesting offenders who present with desire to change their pattern of use are perceived as less culpable than offenders who have not independently and outwardly expressed that desire (Macdonald et al., 1999).

Current Study

To the best of my knowledge, no study has examined the interaction between jurors' perception of defendant culpability for drug-related crimes and the brain disease model of addiction. The current study examines the extent to which expert testimony on the brain disease model of addiction will influence sentence lengths for defendants on trial for drug-related burglary. I hypothesize that participants exposed to the professional testimony outlining the BDM of addiction will be significantly more likely to assign shorter sentences to the hypothetical offender than participants in the control group whose court transcript does not include professional testimony on the brain disease model of addiction.

CHAPTER II

Method

Participants

Prior to beginning the study, participants were presented with the purpose of the study, as well as the potential risks and benefits from completing this study and provided their informed consent. A total of 329 participants completed the survey through Amazon Mechanical Turk and were compensated \$0.25 upon completion of the survey. Of the 329 participants, 18 were excluded from the analyses due to missing information, and 68 participants were excluded due to their inability to pass the manipulation check, totaling 243 participants for the analyses. The participants were primarily female (62%), Caucasian (79%), college educated (37%), between the ages of 31 and 40 years-old (31%), residing in the Southern region of the United States (40%), and knew someone with a history of problematic drug use (45%). For a complete demographics report, see Table 1.

Table 1

Participant Demographics

Demographic	Descriptor	Percentage
Age	18-24	7
	25-30	20.6
	31-40	30.5
	41-50	17.3
	51-60	15.6
	61-70	9.1

(continued)

Demographic	Descriptor	Percentage
Gender	Male	38.3
	Female	61.7
Race	American Indian/Alaskan Native	1.6
	Asian/Native Hawaiian/Pacific Islander	6.6
	Black/African American	5.8
	Latino/Hispanic	5.8
	Two or more races	1.2
	White/Caucasian Other	79.0
Level of Education	Less than high school	.8
	High school diploma/GED	8.2
	Some college/Trade skill/Vocational education (less than Associate's)	25.5
	Associate's degree	12.3
	Bachelor's degree	36.6
	Graduate degree (Master's or Doctorate)	16.5

(continued)

Demographic	Descriptor	Percentage
Residential Region	North East	19.3
	Midwest	18.9
	South	39.5
	West	22.2

Note: All values reflect the final data set after participants were excluded due to inattention to manipulation items and missing data.

Materials

For the purpose of generalizability of the findings to real-world court rooms, the participants read a passage formatted as an official court transcript. The control group read a transcript that reviewed the basic facts of the case, but did not include testimony (see Appendix A). The experimental group read the same transcript as the control group, but it also included testimony about the BDM from an expert witness. The transcript stated that the expert witness worked as a professor and researcher at a local state university (see Appendix B).

Procedures

After reviewing the purpose of the study, as well as risks and benefits of participation, participants electronically signed a consent form. They then completed basic demographic information, including age, gender, race, residential region, and highest level of education. At that time, participants then read their respective court transcripts based on their randomly assigned group placement either in the control group or in the experimental group. Control group participants read a court transcript about the facts of the case, detailing the arrest of a burglary suspect inside of a pharmacy after hours (see Appendix A). According to Mumola and Karberg (2004), state property

offenders are among the most likely to be dependent on or abusing drugs at the time of their crime, while 68% of burglary offenders used drugs during the last month prior to the offense; therefore, the use of a burglary charge in the case is most likely to resemble a real-life criminal case. The facts of the case also included an admission of guilt by the defendant, stating the defendant was withdrawing from opiates and was in search of opiate prescription pills at the pharmacy to relieve the withdrawal symptoms. It was stated in the facts of the case that a hospital physician confirmed the defendant's claims of opiate withdrawal. Participants in the experimental group read a court transcript identical to the control group; however, the experimental court transcript also included the expert testimony of an addictions researcher about the brain disease model of addiction. These circumstances presented in the court transcript directly related to the impact of the disruption in rational decision making caused by alterations in neurotransmitter communication due to chronic drug use, as well as the strong incentive to relapse (or continue drug seeking) in an effort to escape withdrawal symptoms (negative reinforcement). Once participants had finished reading their respective court transcripts, they were asked to choose a sentence length they believed was best assigned to the case. The participants were instructed to assigned a sentence length that falls between six-months and two-years, by using months as a unit of measurement. The sentencing options were a range between the minimum and maximum imprisonment lengths for a first-time state jail felony offender (Tex. Penal Code § 3.12.35(c) (2011)) charged with burglary in the State of Texas (Tex. Penal Code § 7.30.02(a)(1) (1994)). Participants then reported whether they have had personal experience with problematic drug use, personal experience with problematic alcohol use; if they know someone who

