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THE RELATIONSHIP BETWEEN AGE OF ONSET OF DRUG USE, DRUG DEPENDENCE, MENTAL DISORDERS, AND OFFENSE TYPE AND SEVERITY

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A Thesis

Presented to the

Faculty of

California State University,

San Bernardino

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In Partial Fulfillment

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by

Kimberly Diane Gallo

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ABSTRACT

This study examines the relationship between age of onset of drug use and later drug dependence, and that of age of onset of drug use and current offense type/severity. In addition, it investigates the relationship between mental disorders, drug dependence, and current offense type/severity. Data from years 2007 to 2010 of the Arrestee Drug Abuse Monitoring Program II (ADAM II) were used. The analyses included cross tabulation and chi square. The results indicated that early onset marijuana users (those who began using at age fourteen or younger) were more likely to develop drug dependence than late onset users of marijuana. In addition, early onset users of heroin and of methamphetamine were more likely to develop drug dependence than late onset users of those drugs. No significant relationships were found between early onset of any of the four drugs and offense type; however significant relationships were found between early onset of marijuana and of methamphetamine, and offense severity. Significant relationships were found between offense severity and mental disorders, but not between offense type and mental disorders. Significant relationships were found for both offense type and severity when cross tabulated with mental disorders and drug dependence. These results indicate that more research is needed on these topics. This is because the findings of the current study partially support what has been found in existing literature. A clearer understanding of the topics of the current study is needed in order to draw definite conclusions.

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CHAPTER ONE

INTRODUCTION

Statement of the Problem

According to the National Household Survey on Drug Abuse (NHSDA),

22.6 million people, or 8.9 percent of the population, reported drug use in the

past month (NHSDA, 2010). It is estimated that 51% of emergency room visits in

2011 were drug related (DAWN, 2013). According to the Monitoring the Future

study (MTF) (2013), 50.4% of twelfth-graders reported using any illicit substance

in their lifetime. Marijuana was the most commonly reported drug used, with

45.5% of twelfth-graders reporting use at some point during their life. Cocaine

was the next most commonly used drug, with 4.5% reporting lifetime use. A total

of 1.5% of twelfth-graders reported lifetime use of methamphetamine, and 1.0%

reported lifetime use of heroin. Based on current statistics, drug use is a

widespread occurrence in society.

With drug use comes the possibility of developing drug dependence. The

definition of drug dependence is as follows. It is the presence of three or more of

the seven indicators of dependence as defined by the American Psychiatric

Association (Kopak, Vartanian, Hoffmann & Hunt, 2013; Degenhardt & Hall,

2012; Lopez-Quintero et al., 2011; Cotto et al., 2010). In order for an individual to

be considered dependent on drugs, they must display at least three of the

indicators for at least a month over the past year. These seven indicators are a

strong desire to use the drug, lack of control over use, withdrawal upon cessation

of use, tolerance to the drug's effects, needing more of the drug to achieve the

desired psychological effect, spending a disproportionate amount of time spent

using and recovering from use, and continuing to use the drug despite problems

occurring due to use (Degenhardt & Hall, 2012).

Drug dependence is a highly prevalent problem in society. The Substance

Abuse and Mental Health Services Administration estimated that in the United

States in 2012, 4.5 million people met the APA criteria for drug dependence

(SAMHSA, 2013). Marijuana and cocaine were drugs that users became

dependent on most often; 4.3 million people reported being dependent on

marijuana, and 1.1 million indicated dependence on cocaine. 467,000 reporte

dependence on heroin, and 133,000 reported dependence on methamphetamine

(SAMHSA, 2013). According to the 2012 National Survey of Substance Abuse

Treatment Services, there were 186 individuals in treatment for drug dependence

per 100,000 population ages eighteen and over (N-SSATS, 2014).

Drug use is significantly higher among arrestees and the incarcerated than

among the general population. According to the Bureau of Justice Statistics

(2014), 83% of state prisoners and 79% of federal prisoners report using drugs

during their lifetime. In terms of arrestees, it has been found that between sixty

and eighty percent of adult male arrestees test positive for drugs during the

booking process (Deitch, Koutsenok & Ruiz, 2000). The drugs used most

commonly by arrestees are cocaine (16% of participants), marijuana (15% of

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participants), heroin (6% of participants), and methamphetamine (5% of participants) (BJS, 2014).

Drug dependence is also significantly higher among incarcerated populations. According to the Bureau of Justice Statistics (2014), 68% of jail inmates were found to be dependent on drugs, based on their survey responses. Those who were convicted of burglary had the highest rate of drug dependence, followed by those convicted of driving under the influence, weapons violations, and drug possession. In terms of federal prisoners, it is estimated that half meet the criteria for drug dependence. In a study conducted by Kopak, Vartanian, Hoffmann and Hunt (2013), 23 percent of the participants, arrestees during the booking process, were drug dependent. Drug dependence affects approximately 2.6% of the general population (Compton, Thomas, Stinson & Grant, 2007); the significantly higher rates of drug dependence among arrestees and inmates indicate a strong relationship between drug dependence and crime.

Mental disorders are another prevalent problem in society, and are associated with both crime and drug dependence. According to the National Alliance on Mental Illness (2014), about one in four adults, or approximately 61.5 million individuals, meet the criteria for any mental illness each year. Additionally, one in seventeen, or 13.6 million individuals, live with a serious mental illness, such as bipolar disorder, schizophrenia, or depression. The Substance Abuse and Mental Health Services Administration (SAMHSA) defines "any mental illness" as "the presence of any emotional, behavioral, or mental disorder in the

past year that met DSM-IV criteria". SAMHSA defines a "serious mental illness" as a disorder that significantly interferes with one's daily life. According to SAMHSA (2014), 18.2 percent of the population is afflicted with any mental disorder, while four percent have experienced a serious mental disorder in the past year.

Mental disorders are highly correlated with drug dependence (Kessler 2004; Kessler et al., 1997; Liang, Chikritzhs & Lenton, 2011; Marmostein, White, Loeber, & Stouthamer-Loeber, 2010; Thornton,Baker, Lewin, Kay-Lambkin & Kavanagh, 2012; Marmorstein, 2012; Swendsen et al., 2010). Approximately fifty percent of individuals who are dependent on drugs also meet DSM-IV criteria for a mental disorder (Kessler, 2004; Thornton, Baker, Lewin, Kay-Lambkin & Kavanagh, 2012). However, the temporal ordering of the dual diagnoses are not clear; current literature does not agree on whether those with mental disorders are more prone to drug dependency, or that the drug dependency causes or exacerbates the mental disorder. Regardless of which comes first, drug dependence or mental disorders, it is important to study the connection in order to take effective preventative measures against both conditions. This is because the effects of drug dependence and mental disorders are likely to harbor even more serious consequences to both the individual and society than drug dependence alone, since the two conditions have the potential to exacerbate each other and increase the chances that an individual will engage in erratic and/or violent behavior.

There is also a strong correlation between mental disorders and crime. It has been found that approximately half the incarcerated population meets the criteria for a mental disorder; specifically, 56% of state inmates, 45% of federal inmates, and 64% of jail inmates have a mental disorder. This number is significantly higher than the percentage of mentally disordered individuals in the general population, which is approximately 11% (Bureau of Justice Statistics, 2006). Furthermore, it is estimated that 7.9% of those with a mental disorder have been incarcerated at least once (Munetz, Grande & Chambers, 2001).

Drug use and drug dependence are highly correlated with mental disorders and crime. It has been found that 63% of state prisoners with mental disorders use drugs, while only 49% of those without mental disorders use drugs (Bureau of Justice Statistics, 2006). Munetz, Grande and Chambers (2001) found that 70% of inmates with mental disorders were under the influence of drugs during the commission of their crime. Not only do criminals with mental disorders use drugs more often, but they are also often dependent on drugs. The Bureau of Justice Statistics (2006) reports that 76% of jail inmates with a mental disorder also meet the criteria for drug dependence.

Early Onset Theory

Early Onset Theory states that the earlier in life one begins using drugs, the more likely dependence will occur later in life. Existing research lends support for the theory (Anthony & Petronis, 1995; Chen & Anthony, 2003; Chen, Storr, &

Anthony, 2009; Clark, Kirisci & Tarter, 1998; McCabe et al., 2007; Lopez-

Quintero et al., 2011). Early onset of drug use is correlated with using drugs

more frequently later on, escalating to higher amounts of use more quickly, and

persisting in use (Hser, Longshore & Anglin, 2007). Specifically, it has been

found that those who begin using drugs at age fourteen or younger are at

increased risk of becoming drug dependent than those who begin use at age

fifteen to eighteen or older. Studies have shown that most begin using drugs

between the ages of fifteen to eighteen, and use peaks soon after, with a steady

decline in one's early twenties (Nagin, Farrington & Moffitt, 1995). Those who

follow this pattern are referred to as adolescent-limited users, while those who

begin use prior to age fifteen and persist in use to the point of becoming

dependent later in life are referred to as life-course-persistent users (Moffitt,

1993). Based on existing research, it is evident that age of onset of drug use is a

key factor in drug use patterns later in life.

There is a debate regarding the age range that defines early onset of drug

use. Early onset of drug use has been defined as before beginning before age

twenty-five or even before age thirty (Clark et al.,1998). The Clark et al. (1998)

study on the onset of drug use defined adolescent-onset as those who began

using drugs at age seventeen or younger; the early adult-onset group as those

who began using between the ages of eighteen and twenty-four, and the late

adult onset group as those who began using at age twenty-five or older.

However, the majority of studies consider early onset of drug use to be age

fourteen or younger (Hser, Longshore & Anglin, 2007; Nagin, Farrington & Moffitt, 1995). For the purposes of this study, early onset will be defined as use beginning at age fourteen or younger, because it is the most commonly used cutoff age in existing literature.

Purpose of the Current Study

This research seeks to examine the relationship between early onset of drug use and later dependency and offense type and severity, and examine the differences between types of drug users. Specifically, age of onset for marijuana, cocaine, heroin, and methamphetamine will each be compared to current drug dependency in participants, as well as offense type and severity for the current arrest. This study will also examine the differences in offense type and severity between those who have a mental disorder and those who do not, as well as the differences in offense type and severity between those who have both mental disorders and drug dependence, those who have mental disorders only, those who have drug dependence only, and those who have neither. The research questions of this study are as follows.