has experienced problematic drug use, if they know someone who has experienced problematic alcohol use, or if they have no personal or other experience at all with problematic drug and alcohol use. Participants then completed a manipulation check by correctly answering at least 4 out of 5 multiple choice questions about the court transcript. Participants that could not correctly answer at least 4 questions had their data excluded from the analyses.

Table 2

ANCOVA Results

Demographic	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Corrected Model	361.50	10	36.15	1.17	.31
Intercept	.92	1	.92	.03	.86
Gender	65.61	1	65.61	2.12	.15
Age	53.37	1	53.37	1.73	.19
Race	139.85	1	139.85	4.52	.04
Residential Region	.50	1	.50	.02	.90
Education	13.29	1	13.29	.43	.51
Personal Problematic Drug Use	.35	1	.35	.01	.91
Personal Problematic Alcohol Use	.84	1	.84	.03	.87
Other's Problematic Drug Use	3.80	1	3.80	.12	.73
Other's Problematic Alcohol Use	.94	1	.94	.03	.86

(continued)

Demographic	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Group	6.77	1	6.77	.22	.64
Error	7176.80	232	30.94		
Total	16131.00	243			
Corrected Total	7538.31	242			

CHAPTER III

Results

Prior to testing the study hypothesis, descriptive statistics were analyzed. Of the 243 participants, 131 were randomly assigned to the control group, while 112 participants were randomly assigned to the experimental group. The average sentence length assigned was 10.95 months with a standard deviation of 5.58 months. The distribution of the sentencing variable satisfied the assumptions of the ANCOVA modeling, and no transformations were required. With respect to drug use, 7% of participants reported they had a personal history of problematic drug use, while 45.3% reported they knew someone else with a problematic history of drug use. Personal problematic alcohol use was less common, with 4.9% of participants endorsing a personal history, and 35.4% reporting knowing others with a history of problematic alcohol use. Slightly less than one third of the participants reported no personal or other association with problematic alcohol or drug use (30.5%). For the current study, assigned sentence lengths in months served as the dependent variable, while exposure to a court transcript detailing the brain disease model of addiction served as the independent variable. The data were first analyzed using an independent samples t-test that identified no significant difference in assigned sentence lengths, in months, between the experimental ($M = 11.1, SD = 5.9$) and control conditions ($M = 10.8, SD = 5.3$), $t(241) = -.37, p = .73$. In order to identify between-subjects main effects, a one-way ANCOVA was conducted and indicated that there was no between-subjects main effects for condition type $F(1, 232) = .22, p = .64$. With the exception of race, none of the covariate effects were significantly associated with sentence length (see Table 2). With respect to race, the ANCOVA identified a significant

race effect, $F(1, 232) = 4.52, p = .04$ with *post hoc* analyses revealing that participants who identify as Black/African American assigned the shortest average sentence length ($M = 7.86, SD = 2.74, n = 14$) in comparison to White/Caucasian participants ($M = 11.44, SD = 5.80, n = 192$), Asian/Native American/Pacific Islander participants ($M = 8.63, SD = 3.30, n = 16$), and Latino/Hispanic participants ($M = 9.43, SD = 2.95, n = 14$), the three other most prevalent ethnicities represented among participants. See Table 3 for a full report of sentence lengths assigned per demographic variable. Finally, I conducted an exploratory analysis examining the interaction between condition and race among the White and Black/African American participants, which was also nonsignificant $F(1, 202) = .67, p = .41$.