Hypotheses

In terms of the first hypothesis, it is expected that there will be a consistent relationship between lower age of onset and increased probability of later dependence for each drug studied. This is based on consistent findings from

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previous studies (Anthony & Petronis, 1995;Chen & Anthony, 2003; Chen, Storr, & Anthony, 2009; Clark, Kirisci & Tarter, 1998; McCabe et al., 2007; Lopez-Quintero et al., 2011)

For the second research question, the hypothesis is as follows: it is expected that those who begin using drugs at age fourteen or younger will have more severe offenses than those who begin using drugs at age fifteen or older. This is because individuals who use drugs early in life are more likely to become dependent, according to early onset theory. Furthermore, since there is a strong correlation between drug dependence and crime (McBride, VanderWall, Terry-McElrath, 2003; Schroeder, Giordana, Cernkovich, 2007; Green, Doherty, Stuart, & Ensminger, 2010), it is expected that those with an early onset of drug use will be more likely to be arrested for substance related crimes.

For the third research question, the hypothesis is as follows: it is anticipated that those with mental disorders will engage in more severe offenses than those without. This is because research has shown that those with mental disorders have a higher involvement in the criminal justice system than those without mental disorders (Swanson et al., 2002; Van Dorn, Volayka & Johnson, 2012; Munetz, Grande & Chambers, 2001; Elbogen & Johnson, 2009). More involvement in the criminal justice system often means a greater opportunity to escalate to increasingly serious crimes. It is expected that in terms of offense type, those with mental disorders will mainly have non-violent and drug related

crimes, as previous research has identified this pattern (Munetz, Grande &

Chambers, 2001).

In terms of the fourth research question, the hypothesis is as follows. It is

predicted that if an individual has both drug dependence and a mental disorder,

they will commit a more severe crime than one who has neither or only one.

Those with both a mental disorder and drug dependence will be more likely to

commit a violent offense than those with neither or only one. This hypothesis is

based on the findings of existing research by Van Dorn, Volayka & Johnson

(2012) and Elbogen & Johnson (2009).

Importance of the Current Study

The current study is important because of the many detrimental

consequences of drug use and dependence. Drug use in adolescence is

associated with low self-esteem, anxiety, depression, truancy, delinquency, poor

school performance, aggressiveness, and antisocial behavior (Anthony &

Petronis, 1995; Schroeder, Giordano & Cernkovich, 2007). Degenhardt and Hall

(2012) discuss four broad types of negative effects of drug use: the immediate

effects of intoxication, which can lead to violent behavior and/or injury; risk of

becoming dependent on the drug; negative health effects such as cardiovascular

disease or infections; and mental health problems. Schroeder et al. (2007)

discuss the detrimental effects of drug use, which affect all of the major areas of

a typical individual's life: marriage, children, and employment. They found that

use of drugs increases the risk of marital problems. Drug use is also associated with important life events, such as getting married and having children, occurring later in life. In addition, the use of drugs affects one's employment; heavy use was found to be associated with more absences and an increased risk of being terminated as an employee (Schroeder et al., 2007). Drug use, especially in addicts, results in a "snowball effect" in which those around the individual are negatively affected by the user's cycles of social, family, legal, and emotional difficulties (English, 2011).

Another reason why it is important to study drug use is that users have the potential to become drug dependent. It is estimated that 20% of people who use drugs will later become dependent (Degenhardt & Hall, 2012). According to Wagner and Anthony (2002), of those who tried marijuana, one in eleven became dependent, and for cocaine the odds were one in six.

Furthermore, this study is important because the results will allow policy makers to be more informed when making decisions regarding the treatment of mentally disordered and drug dependent individuals within the criminal justice system. For example, creating policies such as sentences that focus on rehabilitation for people with mental disorders and/or drug dependence could potentially reduce recidivism (Kaplan, 2012). In addition, knowing the importance of age of onset of drug use could help inform decisions on what types of programs would be useful to prevent adolescents from commencing drug use.

Understanding the relationship between drug dependence, mental disorders, and crime is necessary in order to enact appropriate criminal justice policies.

This study is important because it is unique and contributes to existing literature on the topic. To date there are no studies using a population of arrestees that examine age of onset of drug use, drug dependence, offense type/severity, and mental disorders. Any relationships between these characteristics of offenders discovered in this study can potentially shed light as to why individuals become drug dependent (e.g., from using drugs at an early age), what types of crime those with mental disorders and/or drug dependence are most likely to engage in, and if there are differences in offense type/severity based on what type of drug is used. The data used in this study was obtained from the Arrestee Drug Abuse Monitoring Program II (ADAM II), which interviews participants within forty-eight hours of their arrest. The use of this data contributes to the importance of this study, because it includes many often underrepresented participants in other types of studies. For example, ADAM II includes homeless individuals, who would be left out of a household survey.

CHAPTER TWO

LITERATURE REVIEW

Early Onset Drug Use and Later Dependence

Many studies have found a clear association between early onset drug use and later dependence (Anthony & Petronis, 1995; Chen & Anthony, 2003; Chen, Storr & Anthony, 2009; Clark, Kirisci & Tarter, 1998; McCabe, West, Morales, Cranford & Boyd, 2007; Grant & Dawson, 1998; Lopez-Quintero et al., 2011). A study by McCabe, West, Morales, Cranford & Boyd (2007) found that of a representative sample of non-institutionalized citizens, those who began using drugs prior to age thirteen developed dependence more often than those who began at or after age twenty-one. In addition, they examined the odds of developing later dependence for age of onset at each year between ages thirteen and twenty-one, and found that the odds of developing dependence were reduced by five percent each year that onset of use was delayed. Similarly, research by Grant and Dawson (1998) found that those who began using before age fifteen were more likely to develop dependence than those who commenced use at age twenty-one. In addition, Robins and Przybeck (1985) found that those who began using at age fifteen or younger were more likely to become drug dependent than those who began use between the ages of fifteen and twenty-one. These results suggest that early age of drug use onset is a significant predictor of later drug dependence.

Much research on early onset drug use and later dependence has focused on marijuana users. Chen & Anthony (2003) found that those who used marijuana for the first time prior to late adolescence were more likely to develop dependence than those who commenced use during or after late adolescence. In their sample of recent-onset marijuana users (those who had begun use within two years of the time of the study), adolescents were twice as likely to be marijuana dependent than adults. Chen, Storr and Anthony (2009) estimated that adolescent-onset marijuana users were two to four times more likely to become dependent on marijuana within the first two years of use than their adult-onset counterparts. Similarly, Clark, Kirisci and Tarter (1998) found that adolescent-onset users were more likely to develop marijuana dependence than those who began use in adulthood. Research has also indicated that those who begin using cocaine in adolescence are more likely to develop dependence than those who begin use in adulthood (Chen, Storr & Anthony, 2009). According to research, it is clear that those who begin use early in life are more likely to later become dependent.

Reasons for the Relationship Between Early Onset and Later Dependence

Similar risk factors have been identified for both early onset of drug use and drug dependence. These factors include antisocial behavior, such as sensation seeking, impulsive tendencies, and low constraint (Chassin, Flora & King, 2004; Anthony & Petronis, 1995). Other risk factors include low family

income (Clark, Kirisci & Tarter, 1998) and alcoholic or drug dependent family members (Obot, Wagner & Anthony, 2001; Anthony & Petronis, 1995). For example, in terms of early onset, Obot, Wagner and Antony (2001) found that by age seventeen, forty-one percent of children with alcohol dependent parents had used marijuana, while 26% of children without alcohol dependent parents had used marijuana. These shared risk factors likely play a role in the strong relationship between early onset of drug use and later dependence.

One hypothesis for the relationship between early onset of drug use and drug dependence was presented by Anthony and Petronis (1995). In their study, they investigated whether the association between early onset and drug dependence was due to the fact that early onset users generally had more years of drug using in which to develop dependence than late onset users. However, the results of their study indicated that within five to seven years of initial use, early onset users were more likely to become dependent than late onset users. Since both early onset and late onset users were screened for dependence seven years after initial use, it can be concluded that the relationship between early onset and later dependence is not entirely due to the fact that early onset users generally have more years of drug using in which to develop dependence.

Another possible reason for the relationship between early onset and later dependence is that early use affects essential developmental processes, making it difficult to navigate life and more likely for the user to cope with problems through drug use. Anthony and Petronis (1995) state that early use may hinder

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an individual from life experiences that lead to healthy adaptation to life as an adult, such as building healthy coping skills. The lack of both normal adaptation and healthy coping skills may encourage an individual to continue and increase use, placing them at higher risk for dependence. However, it has also been concluded that those who use drugs early in life may already be predisposed to lack coping skills before they commence use (Fergusson & Horwood, 1997).

Drug-Crime Connection

Research has found that those who are dependent on drugs are more likely to engage in crime (McBride, VanderWall, Terry-McElrath, 2003; Schroeder, Giordana, Cernkovich, 2007; Green, Doherty, Stuart, & Ensminger, 2010). Drug dependence is correlated with all types of crime, including violent crime and other felonies, as well as juvenile delinquency (Schroeder et al., 2007). A well-known conception of the drug-crime relationship is outlined in Goldstein's (1985) three-part description. The first way that drugs and crime are correlated is due to psychopharmacological effects of the drugs. For example, stimulants such as cocaine and methamphetamine can cause aggression and increased energy, which can render a user more likely to engage in violent crime (McBride et al., 2003). Symptoms of withdrawal from nearly any type of drug can induce irritability and irrationality, which may leave the user predisposed to engaging in crime. The second way drugs and crime are connected is due to economic motives for engaging in crime, e.g., engaging in property crimes in order to fund

an expensive drug habit. The final way that drugs and crime are correlated is through what Goldstein (1985) calls "systematic violence", which is crime related to the sale and distribution of drugs.

Another explanation for the drug-crime connection is referred to as the "common cause" hypothesis. This hypothesis states that drugs and crime are correlated not because of a relationship between the two, but rather through other characteristics. These include being the victim of childhood abuse or being raised in a low income household; research has shown that these factors are associated with both drug dependence and crime (Doherty, Green, & Ensminger, 2008). Though a causal link between drugs and crime has not been established, correlations between the two have been established in various populations of study, including the general population, drug users, and the incarcerated (McBride et al., 2003). Drug dependence is more common among criminals than among the general population. Between twenty-three and sixty-four percent of male offenders test positive for illegal drugs (with the variation being due to regional differences), compared to 6.8% of the general population (Doherty et al., 2008).

Research has indicated differences in the drug-crime relationship based on the type of drug used. For example, of the participants in the Doherty et al. (2008) study, those who were arrested were 3.5 times more likely to have used marijuana, and nine times more likely to have used cocaine. Also, research has noted that the risk of being involved in violent crime increases when one

transitions from using marijuana to "harder" drugs such as cocaine, heroin and methamphetamine. This is because the markets for the latter drugs are often more entrenched in inner-city locales where weapon-carrying and violence is commonplace (Green et al., 2010).

Research has investigated the relationship between early onset drug use and later offense type and severity. It has been found that individuals who begin using drugs prior to mid-adolescence have a higher frequency of crime later in life, and commit more serious crimes than those who initiated use later in life (Chung, Hill, Hawkins, Gilcrist & Nagin, 2002; Farabee, Joshi, & Anglin, 2001). In terms of offense type, Kopak and Hoffmann (2013) found that participants who begin using drugs early are more likely to commit substance-related or non-violent crimes later in life. They hypothesize that this is likely due to the correlation between early onset of drug use and later dependence; those who use early in life are more likely to become dependent, and commit non-violent crime in order to fund their habit, or drug-related crimes that are directly related to their use of illegal substances.

The Correlation between Mental Disorders and Crime

Findings on the correlation between mental disorders and crime have been mixed. One study by Friedman (2006) found that the lifetime prevalence of violence among people with mental disorders was sixteen percent, while only seven percent of those who did not have a mental disorder committed a violent

crime. In addition, Friedman (2006) notes that job-related violent crime was significantly higher for mental health professionals, compared to general physicians (69 per 1,000 and 16.2 per 1,000, respectively).Conversely, a study by Bonta, Law and Hanson (1998) found that severe mental disorders, such as schizophrenia, were inversely related to both general and violent crime. They also found that those with mood disorders such as depression were no more likely to commit crime than those without.

The majority of existing literature has found a correlation between mental disorders and crime, although the relationship is generally not significant and is likely due to other factors (Swanson et al., 2002; Munetz, Grande, & Chambers, 2001; Elbogen & Johnson, 2009). These other factors include the higher likelihood of people with mental disorders to be victims of abuse or violent crime themselves, or to have parents who commit crimes (Elbogen & Johnson, 2009). In addition, individuals with mental disorders are more likely to have substance abuse problems, to lack employment, and to be homeless, all of which are correlated with crime (Swanson et al., 2002). Therefore, the presence of a mental disorder itself does not predict criminal behavior; rather, factors that accompany mental disorders work in combination to create the relationship between mental disorders and crime.

Another reason for the relationship between mental disorders and crime is deinstitutionalization. This refers to the reduction in patients given inpatient treatment in mental health facilities, due to more stringent commitment criteria

(Teplin, 1990; Teplin, 1984). The result of deinstitutionalization has been that more mentally ill individuals are present in the community, where they are likely to come into contact with law enforcement and subsequently become involved with the criminal justice system. It has been found that mentally ill individuals are more likely to be arrested for similar offenses than those who do not have a mental disorder (Teplin, 1984). This is due to abnormal behaviors displayed as a result of their mental disorder; and such bizarre behaviors, though not necessarily illegal, are generally considered disturbing by other citizens. Thus, law enforcement more often arrest mentally disordered individuals, in order to rid public spaces of disturbing individuals and maintain a sense of public order.

Research has also investigated which types of crime those with mental disorders most frequently engage in. Though the mentally ill are often stereotyped as dangerous to society (Teplin, 1984), the majority of crimes they commit are non-violent or substance related (Munetz, Grande, & Chambers, 2001). A small portion of individuals with mental disorders studied by Munetz, Grande and Chambers (2001) committed violent offenses. An association between violent offenses and psychosis was found, however it was not statistically significant. The authors conclude that the strongest predicting factors for violence among the mentally ill are non-compliance with their medication regimen, prior violent behavior, and drug or alcohol dependence. Research indicates that the majority of crimes committed by the mentally ill are non-violent

or substance-related, and of those who do commit violent crimes, other factors, such as drug dependence, contribute to their behavior.

Mental Disorders and Drug Dependence

Research has shown that there is a significant correlation between mental disorders and drug dependence (Thornton, Baker, Lewin, Kay-Lambkin & Kavanagh, 2012; Liang, Chikritzhs & Lenton, 2011; Kessler, 2004; Compton, Thomas, Stinson & Grant, 2007; RachBeisel, Scott & Dixon, 1999). It has been found that approximately fifty percent of people with mental disorders also have drug dependence issues (Thornton, Baker, Lewin, Kay-Lambkin & Kavanagh, 2012; RachBeisel, Scott,& Dixon, 1999). Specifically, it has been found that 51.4% of individuals with drug dependence also meet the criteria for at least one mental disorder, and 50.9% of those with a mental disorder meet the criteria for drug dependence (Kessler, 2004). The terms "dual diagnosis" and "psychiatric comorbidity" are often used to describe co-occurrence of mental disorders and drug dependence (Liang, Chikritzh & Lenton, 2011). Research has clearly indicated that there is a correlation between mental disorders and drug dependence.

Current literature discusses several possible reasons for the correlation between mental disorders and drug dependence. One of the most commonly cited reasons is the self-medication model, according to which an individual uses drugs in order to cope with uncomfortable symptoms associated with their mental

disorder (Marmorstein, White, Loeber, & Stouthamer-Laber, 2012; Kessler, 2004). These uncomfortable symptoms or feelings include depression, anxiety, and severe mood swings. Regular use of drugs in order to cope puts the individual at risk of developing drug dependence. Other reasons why those with mental disorders begin using drugs include pleasure, alleviation of boredom, and relaxation (Thornton, Baker, Lewin, Kay-Lambkin & Kavanagh, 2012). There are several ways in which individuals with mental disorders develop drug dependence.

Another way in which researchers have explained the relationship between mental disorders and drug dependence is that dependence leads to mental disorders. For example, an individual who is dependent on cocaine may have panic attacks due to the physiological effects of cocaine. In addition, those who are drug dependent are often exposed to stress-filled environments and may lack the skills and resources to cope with the stress, which may lead to the development of a mental disorder (Kessler, 2004).

An additional explanation for the relationship between mental disorders and drug dependence is the common cause hypothesis. This hypothesis states that the correlation between mental disorders and drug dependence is due to risk factors common to both conditions. For example, a stressful environment predicts both drug dependence and mental disorders (Liang, Chikritzhs & Lentin, 2011; Swendsen et al., 2010). Other risk factors common to both conditions include low family income during childhood years and poor parental monitoring

(Kendler, Prescott, Myers & Neale, 2003). As with the relationship between drug

dependence and crime, the relationship between drug dependence and mental

disorders can be explained using the common cause hypothesis.

Comorbid drug dependence and mental disorders have additional adverse

effects than either condition alone. Heavy drug use reduces the likelihood that

an individual will take their psychiatric medication as prescribed, and even if it is

taken according to schedule, drug use may cause the medication to be less

effective. Heavy drug use can also exacerbate symptoms of a mental disorder,

especially positive psychotic symptoms (Thornton, Baker, Lewin, Kay-Lambkin &

Kavanagh, 2012). Successful treatment for both conditions is less likely than

success at treating one or the other, especially if health care professionals are

not aware that a patient has both (Liang, Chikritzhs & Lenton, 2011). Those who

have both drug dependence and mental disorders are more likely to attempt or

commit suicide, and are more likely to require psychiatric hospital stays and

emergency room visits, which are extremely costly (Thornton, Baker, Lewin, Kay-

Lambkin & Kavanagh, 2012). Those with both mental disorders and drug

dependence face many challenges as a result of their dual diagnosis.

Research has found that those with both mental disorders and drug

dependence have the highest risk of engaging in crime, compared to those with

only one or the other (Van Dorn, Volayka & Johnson, 2012; Volavka & Swanson,

2010; RachBeisel, Scott & Dixon, 1999; Elbogen & Johnson, 2009; Munetz,

Grande & Chambers, 2001; Swanson et al., 2002; Friedman, 2006; Mulvey et al.,

2006). Munetz, Grande, and Chambers (2001) found that of mentally disordered participants incarcerated in the local jail, eighty-six percent had a history of drug dependence, seventy percent currently had drug dependence issues, and two-thirds of the arrests made were for substance-related crimes. The extremely high percentage of drug dependent individuals indicates that dependence plays a large role in the relationship between mental disorders and crime. Elbogen and Johnson (2009) confirm this based on their study's results; they found that those with mental disorders were more likely to commit crimes than those without, but the difference was only significant for those with co-occurring drug dependence. Van Dorn, Volayka and Johnson (2012) found similar results; their research indicated a modest relationship between mental disorders and crime, and a much stronger relationship between mental disorders, drug dependence, and crime. Likewise, Mulvey et al. (2006) found that having drug dependence made it twice as likely for a mentally disordered individual to engage in crime. RachBeisel, Scott and Dixon (1999) found that the rate of crime for those with only a mental disorder was 17.9 percent, while 31.1 percent of those with both a mental disorder and drug dependence were involved in crime. Research has indicated that mental disorders do not independently predict criminal behavior; however, both mental disorders and drug dependence do.