Table 3

Means and Standard Deviations of Sentence Lengths Based on Demographics

Demographics	Descriptor	Mean	Standard Deviation
Age	18-24	9.47	4.74
	25-30	10.10	5.59
	31-40	10.34	5.29
	41-50	13.14	6.16
	51-60	11.53	5.53
	61-70	10.86	5.35
Gender	Males	10.14	5.03
	Female	11.45	5.86
Race	American Indian/Alaskan Native	12.00	8.49
	Asian/Native Hawaiian/Pacific Islander	8.63	3.30
	Black/African American	7.86	2.74

(continued)

Demographics	Descriptor	Mean	Standard Deviation
Education	Latino/Hispanic	9.43	2.95
	White/Caucasian	11.44	5.80
	Two or more	12.00	10.39
	Some high school	15.50	12.02
	High school/Diploma/GED	11.50	5.60
	Some college/Trade skill/Vocational education (less than Associate's)	10.35	5.31
	Associate's degree	12.50	6.22
	Bachelor's degree	10.99	5.68
	Graduate degree (Master's or Doctorate)	10.01	4.92
Residential Region	North East	10.21	5.09
	Midwest	12.46	6.06
	South	10.73	5.60
	West	10.69	5.45

Note: All sentences are measured in months

CHAPTER IV

Discussion

Results of the current study suggest that educating prospective jurors on the brain disease model of addiction may not affect perceptions of culpability when assigning sentence lengths to offenders on trial for drug-related crimes, at least using the vignettes employed in the study. Indeed, contrary to the primary hypothesis, participants who were exposed to the court transcript detailing the BDM assigned slightly longer, but not statistically significantly different, sentences to prospective defendants than participants in the control group. This finding suggests that prospective jurors are unlikely to take the putative etiology that contributes to the context of the offense into consideration when assigning sentences for drug-related offenses, and are more likely to consider the offense itself. The null results are consistent with previous related research. For instance, Meurk and colleagues (2014), found that novel education about the BDM did not influence participants' attitudes towards treatment of individuals with SUDs.

Neither personal experience nor the experience of known others with problematic drug and/or alcohol use had any effect on assigned sentence lengths, mirroring a 2014 study by Meurk and colleagues when measuring endorsement of coercive substance abuse treatment. Interestingly, the present data reflected a contradiction to a study conducted by Humphreys and colleagues (1996), which identified higher education being negatively correlated with endorsement of the BDM. The current data set indicated that participants with graduate degrees assigned the shortest average sentences, while those with an associate's degree assigned longer average sentences than participants with bachelor's or graduate degrees. According to Humphreys et al. (1996), this negative correlation is observed in individuals with greater education, as these individuals may

evaluate theories based on analysis of scientific proof, thus, rejecting the BDM, as Humphreys and colleagues postulated that the BDM is subjective and anecdotal. In contrast, the current study appealed to this same tendency for well-educated participants to utilize scientific, fact-based reasoning to identify justification for support of the BDM. Indeed, study procedures demonstrated to participants that the BDM is more than a simple subjective or anecdotal theory, and presented participants with supportive scientific facts. It is important to note that Humphreys et al. were measuring endorsement of the BDM, while the present study was measuring perceptions of culpability; therefore, the results can only be compared indirectly. In addition, and consistent with Blum et al. (1989), there were no differences in region of the country in which participants lived, suggesting that the results generalized across the rough geographic regions assessed in the current study. Further, Blum et al. found that participants 60 years-old and above were the least receptive to the BDM, and somewhat consistently, participants in the current study between the ages of 41 and 50 years-old assigned the longest sentences to the hypothetical offender, although the difference among age ranges was not significant. Previous research (Blum, et al. 1989; Meurk, et al. 2014) has also identified no significant sex differences in perceptions of justified imprisonment for individuals with SUDs, a finding that was also replicated in the current study.