Current literature discusses various reasons for the relationship between mental disorders, drug dependence, and crime. Though most authors do not present a specific causal mechanism for the relationship between mental

disorders, drug dependence and crime (Van Dorn, Volayka & Johnson, 2012; RachBeisel, Scott & Dixon, 1999; Elbogen & Johnson, 2009; Munetz, Grande & Chambers, 2001), several propose possible explanations for the relationship. First, drug dependence itself is correlated with crime; therefore those with both mental disorders and drug dependence would be more likely to commit crime than those with only a mental disorder (Swanson et al., 2002). Specifically, those with both a mental disorder and drug dependence may be more likely to commit crime because of the combination of lowered inhibitions from drug intoxication and symptoms of mental disorders, such as impaired impulse control, grandiosity, delusions, hallucinations, and dysphoria (Volavka & Swanson, 2010). In addition, having drug dependence makes it less likely for individuals with mental disorders to comply with medication regimens and participate in treatment, and this non-adherence itself is a risk factor for criminal behavior. Though research has provided several plausible explanations for the relationship between drug dependence, mental disorders, and crime, further study is required in order to more fully understand the correlation.

CHAPTER THREE

METHODOLOGY

Participants

The current study used data from the Arrestee Drug Abuse Monitoring

Program II (ADAM II), years 2007 to 2010. Only those participants with a

completed interview were used. The data contained a total of 32,139 participants;

18,421 (57.3%) provided a complete interview. The others provided either a

partial interview or no interview (facesheet only). Using those with a completed

interview is the only restriction placed on participant selection; otherwise, all

ADAM II participants from 2007 to 2010 were included in the current study. See

Table 1 below.

Table 1. Types of Interviews

Type of Interview	N	Percentage (%)
Completed	18,421	57.3
Partial	207	0.6
Facesheet Only	13,511	42.0
Total	32,139	100.0

The current study uses ADAM II data from years 2007 to 2010. A total of 4,334 participants, or 23.5% of the sample, were from the year 2007; 4,592 participants, or 24.9% of the sample, were from 2008. A total of 4,746 participants, or 25.8% of the sample, were from year 2009, and 4,749 participants, or 25.8% of the sample, were from 2010. See Table 2 below.

Table 2. Participants by Year

Year	N	Percentage (%)
2007	4,334	23.5
2008	4,592	24.9
2009	4,746	25.8
2010	4,749	25.8
Total	18,421	100.0

ADAM II collected data from ten cities throughout the United States. The cities, with the number of participants from each as well as the percentage of the overall sample, are as follows. New York, New York had 2,332 participants, which is 12.7 % of the sample. Washington, D.C. had 527 participants, or 2.9% of the sample. Portland, Oregon had 1,946 participants, or 10.6% of the sample. Indianapolis, Indiana had 2,157, or 11.7% of the sample. Chicago, Illinois had 1,960 participants, or 10.6 of the sample. Denver, Colorado had 1985

participants, or 10.8% of the sample. Atlanta, Georgia had 1,735 participants, or

9.4% of the sample. Minneapolis, Minnesota had 1,806 participants, which was

9.8% of the sample. Sacramento, California had 2,077 participants, or 11.3% of

the sample. Charlotte, North Carolina had 1,896 participants, or 10.3% of the

sample. See Table 3 below.

Table 3. Participants by Location

City	N	Percentage (%)
New York	2,332	12.7
Washington, D.C.	527	2.9
Portland	1,946	10.6
Indianapolis	2,157	11.7
Chicago	1,960	10.6
Denver	1,985	10.8
Atlanta	1,735	9.4
Minneapolis	1,806	9.8
Sacramento	2,077	11.3
Charlotte	1,896	10.3
Total	18,421	100.0

Demographic characteristics of the sample are as follows. Participants' ages ranged from eighteen to eighty-nine, with a mean age of 33.82. 51.9% of participants (9,541) reported being employed, and 48.1% (8,858) stated they were unemployed. See Table 4 below.

Table 4. Employment Status of Participants

Participants	Employed	Not Employed	Total
Percentage (%)	51.9	48.1	100.0
N	9,541	8,858	18,399

17.1% of participants (3,132) reported being married, while 82.9% (15,190) reported being unmarried. See Table 5 below.

Table 5. Marital Status of Participants

Participants	Married	Not Married	Total
Percentage (%)	17.1	82.9	100.0
N	3,132	15,190	18,322

In terms of prior arrest history, 83.9% of the participants (15,432) had been arrested before, and 16.1% (2,971) had not. See Table 6 below.

Table 6. Prior Arrest History of Participants

Participants	Prior Arrest	No Prior Arrest	Total
Percentage (%)	83.9	16.1	100.0
N	15,432	2,971	18,403

11.4% of participants (2,104) reported having a mental disorder, while 88.6% (16,302) did not. See Table 7 below.

Table 7. Mental Disorders Among Participants

Participants	Mental Disorder	No Mental Disorder	Total
Percentage (%)	11.4	88.6	100.0
N	2,104	16,302	18,406

51.5% of participants (4,889) met the criteria for drug dependence, while 48.5% (4,608) did not. See Table 8 below.

Table 8. Drug Dependence Among Participants

Participants	Drug Dependent	Not Drug Dependent	Total
Percentage (%)	51.5	48.5	100.0
N	4,889	4,608	9,497

16.0% of participants (360) had a mental disorder and were drug dependent, 50.9% (1,145) had drug dependence only, 5.9% (133) had only a mental disorder, and 27.1% (610) had neither. See Table 9 below.

Table 9. Mental Disorders and Drug Dependence Among Participants

Participants	Both	Drug Dependence	Mental Disorder	Neither	Total
Percentage (%)	16.0	50.9	5.9	27.1	100.0
N	360	1,145	133	610	2,248

In terms of offense type, 22.8% of participants (4,063) were arrested for violent crimes, while 54.2% (9,645) were charged with non-violent crimes, and 23.0% (4,089) were arrested for substance-related crimes. See Table 10 below.

Table 10. Offense Type of Participants

Participants	Violent	Non-Violent	Substance Related	Total
Percentage (%)	22.8	54.2	23.0	100.0
N	4,063	9,645	4,089	17,797

Regarding offense severity, 40.4% (6,069) were arrested for felonies, and 59.6% (8,955) were arrested for misdemeanors. See Table 11 below.

Table 11. Offense Severity of Participants

Participants	Felony	Misdemeanor	Total
Percentage (%)	40.4	59.6	100.0
N	6,069	8,955	15,024

The participants' age of onset of use for various drugs is as follows. The mean age of onset for marijuana was 15.16, with a standard deviation of 4.00. The earliest reported age of onset for marijuana was age 1, and the latest age of onset was age 59. The mean age of onset of cocaine was 21.02, with a standard deviation of 6.23. The earliest reported age of onset for cocaine was age two, and the latest age of onset was 59. The mean age of onset of heroin was 23.82,

with a standard deviation of 8.11. The earliest reported age of onset was 8, and the latest was age 63. The mean age of onset for methamphetamine was 22.21, with a standard deviation of 8.32. The minimum reported age of onset for methamphetamine was 4, and the latest was 62. See Table 12 below for a representation of this information.

Table 12. Age of Onset by Drug

Drug	N	Minimum Age of Onset	Maximum Age of Onset	Mean Age of Onset	Standard Deviation
Marijuana	1,427	1	59	15.16	4.00
Cocaine	6,301	2	59	21.02	6.23
Heroin	2,404	8	63	23.82	8.11
Methamphetamine	2,994	4	62	22.21	8.32

For the purposes of statistical analysis, age of onset was combined into two groups: early onset and late onset. Early onset included those who reported first use at age fourteen or younger and late onset refers to those who began use at age fifteen or later. 44.3% of users (6,326) reported early onset of marijuana, while 55.7% (7,949) reported late onset. See Table 13 below.

Table 13. Onset of Marijuana Use

Participants	Early Onset	Late Onset	Total
Percentage (%)	44.3	55.7	100.0
N	6,326	7,949	14,275

7.2% (452) reported early onset of cocaine, while 92.8% (5,849) reported late onset. See Table 14 below.

Table 14. Onset of Cocaine Use

Participants	Early Onset	Late Onset	Total
Percentage (%)	7.2	92.8	100.0
N	452	5,849	6,301

6.4% of participants (155) reported early onset of heroin, while 93.6% (2,249) reported late onset. See Table 15 below.

Table 15. Onset of Heroin Use

Participants	Early Onset	Late Onset	Total
Percentage (%)	6.4	93.6	100.0
N	155	2,249	2,404

In terms of methamphetamine, 10.8% (323) reported early onset, and 89.2% (2,671) reported late onset. This information is illustrated below in Table 16.

Table 16. Onset of Methamphetamine Use

Participants	Early Onset	Late Onset	Total
Percentage (%)	10.8	89.2	100.0
N	323	2,671	2,994

Materials

The current study uses data from the Arrestee Drug Abuse Monitoring II (ADAM II). ADAM II is a study, sponsored by the Office of National Drug Control Policy (ONDCP), which examines drug use and other related behaviors of adult males booked into various correctional facilities across the country. A brief history of ADAM II is as follows. The original study, Drug Use Forecasting (DUF)

began in 1987, and was a non-experimental survey of booked arrestees in twenty-four sites across the United States, ending in 1997. In 2000, DUF was renamed Arrestee Drug Abuse Monitoring (ADAM), and changes to the methodology, most importantly the use of probability-based sampling, were made. ADAM was sponsored by the National Institute of Justice (NIJ) and took place from 2000 to 2003. In 2007, the study was reinstated as ADAM II under the Office of National Drug Control Policy (ONDCP), and continued through 2012 (Office of National Drug Control Policy, 2013).

ADAM has collected data in various sites across the United States. The original ADAM study included thirty-five counties, but this number was reduced to ten in 2007 with the advent of ADAM II. The reduction in number of sites was due a lack of funding. Each site is named after the city in which the data collection took place, but the catchment area for participants includes the county in which the city is located. The ten sites included in the 2007-2010 ADAM II data collection are Atlanta, Georgia; Washington, D.C; Portland, Oregon; Indianapolis, Indiana; Minneapolis, Minnesota; Charlotte, North Carolina; Chicago, Illinois; Denver, Colorado; New York, New York; and Sacramento, California. It should be noted that the ten sites are not representative of the drug use estimates of the country as a whole, nor are the individual sites representative of their surrounding region. The data is, however, representative of the county in which the data collection takes place (Office of National Drug Control Policy, 2013).

Methods

      The protocol for ADAM II data collection preparation is as follows. Prior to the interviews, a facesheet was created for every participant sampled, regardless of whether they were available or willing to be interviewed. The facesheets were forms that contained general information about the participants, including their charges, age, date and time of arrest, arresting agency, race, and booking time/date. This information was obtained from the arrestees' booking sheets. Also, it was noted whether or not an interview was conducted, and if not, the reason was recorded (Office of National Drug Control Policy, 2013). ADAM II participants were chosen based on two levels of sampling. The first was at the county level; the researchers chose specific facilities that would be representative of the number and type of booked arrestees in the overall county. These decisions were made by looking at the total number of facilities in each county, the amount of arrestees booked into each, and the amount of transfers between facilities, and deciding which facility would be most representative of the entire county.

      The second level of sampling was at the individual level. Researchers kept track of all arrestees booked into the specified facilities during each twenty-four hour period of the twenty-one day data collection period. A "stock and flow" method was used because researchers were only present in the facility for an eight hour shift each day (budget limitations prevented the use of longer shifts). The "stock" was composed of the arrestees booked during the sixteen hour

period when researchers were not present; and the "flow" consisted of the

arrestees being booked during the time when researchers were there.

Participants had an equal chance of being selected whether they were booked

during the "stock" or "flow" period, so that arrestees chosen to participate were

representative of all adult males booked into that facility in the specified twenty-

four hour period. Every *nth* arrestee (based on a list of all arrestees in order of

arrival time to the facility) was chosen to be a participant, approached by

researchers, and asked to participate in a brief, face-to-face interview and

provide a urine sample for drug testing. All participants were interviewed and

urine sampled within 48 hours of arrest; this ensured that urine samples would be

as accurate as possible, given the transitory nature of detection of drugs in an

individual's system. If an arrestee refused to participate or was not available (for

example, they had already been moved to another facility), they were still

included in the data with the reason for their unavailability noted, and that

arrestee was replaced with the nearest neighbor (Office of National Drug Control

Policy, 2013).

     ADAM II utilized case weighting to ensure participants were representative

of all arrestees booked in the specific facilities. Even though the sampling

method of using every *nth* arrestee is statistically sound, certain characteristics of

the arrestees make some more likely to be chosen for an interview than others.

These include the time of day they were booked (arrestees booked during the

"stock" period generally had more time to wait before being interviewed, making it

more likely for them to be unavailable at the time of interview) and the severity of

their charge (an arrestee booked on a felony charge during the "stock" period

when researchers were not available would be more likely to be available for the

interview later on, as opposed to a misdemeanant who could potentially be

released before the next shift) (Office of National Drug Control Policy, 2013).

These differences were accounted for using propensity scores, which are used

often in medical care, health policy, and economics, and reduce the effect of

confounding variables using logistic regression (Li, Zaslavsky, & Landrum, 2013).

A propensity score is simply the probability of a member of the population under

investigation being included in the sample, and the inverse of this score is the

ADAM II case weight for that individual.

The following is the data collection procedure used in ADAM II. The face-

to-face interviews were approximately 20 to 25 minutes in length, and were

recorded using pen and paper, because electronic devices such as computers

were not allowed in the booking areas. Before the interview began, the

researchers explained the purpose of the study, and provided an IRB-approved

informed consent form that specified the length and topic of the interview, the

privacy standards of the data, and the fact that the participants will be asked for a

urine sample. The interviews were conducted in either English or Spanish,

depending on the preference of the participant. After the interview, a urine

sample was requested. All information was kept anonymous; numeric bar code

labels without any personally identifying information were affixed to both the urine

cup and the survey documents (Office of National Drug Control Policy, 2013).

The following information was collected during the interviews. The

interviews consisted of a comprehensive set of questions pertaining to the

arrestees drug use within the past year, behaviors that indicated drug or alcohol

dependence, behaviors relating to the purchase of illegal drugs, participants'

living situation for the past year, as well as prior arrest history and experiences

with drug or alcohol treatment facilities. In addition, information about the

participants' current arrest charges (including time and location of arrest), as well

as demographic characteristics, were obtained from booking paperwork.

Questions regarding participants' drug use were varied to include number of days

of use of each drug for every month of the past year, as well as use of each drug

in the past thirty, seven, and three days (Office of National Drug Control Policy,

2013).

Measures

In the ADAM II study, information was provided by participants during self-

report interviews. Demographic information was also collected from facility

booking records. Certain variables have been manipulated to suit the needs of

the research questions, and this process is described below.

Age of onset of drug use was measured as follows. The interview

contained separate questions regarding age of onset for each drug: age of onset

of marijuana, age of onset of cocaine, age of onset of heroin, and age of onset of methamphetamine. For each question, participants were asked to indicate the exact age in years in which they first used each drug. As was mentioned above, this variable was transformed into two groups: early onset (ages fourteen and younger) and late onset (ages fifteen and older).

Drug dependence was measured by a screening assessment referred to as UNCOPE, which is an acronym based on the American Psychiatric Association's (2013) definition of dependence. Previously, drug abuse and drug dependence were identified separately by the American Psychiatric Association (2013), but have been combined into one disorder: substance use disorder. In this model, drug abuse is now considered one form of mild substance use disorder, while drug dependence is a more severe form of the disorder. UNCOPE has been found to be a reliable and useful method of screening for dependence in various populations, including those who are incarcerated (Hoffman, Hunt, Rhodes & Riley, 2003; Campbell, Hoffman, Hoffman, & Gillaspy, 2005). The UNCOPE assessment is based on the American Psychiatric Association's criteria for substance use disorder, and includes the following six questions.

(1) Have you spent more time **U**sing drugs than you intended?

(2) Have you **N**eglected some of your usual responsibilities because of using drugs?

(3) Have you wanted to **C**ut down on your drug use?

(4) Has anyone **O**bjected to your use of drugs?

(5) Do you have a **P**reoccupation with using drugs?

(6)Have you used drugs to relieve **E**motional discomfort?

Each of the six questions in UNCOPE were asked during the ADAM II interview, and responses were coded as "Yes" = 1 and "No" = 0. In order to obtain a variable with two choices, "dependent" and "not dependent", the six questions were added together using SPSS software, and those with a total of zero, one and two were classified as "not dependent", while those with a total of three, four, five, or six were placed in the "dependent" category.

Interview responses were also used to measure the presence of a mental disorder. The presence of a mental disorder was measured based on each participant's response to the question of whether they had ever been in a mental health treatment program. Participants were to choose either "Yes" or "No"; those who stated "Yes" were considered to have a mental disorder, while those who said "No" did not.

The variables for drug dependence and mental disorders were combined using SPSS in order to compare those with both mental disorders and drug dependence to those with one or neither. This was done by creating a new variable by adding the existing variables of mental disorders and drug dependence. The mental disorders variable was coded as Yes=2 and No=0; while the dependence variable was coded as Yes=1 and No=0. Therefore, by adding the two variables, a sum of zero meant that the participant had neither mental disorders nor drug dependence, a sum of one meant that the participant

had drug dependence only, a sum of two meant that the participant had a mental disorder only, and a sum of three meant the participant had both. The new variable was coded into four groups: "neither", "drug dependence only", "mental disorders only", and "both".

Offense type and severity were measured as follows. Offense type was measured by examining the variable of "First ADAM charge code" in the ADAM II dataset. Types of crime included in the variable were aggravated assault, blackmail/extortion/threat, kidnapping, murder/homicide, robbery, sexual assault/rape, weapons, domestic violence, child abuse, spouse/partner abuse, offense against family/child, violation of protection order, other assault, other crime against persons, DWI/DUI, drug possession, drug sale, liquor, possession of alcohol, under influence of substance, other drug offense, arson, bribery, burglary, burglary tools, damage/destroy property, forgery, fraud, larceny/theft, stolen property, stolen vehicle, trespassing, prostitution, embezzlement, fare beating, flight/escape, gambling, obscenity, obstruction of justice, other, public peace/disturbance, sex offense, probation/parole violation, technical violation, traffic related, contributing to the delinquency of a minor, unspecified warrant, sales no license, PC_DWI/DWI, PC_sex offense, and federal violation. These crimes were grouped into three categories: violent crimes, non-violent crimes, and drug-related crimes. In terms of offense severity, participants were grouped according to their response regarding the question of their current offense severity: felony or misdemeanor.

Statistical Analyses

A description of statistical analyses used in this study is presented below. An explanation of why each analysis is appropriate is also included. All analyses were performed using IBM SPSS Statistics 22.

For each of the four research questions, the following procedure was used. First, cross-tabulation was performed, because all of the variables were nominal. Cross-tabulation creates a contingency table by which one can examine the relationship between nominal variables with two or more categories. Cross-tabulations display relationships between variables, in the form of frequencies or percentages, but do not indicate whether the relationships are statistically significant. Therefore, further analyses were necessary in order to make conclusions based on the results.

The next step in analyzing the data was to use chi square. This analysis was performed in order to determine whether any associations were statistically significant, meaning not due to random chance. Chi square was used because the variables are nominal, and therefore nonparametric. Many statistical procedures assume that variables are parametric, or have a normal distribution. A nominal variable cannot have a normal distribution because it is not numerical; the values cannot be placed in a meaningful ranked order. The chi square analysis compares the observed values given in the data with expected values (those which would be expected if the sample was based on random chance). If

a significant difference is found between observed and expected values, then for those cases the relationship between variables is considered statistically significant.

CHAPTER FOUR

RESULTS

Introduction

The current study sought to supplement existing research on the

relationships between offense type and severity, age of onset of drug use, drug

dependency, and mental disorders. The purpose of this investigation is to gain

additional knowledge regarding these relationships, in order to inform more

effective criminal justice policies relating to drug dependent and mentally

disordered individuals involved in the criminal justice system.