Although there no specific hypothesis addressed possible racial differences, study findings regarding race are interesting and potentially important. Participants who identified as Black/African American assigned the shortest mean sentences of all race groups. Mumola and Karberg (2004) reported that offenders who identify as

Black/African American represent the largest proportion of offenders in both state (40.52%) and federal prisons (43.31%), while Black/African Americans represent a mere 12.6% of the general population according to the most recent U.S. Census Bureau report in 2010 (Rastogi, Johnson, Hoeffel & Drewery, 2011). Therefore, the finding that Black/African American participants provided more lenient sentences may reflect a distrust of the justice system engendered through the disproportionate representation of Black individuals at all levels of the justice system. Indeed, research has indicated that Black/African American citizens perceive others of the same race as being more likely to be stopped by police, jailed, and sentenced to death, subsequently leading to deeply held beliefs that the criminal justice system is racially biased (Henderson, Cullen, Cao, Browning & Kopache, 1997). This data suggests that Black/African Americans' negative perception of the criminal justice system as racially biased may have a direct effect on the sentencing of offenders on-trial for drug related crimes, regardless of education on the BDM. Additionally, the court transcript did not indicate the race, age, gender, residential region, or level of education of the offender, suggesting that Black/African American participants assigned shorter sentences without respect to the race or other identifiable characteristics of the offender. In the future, a similar study may examine the interaction between race of the offender and Black/African American participants' perceptions of culpability for drug-related crimes in conjunction with education on the BDM.

A potential limitation to the current study is the sample size ($n = 243$); a larger sample size may have reflected a more even distribution of participants, as a secondary limitation is the inequitable distribution of participant demographics. More specifically, the current data set indicated that the largest proportion of participants had obtained a

bachelor's degree (36.6%), while an overwhelming majority of participants were White/Caucasian (79%). A data set with more evenly distributed participant demographics should be sought for future research, by potentially employing stratified random sampling. In the past, it has been suggested that Amazon Mechanical Turk may provide a lower quality data set based on the rate of compensation for completing a survey. However, it is important to note that research has identified that the quality of data is unaffected by compensation rates, with mean alpha reliabilities within one hundredth of a point across various compensation levels, of which encompassed the compensation rate utilized for the present study (Buhrmester, Kwang & Gosling, 2011). In the future, a replication of this study should include ratings of endorsement of the BDM versus the moral weakness model as a covariate, as previous research has identified these endorsements impact perceptions of individuals with SUDs.

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APPENDIX A

Court Transcript for Control Group

CRIMINAL DISTRICT COURT
YORK COUNTY, SOVEREIGN STATE

-----X

IN THE MATTER OF:

SOVEREIGN STATE,

Plaintiff

Docket No.: 123-456

- Vs.

DEFENDANT,

Defendant

-----X

January 1, 2016

HELD AT:
SOVEREIGN STATE

123 Courtroom Street

BEFORE:

HONORABLE
Judge Hart

APPEARANCES:

JOHN SMITH
Attorney for the Plaintiff
SMITH AND ASSOCIATES

MICHAEL DOE
Attorney for the Defendant
DOE AND ASSOCIATES

FACTS

On the evening of January 20th, 2016, the Defendant was arrested inside of a closed pharmacy after security alarms were sounded. The Defendant admitted to entering the closed pharmacy after hours to find opiate pills. Defendant stated he is addicted to opiates and was experiencing withdrawal symptoms and knew the pharmacy had pills that could relieve the withdrawal symptoms by getting him high. After a local hospital physician examined the defendant, he confirmed the defendant was indeed suffering opiate withdrawal symptoms. Security cameras also showed the Defendant entering the pharmacy after hours. The Defendant is on trial for one charge of Burglary; a State Jail Felony as a first time offense.

A State Jail Felony carries a penalty of a minimum of 180 days in jail, and a maximum of 2 years in prison. Additionally, the Defendant may be fined up to \$10,000.

APPENDIX B

Court Transcript for Experimental Group

CRIMINAL DISTRICT COURT
YORK COUNTY, SOVEREIGN STATE

-----X

IN THE MATTER OF:

SOVEREIGN STATE,

Plaintiff

Docket No.: 123-456

- Vs.

DEFENDANT,

Defendant

-----X

January 1, 2016

HELD AT: 123 Courtroom Street
SOVEREIGN STATE

BEFORE: HONORABLE
Judge Hart

APPEARANCES: JOHN SMITH
Attorney for the Plaintiff
SMITH AND ASSOCIATES

MICHAEL DOE
Attorney for the Defendant
DOE AND ASSOCIATES

JESSE CORBIN
Expert Testimony
Department of Psychology and Philosophy
SOVEREIGN STATE UNIVERSITY

FACTS

On the evening of January 20th, 2016, the Defendant was arrested inside of a closed pharmacy after security alarms were sounded. The Defendant admitted to entering the closed pharmacy after hours to find opiate pills. Defendant stated he is addicted to opiates and was experiencing withdrawal symptoms and knew the pharmacy had pills that could relieve the withdrawal symptoms. After a local hospital physician examined the defendant, he confirmed the defendant was indeed suffering opiate withdrawal symptoms. Security cameras also showed the Defendant entering the pharmacy after hours. The Defendant is on trial for one charge of Burglary; a State Jail Felony as a first time offense.

A State Jail Felony carries a penalty of a minimum of 180 days in jail, and a maximum of 2 years in prison. Additionally, the Defendant may be fined up to \$10,000.

PROCEEDINGS

DOCTOR JESSE CORBIN, having been first duly sworn, testified
as follows:

DIRECT EXAMINATION

BY MR. MICHAEL DOE

Q. Doctor Corbin, would you please state for the court where you work, and what you specialize in?

A. Yes, sir. I am Doctor Jesse Corbin, licensed psychologist. I work as an Associate Professor and researcher at Sovereign State University in the Department of Psychology and Philosophy. I specialize in neurology of addiction, and the psychology of criminal behavior.

Q. Would you say you are familiar with current research on the issue drug abuse?

A. I would.

Q. The Defendant has previously admitted that he broke into the pharmacy after hours to obtain prescription drugs. The Defendant states he has become dependent on opiate drugs and was experiencing withdrawal symptoms that led him to break into the store. In your expert opinion, what would motivate the defendant to commit this act?

A. Addiction that goes hand-in-hand with physical withdrawal symptoms typically comes after repeated drug use. This kind of constant exposure to drugs can cause alterations in the brain at the structural, functional, cellular, and molecular level.

Q. Why would the Defendant repeatedly engage in an activity as high risk as drug use?

A. Nearly all drugs of addiction activate the same parts of your brain that make you feel good, like when you eat food or have sex. These parts release a chemical called dopamine, which is natural. But the amount of dopamine that is released is unnatural. That is, drugs make your brain feel unnaturally good, so nothing else but the drug can make the addict feel that good.

Q: So you're saying the Defendant engaged in drug use because it felt good?

A: At first, yes.

Q: What do you mean, "at first"?

A: Later in addiction, the brain loses its capacity to feel normal without the drugs. In fact, this dysfunction in the brain causes the addict to no longer enjoy things like food and sex the way non-substance involved individuals do. Someone like the Defendant would even feel depressed and become more vulnerable to stressful events

when not using drugs because the brain has lost its capacity to regulate the natural chemicals in the brain.

Q: Are there chemicals other than dopamine that are involved in the process of addiction?

A: Yes. The other chemicals have more to do with the parts of the brain that control cravings, and rational decision making.

Q: Do you mean to say the Defendant's ability to make good decisions was impaired when he committed the crime?

A: I can't say for sure about the Defendant since I have not examined him and was not there at the time of the crime, but in most cases, yes. Dopamine and glutamate are active in the regions of the brain that control the ability to evaluate decisions and circumstances. Both of these chemicals are disturbed during addiction, causing a disruption of communication with various brain regions associated with controlling impulses.

Q: Would being in withdrawal also affect the Defendant's ability to make good decisions in this case?

A: Again, I don't know about the Defendant specifically, but in most cases, yes. Withdrawal from opiates is especially painful which would create even stronger motivation to use drugs.

Q: What are withdrawal symptoms like for someone addicted to opiates?

A: Someone would experience nausea and vomiting, as well as intense muscle and bone pain. One would suffer from sleep disturbances, diarrhea and cold sweats. These symptoms last at least several days or as long as some weeks.

Q: Doctor Corbin, going back to the changes in the brain for a moment. Can

the Defendant fix these changes alone?

A: Not easily and not quickly. These changes in the functioning and structure of the brain are enduring, and take many months to begin to recover. It is very difficult to reverse the changes without intense professional help.