Research Question One

The first research question examined the differences between marijuana,

cocaine, heroin and methamphetamine in terms of the association between age

of onset and later dependency. Regarding the analysis of the relationship

between age of onset of marijuana use and dependency, a total of 9,062

participants were included. Of these, 4,641 (51.2%) had drug dependence, and

4,421 (48.8%) did not. There were 4,567 (50.4%) early onset users of marijuana,

and 4,495 (49.6%) late onset users of marijuana. The cross tabulation indicated

a relationship between age of onset and dependence, in which those with early

onset of marijuana were more likely to become dependent than those with late

onset of marijuana. Within the early onset group, 2,578 (56.4%) had drug

45

dependence, and 1,989 (43.6%) did not. In the late onset group, 2,063 (45.9%)

were dependent, and 2,432 (54.1%) were not. See Table 17 below.

Table 17. Cross Tabulation of Marijuana Onset and Dependence

Age of Marijuana Onset	Drug Dependence		
	Not Dependent (N)	Dependent (N)	Total (N)
Late Onset	54.1% (2,432)	45.9% (2,063)	100.0% (4,495)
Early Onset	43.6% (1,989)	56.4% (2,578)	100.0% (4,567)
Total	48.8% (4,421)	51.2% (4,641)	100.0% (9,062)

The relationship between early onset of marijuana use and later drug

dependence was determined to be statistically significant based on the results of

the chi square test ($\chi^2 (1) = 100.973$, p = .000). Since the p value was found to be

below 0.05, it can be concluded that the differences between early and late onset

marijuana users was not due to random chance. This means that the observed

values in Table 17 are significantly different than those that would be expected

based on random chance. The results indicate that early onset users of

marijuana are more likely to become dependent than late onset users of

marijuana. The Pearson chi square value, degrees of freedom, and two-sided

significance level are shown below in Table 18.

Table 18. Age of Marijuana Onset and Dependence Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	100.974[a]	1	.000

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 2192.94.

For the analysis of the relationship between age of onset of cocaine use and drug dependence, a total of 4,428 participants were used. Of these, 2,838 (64.1%) had drug dependence, and 1,590 (35.9%) did not. Furthermore, 341 (7.7%) had early onset of cocaine use, and 4,087 (92.3%) had late onset of cocaine use. The cross tabulation indicated a relationship between age of onset and dependence, in which those with early onset of cocaine use were more likely to become dependent than those with late onset. Within the early onset group, 247 (72.4%) had drug dependence, and 94 (27.6%) did not. In the late onset group, 2,591 (63.4%) had drug dependence, and 1,496 (36.6%) did not. See Table 19 below.

Table 19. Cross Tabulation of Cocaine Onset and Dependence

Age of Cocaine Onset	Drug Dependence		
	Not Dependent (N)	Dependent (N)	Total (N)
Late Onset	36.6% (1,496)	63.4% (2,591)	100.0% (4,087)
Early Onset	27.6% (94)	72.4% (274)	100.0% (341)
Total	35.9% (1,590)	64.1% (2,838)	100.0% (4,428)

The relationship between early onset of cocaine use and later drug dependence was found to be statistically significant based on the results of the chi square test (χ^2 (1) = 11.171, p= .001). Since the p value was found to be below 0.05, it can be concluded that the differences between early and late onset cocaine users was not based on random chance. This means that the observed values in Table 19 are significantly different than those that would be expected based on random chance. The results indicate that early onset users of cocaine are more likely to become dependent than late onset users of cocaine. The Pearson chi square value, degrees of freedom, and two-sided significance level are shown below in Table 20.

Table 20. Age of Cocaine Onset and Dependence Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	11.171[a]	1	.001

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 122.45.

For the analysis of the relationship between age of onset of heroin use and drug dependence, a total of 1,878 participants were included. Of these, 1,439 (76.6%) had drug dependence, while 439 (23.4%) did not. Furthermore, 114 (6.1%) had early onset of heroin use, and 1,764 (93.9%) had late onset of heroin use. The cross tabulation did not indicate any significant relationship between age of onset and dependence. See Table 21 below.

Table 21. Cross Tabulation of Heroin Onset and Dependence

Age of Heroin Onset	Drug Dependence		
	Not Dependent (N)	Dependent (N)	Total (N)
Late Onset	23.4% (413)	76.6% (1,351)	100.0% (1,764)
Early Onset	22.8% (26)	77.2% (88)	100.0% (114)
Total	23.4% (439)	76.6% (1,439)	100.0% (1,878)

The relationship between early onset of heroin use and later drug dependence was not determined to be statistically significant based on the results of the chi square test (x^2 (1)= .022, p= .882). Since the p value was not below 0.05, the differences between early and late onset heroin users were small enough to be due to random chance. This means that the observed values in Table 21 were not significantly different than those expected based on random chance. The Pearson chi square value, degrees of freedom, and two-sided significance level are shown below in Table 22.

Table 22. Age of Heroin Onset and Dependence Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	.022[a]	1	.882

   a. 0 cells (0.0%) have expected count less than 5. The minimum
       expected count is 26.65.

Regarding the analysis of the relationship between age of onset of methamphetamine use and drug dependence, a total of 2,248 participants were included. Of these, 1,505 (66.9%) had drug dependence, and 743 (33.1%) did not. In addition, 252 (11.2%) had early onset of methamphetamine use, and 1,996 (88.8%) had late onset of methamphetamine use. The cross tabulation indicated a relationship between age of onset and dependence, in which those with early onset of methamphetamine use were more likely to become dependent

on drugs than those with late onset of methamphetamine use. Within the early

onset group, 185 (73.4%) had drug dependence, and 67 (26.6%) did not. Within

the late onset group, 1,320 (66.1%) had drug dependence, and 676 (33.9%) did

not. See Table 23 below.

Table 23. Cross Tabulation of Methamphetamine Onset and Dependence

Age of Methamphetamine Onset	Drug Dependence		
	Not Dependent (N)	Dependent (N)	Total (N)
Late Onset	33.9% (676)	66.1% (1,320)	100.0% (1,996)
Early Onset	26.6% (67)	73.4% (185)	100.0% (252)
Total	33.1% (743)	66.9% (1,505)	100.0% (2,248)

The relationship between early onset of methamphetamine use and later

drug dependence was determined to be statistically significant based on the

results of the chi square test ($\chi^2(1)=5.360$, $p=.021$). Since the p value was found

to be below 0.05, it can be concluded that the differences between early and late

onset methamphetamine users was not due to random chance. This means that

the observed values in Table 23 were significantly different than those that would

be expected based on random chance. The results indicate that early onset

users of methamphetamine are more likely to become dependent than late onset

users of methamphetamine. The Pearson chi square value, degrees of freedom,

and two-sided significance level are shown below in Table 24.

Table 24. Age of Methamphetamine Onset and Dependence Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	5.360[a]	1	.021

    a. 0 cells (0.0%) have expected count less than 5. The minimum
       expected count is 83.29.

Research Question Two

For the analysis of the relationship between age of onset of marijuana use

and offense type, no significant results were found (χ^2 (2) =1.720, p= .423). The

analysis included 13,790 cases. Of those, 6,091 (44.2%) were early onset users

of marijuana, and 7,699 (55.8%) were late onset marijuana users. Furthermore,

3,084 participants (22.4%) were arrested for a violent offense, 7,367 (53.4%) for

a non-violent offense, and 3,339 (24.2%) for a substance-related offense. See

Table 25 below for a representation of the cross tabulation.

Table 25. Marijuana Onset and Offense Type Cross Tabulation

Age of Marijuana Onset	Offense Type			
	Violent Offense (N)	Non-Violent Offense (N)	Substance Related Offense (N)	Total (N)
Late Onset	22.0% (1,690)	53.7% (4,133)	24.4% (1,876)	100.0% (7,699)
Early Onset	22.9% (1,394)	53.1% (3,234)	24.0% (1,463)	100.0% (6,091)
Total	22.4% (3,084)	53.4% (7,367)	24.2% (3,339)	100.0% (13,790)

The analysis of the relationship between age of onset of cocaine use and offense type did not yield any significant results (χ^2 (2) =1.619, p= .445). A total of 6,082 cases were included in the analysis. Of these, 429 (7.1%) were early onset cocaine users, and 5,653 (92.9%) were late onset cocaine users. Furthermore, 1,130 participants (18.6%) were arrested for a violent offense; 3,375 (55.5%) for a non-violent offense; and 1,577 (25.9%) for a substance-related offense. See Table 26 below for a representation of the cross tabulation.

Table 26. Cocaine Onset and Offense Type Cross Tabulation

Age of Cocaine Onset	Offense Type			
	Violent Offense (N)	Non-Violent Offense (N)	Substance-Related Offense (N)	Total (N)
Late Onset	18.7% (1,058)	55.3% (3,125)	26.0% (1,470)	100.0% (5,653)
Early Onset	16.8% (72)	58.3% (250)	24.9% (107)	100.0% (429)
Total	18.6% (1,130)	5.5% (3,375)	25.9% (1,577)	100.0% (6,082)

The analysis of the relationship between age of heroin use onset and offense type did not yield any significant results (x^2 (2) =1.699, p= .428). A total of 2,334 cases were included. Of these, 151 (6.5%) were early onset users of heroin, and 2,183 (93.5%) were late onset users of heroin. A total of 333 participants (14.3%) were arrested for a violent offense, 1,339 (57.4%) for a non-violent offense, and 662 (28.4%) for a substance-related offense. See Table 27 below for a representation of the cross tabulation.

Table 27. Heroin Onset and Offense Type Cross Tabulation

| Age of Heroin Onset | Offense Type | | | |
	Violent Offense (N)	Non-Violent Offense (N)	Substance-Related Offense (N)	Total (N)
Late Onset	4.2% (309)	57.2% (1,248)	28.7% (626)	100.0% (2,183)
Early Onset	15.9% (24)	60.3% (91)	23.8% (360)	100.0% (151)
Total	14.3% (333)	57.4% (1,339)	28.4% (662)	100.0% (2,334)

The analysis of the relationship between age of methamphetamine onset and offense type did not yield any significant results (x^2 (2)=4.385, p=.112). A total of 2,897 cases were included in the analysis. Of these, 311 (10.7%) were early onset users of methamphetamine, and 2,586 (89.3%) were late onset users of methamphetamine. Furthermore, 545 participants (18.8%) were arrested for a

violent offense, 1,621 (56.0%) for a non-violent offense, and 731 (25.2%) for a

substance-related offense. See Table 28 below for a representation of the cross

tabulation.