Q: Thank you for your testimony, Doctor Corbin.

[END OF HEARING]

APPENDIX C

IRB Approval

DATE: February 13, 2017
 TO: Mia Figueroa [Faculty Sponsor: Dr. Craig Henderson]
 FROM: Sam Houston State University (SHSU) IRB
 PROJECT TITLE: *The Effect of the Brain Disease Model of Addiction on Juror Perceptions of Culpability [T/D]*
 PROTOCOL #: 2016-12-33003
 SUBMISSION TYPE: INITIAL REVIEW—RESPONSE TO MODIFICATIONS
 ACTION: APPROVED
 APPROVAL DATE: February 13, 2017
EXPIRATION DATE: February 13, 2018
 REVIEW TYPE: EXPEDITED
 REVIEW 7
 CATEGORIES:

Thank you for your submission of your **Response to Modifications** for this project. The Sam Houston State University (SHSU) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received **Expedited** Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure which are found on the Application Page to the SHSU IRB website.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All Department of Health and Human Services and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. **Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of February 13, 2018. When you have completed the project, a Final Report must be submitted to ORSP in order to close the project file.**

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact the IRB Office at 936-294-4875 or irb@shsu.edu. Please include your project title and protocol number in all correspondence with this committee.

Sincerely,

Donna Desforges
IRB Chair, PHSC
PHSC-IRB

VITA

Mia M. Figueroa, B.A., LCDC
Department of Psychology and Philosophy
 Sam Houston State University

EDUCATION

2015/2017	Sam Houston State University, Huntsville, Texas MA Clinical Psychology
2013/2015	University of Southern Maine, Portland, Maine BA Psychology
2011/2013	Southern Maine Community College, South Portland, Maine AAS Behavioral Health and Human Services

LICENSES

2016 Licensed Chemical Dependency Counselor – State of Texas

Active

CERTIFICATIONS

2016 Advanced Emergency Medical Dispatcher – International
 2012 Mental Health & Rehabilitation Technician/Community –State of Maine
 2011 Behavioral Health Professional – State of Maine

PROFESSIONAL MEMBERSHIPS

2016 Association for Psychological Sciences
 2016 American Psychological Association
 2016 Society for Military Psychology (APA Division 19)
 2016 Psychologists in Public Service (APA Division 18)
 2016 Psychopharmacology and Substance Abuse (APA Division 28)
 2015 American Psychological Association of Graduate Students
 2015 American Psychology – Law Society (APA Division 41)
 2014 Psi Chi

HONORS AND AWARDS

- 2016 Sam Houston Area Psychological Association Travel Award
- 2016 National Military Family Association Scholarship - Fisher House
- 2015/2016 College of Humanities and Social Services Scholarship
- 2014 Next Step Maine Scholarship
- 2012/2013 Vincent B. and Barbara G. Welch Scholarship

MASTER'S THESIS

Figueroa, M. M. & Henderson, C. E. (chair). *The Effect of the Brain Disease Model of Addiction on Juror Perceptions of Culpability*. Defended 03/28/2017.

CONFERENCE PAPER AND POSTER PRESENTATIONS

Henderson, C. E., Yenne, E., Sledd, M., Schiafo, M., Mena, C., **Figueroa, M. M.**, Missimo, C., Goodson, A. & Langemeier, D. (2016). *Don't drink and exercise: New research on exercise and alcohol use among college students*. Symposium conducted at the annual convention of the Texas Psychological Association, Austin, TX.

Falgout, R., Goodson, A., Mena, C., Manning, J. A., Yenne, E. M., Schiafo, M., Sledd, M., **Figueroa, M. M.**, Missimo, C., Langemeire, D. A., Henderson, C. (2016). *Drinking and Physical Activity*. Poster presented at the annual Sam Houston State University Undergraduate Research Symposium, Huntsville, TX.

Ricardo, M., Magyar, M., Abate, A. C., Cammins, J., & Edens, J. (2015). *Personality Assessment Inventory-Adolescent (PAI-A) substance use-related scales' predictive validity within a justice involved youth sample*. Paper presented at the annual convention of the American Psychology – Law Society, Atlanta, GA.

Abate, A. C., Magyar, M., Ball, E., **Ricardo, M.**, Hart, J., & Edens, J. (2015). *Use of the Personality Assessment Inventory-Adolescent to assess trauma-related symptoms in justice-involved youth*. Paper presented at the annual convention of the American Psychology – Law Society, Atlanta, GA.

MANUSCRIPTS UNDER REVIEW

Vella, E.J. & **Figueroa, M.M.** (2017). Predictors of Cardiovascular Reactivity to the Trier Social Stress Test: Public Self-Consciousness and Gender.

MANUSCRIPTS IN PROGRESS

Henderson, C.E., **Figueroa, M. M.** & Dakof, G. (2017). Sustainability of Evidence Based Practices in Community Behavioral Health Settings; The Multidimensional Family Therapy (MDFT) Experience.

RESEARCH EXPERIENCE

- | | |
|----------------|---|
| 8/2015-present | Graduate Lab Assistant - Volunteer
Sam Houston State University
PI: Craig Henderson, Ph.D. |
| 8/2015-8/2016 | Graduate Lab Assistant - Volunteer
Sam Houston State University
PI: Melissa S. Magyar, Ph.D. |
| 1/2015-5/2015 | Undergraduate Research Assistant
University of Southern Maine
PI: Elizabeth J. Vella, Ph.D.
<i>Psychosocial and Cardiovascular Correlates of Facebook Use</i> <ul style="list-style-type: none"> • Collected data via survey and task administration • Bio-monitoring of blood pressure, EKG and skin conductance |

CLINICAL EXPERIENCE

- | | |
|--------------|--|
| 2017-present | Practicum Student
Federal Bureau of Prisons – Federal Detention Center, Houston, TX <ul style="list-style-type: none"> • Trained under a Licensed Psychologist • Assessed mental health needs of offenders seeking mental health counseling • Primary counselor to caseload of 8 offenders • Facilitated Thinking for a Change group counseling sessions • Shadowed on-staff forensic psychologist during forensic evaluations and competency assessments |
| 2016-present | Residential Advocate
Sexual Assault & Abuse Free Environment (SAAFE House), Huntsville, TX <ul style="list-style-type: none"> • Conducted crisis intervention services for the 24-hour crisis hotline • Provided intervention and support services to victims of sexual assault and family violence • Monitored and maintained the functioning of the long-term shelter for victims |

- Assessed appropriateness for placement in the long-term shelter for victims
- 2016-present **Psychological Technician**
Applied Psychology Services, PLLC, The Woodlands, TX
- Completed clinical interviews, IQ assessments, hearing impaired assessments, neuropsychological assessments and autism assessments
 - Utilized the following tests:
WAIS-IV; WRAT-4; WISC-V; BDI, BAI, RISB, NSE/NSC; RBANS; WMS-IV; Trails A & B; Clock Draw
- 2016-2016 **Practicum Placement**
TDCJ/UTMB Ferguson Unit, Midway, TX
- Trained under a Licensed Psychological Counselor – Supervisor
 - Completed segregation rounds for mental health caseload
 - Assessed mental health status of offenders seeking counseling
 - Observed interpretation of the Personality Assessment Inventory in a forensic population
- 2016-2016 **Licensed Chemical Dependency Counselor/Supervisor**
MTC – J.W. Hamilton Unit – Bryan, TX (temporary)
- Provide individual and group substance abuse therapy to adult male offenders in a minimum-security pre-release prison setting for DWI offenses
 - Carried caseload of 25 offenders
 - Supervised 3 LCDC-CI staff and 2 treatment specialists
 - Maintained documentation and records
 - Provided comprehensive assessment and evaluation of offender appropriateness for treatment
- 2013-2015 **Licensed Alcohol and Drug Counselor**
Day One, Inc. – South Portland, ME
- Provide individual and group therapy to adolescents with substance abuse, dual diagnoses and extensive criminal histories, in a residential setting
 - Performed bio-psychosocial assessments to evaluate treatment needs
 - Aided in formulation and implementation of policies, procedures and protocols of a new residential substance abuse program
 - Created, maintained and audited client files