Table 28. Methamphetamine Onset and Offense Type Cross Tabulation

Age of Methamphetamine Onset	Offense Type			
	Violent Offense (N)	Non-Violent Offense (N)	Substance-Related Offense (N)	Total (N)
Late Onset	19.2% (496)	55.3% (1,430)	25.5% (660)	100.0% (2,586)
Early Onset	15.8% (49)	61.4% (191)	22.8% (71)	100.0% (311)
Total	18.8% (545)	56.0% (1,621)	25.2% (731)	100.0% (731)

For the analysis of the relationship between age of onset of marijuana use

and offense severity, 11,742 cases were included. Of these, 5,189 (44.2%) were

early onset users of marijuana, and 6,553 (55.8%) were late onset users. A total

of 4,918 participants (41.9%) were arrested for a felony, and 6,824 (58.1%) were

arrested for a misdemeanor. The cross tabulation indicated a relationship

between marijuana use onset and offense severity, in which those with early

onset were more likely to have been arrested for a felony than a misdemeanor.

A total of 2,286 early onset users of marijuana (44.1%) were arrested for a

felony, compared to 2,632 late onset users of marijuana (40.2%). See Table 29

below.

Table 29. Cross Tabulation of Marijuana Onset and Offense Severity

Age of Marijuana Onset	Offense Severity		
	Felony (N)	Misdemeanor (N)	Total (N)
Late Onset	40.2% (2,632)	59.8% (3,921)	100.0% (6,553)
Early Onset	44.1% (2,286)	55.9% (2,903)	100.0% (5,189)
Total	41.9% (4,918)	58.1% (6,824)	100.0% (11,742)

The relationship between early onset marijuana use and offense severity was found to be statistically significant (χ^2 (1)=18.002, p=.000). Since the p value was found to be below 0.05, it can be concluded that the differences between early and late onset marijuana users were not due to random chance. This means that the observed values in Table 29 were significantly different that those expected based on random chance. The results indicate that early onset users of marijuana are more likely to be arrested for serious charges (felonies) than late onset users of marijuana. The Pearson chi square value, degrees of freedom, and two-sided p value are shown below in Table 30.

Table 30. Age of Marijuana Onset and Offense Severity Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	18.002[a]	1	.000

    a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 2173.35.

The analysis of the relationship between age of onset of cocaine use and offense severity did not yield significant results (χ^2 (1)=1.644, p= .200). A total of 5,114 cases were included in the analysis. Of those, 340 (6.7%) were early onset users, and 4,774 (93.3%) were late onset users. Furthermore, 2,266 (44.3%) participants were arrested for a felony, and 2,848 (55.7%) were arrested for a misdemeanor. See Table 31 below for a representation of the cross tabulation.

Table 31. Cross Tabulation of Cocaine Onset and Offense Severity

Age of Cocaine Onset	Offense Severity		
	Felony (N)	Misdemeanor (N)	Total (N)
Late Onset	44.1% (2,104)	55.9% (2,670)	100.0% (4,774)
Early Onset	47.6% (162)	52.4% (178)	100.0% (340)
Total	44.3% (2,266)	55.7% (2,848)	100.0% (5,114)

For the analysis of the relationship between onset of heroin use and offense severity, no significant results were found (χ^2 (1) =.266, p= .606). A total of 1,918 cases were included. Of these, 119 (6.2%) were early onset users of heroin, and 1,799 (93.8%) were late onset users of heroin. A total of 891 (46.5%) were arrested for a felony, and 1,027 (53.5%) were arrested for a misdemeanor. See Table 32 below for a representation of the cross tabulation.

Table 32. Cross Tabulation of Heroin Onset and Offense Severity

Age of Heroin Onset	Offense Severity		
	Felony (N)	Misdemeanor (N)	Total (N)
Late Onset	46.3% (833)	53.7% (966)	100.0% (1,799)
Early Onset	48.7% (58)	51.3% (61)	100.0% (199)
Total	46.5% (891)	53.5% (1,027)	100.0% (1,918)

For the analysis of the relationship between age of methamphetamine onset and offense severity, 2,380 cases were included. Of these, 250 (10.5%) were early onset users of methamphetamine, and 2,130 (89.5%) were late onset methamphetamine users. A total of 1,289 (54.2%) were arrested for a felony charge, and 1,091 (45.8%) were arrested for a misdemeanor. The cross tabulation indicated a trend in which early onset methamphetamine users were more likely to be arrested for a felony than late onset methamphetamine users. Specifically, 154 participants, or 61.6% of early onset users, were arrested for a felony; while 1,135 participants, or 53.3% of late onset users, were arrested for a felony. Another trend present in the cross tabulation was that late onset methamphetamine users were more likely to be arrested for a misdemeanor than early onset methamphetamine users. Specifically, 995 participants (46.7% of late onset users) were arrested for a misdemeanor, while 96 participants (38.4% of early onset users) were arrested for a misdemeanor. See Table 33 below.

Table 33. Cross Tabulation of Methamphetamine Onset and Offense Severity

Age of Methamphetamine Onset	Offense Severity		
	Felony (N)	Misdemeanor (N)	Total (N)
Late Onset	55.3% (1,135)	46.7% (995)	100.0% (2,130)
Early Onset	61.6% (154)	38.4% (96)	100.0% (250)
Total	54.2% (1,289)	45.8% (1,091)	100.0% (2,380)

The relationship between early onset of methamphetamine use and offense severity was determined to be statistically significant (χ^2 (1) =6.229, p= .013). Since the p value was below 0.05, it can be concluded that the differences between early and late onset methamphetamine users was not due to random chance. This means that the observed values in Table 33 are significantly different than those that would be expected based on random chance. The results indicate that early onset users of methamphetamine are more likely to be arrested for serious charges (felonies) than late onset users of methamphetamine. The Pearson chi square value, degrees of freedom, and two-sided significance level are shown below in Table 34.

Table 34. Methamphetamine Onset and Offense Severity Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	6.229[a]	1	.013

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 114.60.

Research Question Three

For the analysis of the relationship between mental disorders and offense type, 17,783 cases were included. Of these, 15,747 (88.5%) did not have a mental disorder, and 2,036 (11.5%) did. A total of 4,060 (22.8%) were arrested for a violent offense, 9,637 (54.2%) for a non-violent offense, and 4,086 (23.0%) for a substance-related offense. The cross tabulation indicated a trend in which those with mental disorders were more likely to be arrested for a violent or non-violent offense, and less likely to be arrested for a substance related offense, compared to those without mental disorders. Specifically, 486 (23.9% of those with a mental disorder) were arrested for a violent offense, compared to 3,574 (22.7% of those without a mental disorder). In terms of non-violent offenses, 1,140 (56.0% of those with a mental disorder) were arrested for one, as compared to 8.497 (54.0% of participants without mental disorders). Furthermore, 410 (20.1% of participants with a mental disorder) were arrested for a substance related offense, while 3,676 (23.3% of participants without a mental disorder) were arrested for substance related offenses. See Table 35 below.

Table 35. Mental Disorders and Offense Type Cross Tabulation

Mental Disorder	Offense Type			
	Violent Offense	Non-Violent Offense	Substance-Related	Total
No	22.7% (3,574)	54.0% (8,497)	23.3% (3,676)	100.0% (15,747)
Yes	23.9% (486)	56.0% (1,140)	20.1% (410)	100.0% (2,036)
Total	22.8% (4,060)	54.2% (9,637)	23.0% (4,086)	100.0% (17,783)

The relationship between mental disorders and offense type was found to be statistically significant (χ^2 (2)=10.531, p=.005). Since the p value was found to be below 0.05, it can be concluded that the trends were not due to random chance. This means that the observed values in Table 35 are significantly different than those that would be expected based on random chance. The results indicate that individuals with mental disorders are more likely to be arrested for a violent or non-violent offense than those without mental disorders. In addition, the results indicate that those with mental disorders are less likely to be arrested for a substance related offense than those without a mental disorder. The Pearson chi square value, degrees of freedom and two-sided significant level are shown below in Table 36.

Table 36. Mental Disorders and Offense Type Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	10.531[a]	2	.005

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 464.83.

The analysis of the relationship between mental disorders and offense severity did not yield significant results (x^2 (1)=1.106, p=.293). A total of 15,015 cases were included. Of these, 13,274 (88.4%) did not have a mental disorder, and 1,741 (11.6%) did. A total of 6,065 (40.4%) were arrested for a felony, and 8950 (59.6%) were arrested for a misdemeanor. The cross tabulation is presented below in Table 37.

Table 37. Mental Disorders and Offense Severity Cross Tabulation

Mental Disorder	Offense Severity		
	Felony (N)	Misdemeanor (N)	Total (N)
No	40.5% (5,382)	59.5% (7,892)	100.0% (13,274)
Yes	39.2% (683)	60.8% (1,058)	100.0% (1,741)
Total	40.4% (6,065)	59.6% (8,950)	100.0% (15,015)

Research Question Four

The analysis of the relationship between mental disorders, drug dependence, and offense type included 2,172 cases. Of these, 582 (26.8%) had

neither a mental disorder nor drug dependence; 1,116 (51.4%) had drug

dependence only; 129 (5.9%) had a mental disorder only; and 345 (15.9%) had

both a mental disorder and drug dependence. A total of 372 (17.1%) were

arrested for a violent offense; 1,219 (56.1%) for a non-violent offense; and 581

(26.7%) for a substance-related offense. The cross tabulation indicated a trend in

which those with neither condition were most likely to have a violent offense (132

participants, or 22.7%), followed by those with both (61 participants, or 17.7%);

those with a mental disorder only (21 participants, or 16.3%), and those with drug

dependence only (158 participants, or 14.2%). Those with a mental disorder only

were most likely to be arrested for a non-violent offense (79 participants, or

61.2%), followed by those with both (202 participants, or 58.6%), those with drug

dependence only (158 participants, or 57.6%), and those with neither (295

participants, or 50.7%). Those with drug dependence only were most likely to be

arrested for a substance-related crime (315 participants, or 28.2%), followed by

those with neither (155 participants, or 26.6%), those with both (82 participants,

or 23.8%) and those with a mental disorder only (29 participants, or 22.5%). See

Table 38 below for a representation of the cross tabulation.

Table 38. Mental Disorders, Drug Dependence and Offense Type
Cross Tabulation

Mental Disorders and Drug Dependence	Offense Type			
	Violent Offense (N)	Non-Violent Offense (N)	Substance-Related Offense (N)	Total (N)
Neither	22.7% (132)	50.7% (295)	26.6% (155)	100.0% (582)
Drug Dependence	14.2% (158)	57.6% (643)	28.2% (315)	100.0% (1,116)
Mental Disorder	16.3% (21)	61.2% (79)	22.5% (29)	100.0% (129)
Both	17.7% (61)	58.6% (202)	23.8% (82)	100.0% (345)
Total	17.1% (372)	56.1% (1,219)	26.7% (581)	100.0% (2,172)

The relationship between mental disorders, drug dependence and offense type was determined to be statistically significant (χ^2 (6)=23.750, p=.001). Since the p value was found to be below 0.05, it can be concluded that the trends found in the cross tabulation are not due to random chance. This means that the observed values in Table 38 are significantly different than those that would be expected based on random chance. The results indicate that those with neither were most likely to commit a violent offense, followed by those with both, those with a mental disorder only, and those with drug dependence only. Participants with a mental disorder only were most likely to commit a non-violent offense, followed by those with both, those with drug dependence only, and those with neither. Participants with drug dependence only were most likely to commit a

substance-related offense, followed by those with neither, those with both, and those with a mental disorder only. The Pearson chi square value, degrees of freedom, and two-sided significance level are presented below in Table 39.

Table 39. Mental Disorders, Drug Dependence and Offense Type Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	23.750[a]	6	.001

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.09.

For the analysis of the relationship between mental disorders, drug dependence, and offense severity, 1,813 cases were included. Of these, 483 (26.6%) had neither a mental disorder nor drug dependence; 942 (52.0%) had drug dependence only; 103 (5.7%) had a mental disorder only, and 285 (15.7%) had both. A total of 1,045 (57.6%) participants were arrested for a felony, and 768 (42.4%) were arrested for a misdemeanor. The cross tabulation indicated a trend in which those with drug dependence were most likely to be arrested for a felony (591 participants, or 62.7%), followed by those with neither (257 participants, or 53.2%), those with both (149 participants, or 52.3%), and those with a mental disorder only (48 participants, or 46.6%). Those with a mental disorder only were most likely to be arrested for a misdemeanor (55 participants, or 53.4%), followed by those with both (136 participants, or 47.7%), those with

65

neither (226 participants, or 46.8%), and those with drug dependence only (351 participants, or 37.3%). See Table 40 below for a representation of the cross tabulation.

Table 40. Mental Disorders, Drug Dependence and Offense Severity Cross Tabulation

Mental Disorders and Drug Dependence	Offense Severity		
	Felony (N)	Misdemeanor (N)	Total (N)
Neither	53.2% (257)	46.8% (226)	100.0% (483)
Drug Dependence	62.7% (591)	37.3% (351)	100.0% (942)
Mental Disorder	46.6% (48)	53.4% (55)	100.0% (103)
Both	52.3% (149)	47.7% (136)	100.0% (285)
Total	57.6% (1,045)	42.4% (768)	100.0% (1,813)

The relationship between mental disorders, drug dependence and offense severity was found to be statistically significant based on the results of the chi square test (χ^2 (3)=22.406, p=.000). Since the p value was determined to be below 0.05, it can be concluded that the trends were not due to random chance. This means that the observed values in Table 39 are significantly different than those that would be expected based on random chance. The results indicate that those with drug dependence only were most likely to be arrested for a felony, followed by those with neither, those with both, and those with a mental disorder

only. Those with a mental disorder only were most likely to be arrested for a felony, followed by those with both, those with neither, and those with drug dependence only. The Pearson chi square value, degrees of freedom, and two-sided significance level are shown below in Table 41.

Table 41. Mental Disorders, Drug Dependence and Offense Severity Chi Square

Statistic	Value	Degrees of Freedom	P Value
Pearson Chi Square	22.406^a	3	.000

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 43.63.

Summary

An overview of the results of the current study is as follows. For the first research question, early onset users of marijuana, cocaine, and methamphetamine were more likely to become drug dependent. No significance was found between heroin onset and later dependence. For the second research question, no significance was found for age of onset (for any of the four drugs) and current offense type. Early onset users of marijuana and methamphetamine were more likely to be arrested for a felony than late onset users of each drug. No significance was found for cocaine onset and offense severity, nor heroin onset and offense severity. In terms of the third research question, those with mental disorders were more likely to be arrested for a violent or non-violent

crime, and less likely to be arrested for a substance related crime compared to those without mental disorders. There was no significant relationship between mental disorders and offense severity. In terms of the fourth research question, those with neither drug dependence nor a mental disorder were most likely to be arrested for a violent offense; those with a mental disorder only were most likely to be arrested for a non-violent offense; and those with drug dependence only were most likely to be arrested for a substance-related offense. Those with drug dependence only were most likely to be arrested for a felony, and those with a mental disorder only were most likely to be arrested for a misdemeanor. A summary of these results is provided in Table 42 below.

Table 42. Summary of the Findings

Research Question	Dependent Variable	Findings
One	Dependence	Early Onset users of marijuana, cocaine, and methamphetamine more likely to be drug dependent. No significance for heroin.
Two	Offense Type	No significant relationships.
	Offense Severity	Early Onset users of marijuana and methamphetamine more likely to have a felony. No significance for cocaine onset nor heroin onset.
Three	Offense Type	Those with mental disorders more likely to be arrested for violent or non-violent crimes and less likely to be arrested for substance-related crimes.
	Offense Severity	No significant findings
Four	Offense Type	Those with neither most likely to be arrested for a violent crime; those with a mental disorder only most likely to be arrested for a non-violent crime, and those with drug dependence only most likely to be arrested for a substance-related crime.
	Offense Severity	Those with drug dependence only most likely to be arrested for a felony; those with a mental disorder only most likely to be arrested for a misdemeanor.

CHAPTER FIVE

DISCUSSION

Research Question One

As indicated in the previous chapter, partial support for the first hypothesis was found based on the results of the statistical analyses. Specifically, significant positive relationships were found between early onset of marijuana use and drug dependence, early onset of cocaine use and drug dependence, and early onset of methamphetamine use and drug dependence, in which those with early onset were more likely to be drug dependent. No significant relationships were found for age of onset of heroin use and drug dependence. Overall, the results only partially support the first hypothesis, since the relationship between age of onset and drug dependence is not consistent for each drug studied. Early onset users of marijuana, of cocaine, and of methamphetamine were each more likely to become dependent, but the trend did not extend to early onset users of heroin.

Possible reasons for the findings are as follows. First, early onset of drug use and drug dependence have similar risk factors. These include impulsivity, low constraint, low family income, and relatives with drug or alcohol dependence (Chassin, Flora & King, 2004; Anthony & Petronis, 1995; Clark, Kirisci & Tarter, 1998; Obot, Wagner & Anthony, 2001). Therefore, the correlation between early onset of drug use and later drug dependence may be at least partially explained by these factors, rather than solely due to a relationship between onset of use and later dependence. Another possible reason for the relationship between

early onset of use and later dependence is that those who begin using early in

life interrupt normal developmental processes. Early onset users often engage in

unhealthy coping skills, such as using drugs, to cope with the stressors of life.

This behavior impedes the development of healthy coping skills and adaptation

to life's problems that normally occur in adolescence or childhood. This lack of

healthy coping skills puts the individual at risk of developing drug dependence if

they continuously turn to drug use as a coping mechanism. Though the results of

the current study indicate relationships between early onset of marijuana use and

drug dependence, early onset of cocaine use and drug dependence, and early

onset of methamphetamine use and drug dependence, the identification of the

exact cause(s) of these relationships are outside the scope of this study.

One possible reason why a significant relationship between heroin onset

and drug dependence was not found is the extremely addictive nature of the

drug. Heroin users frequently experience both psychological and physical

dependence, to a greater extent than users of marijuana, cocaine, or

methamphetamine (Nutt, King, Saulsbury, & Blakemore, 2007). It appears that

heroin users become dependent at similar rates, regardless of age of onset, and

this is likely due to the extremely addictive nature of the drug in which users

develop both psychological and physical dependence.

Though the results did not fully support the hypothesis, the participant

demographics did lend support for the drug-crime connection discussed in

existing research (McBride, VanderWall, Terry-McElrath, 2003; Schroeder,

Giordana, Cernkovich, 2007; Green, Doherty, Stuart, & Ensminger, 2010). A total of 51.5% of participants were considered drug dependent based on the UNCOPE scale. This number is significantly higher than in the general population, of which 6.8% are estimated to be drug dependent (Doherty et al., 2008).

Research Question Two

The results of the analyses indicated partial support for the second research question's hypothesis. As discussed in the previous section, no significant results were found for offense type and early onset for any of the drugs. Possible reasons for the lack of significant associations are as follows. First, the participants' current offense type may not provide a complete picture of their offending behavior. For instance, an individual's criminal history may consist largely of violent crimes, but by chance they were arrested for a substance-related charge at the time of the study. However, with the large number of cases included in the analysis, it would be expected that if an overall trend between age of onset of use and offense type was present, it would be reflected in the results. Also, there is a possibility that participants did not accurately report their age of onset of drug use. Possible reasons for this are being under the influence at the time of the interview or attempting to impress the interviewer. Lastly, it is possible that there is no relationship between age of onset of drug use and offense type. Currently there is a lack of research as to the relationship between age of onset and drug use and offense type.

The current study indicated partial support for the hypothesis with regards to the relationship between age of onset of drug use and offense severity. Specifically, early onset users of marijuana and of methamphetamine were more likely to have felony charges than late onset users. It is not clear why the trend did not extend to early onset users of cocaine or heroin. It is possible that the overall relationship between early onset of drug use and offense severity is inconsistent, as there are many factors that play into an individual's criminal trajectory.

Research Question Three

The results of the statistical analyses performed in this study provided partial support for the third hypothesis. Significant relationships between offense type and mental disorders were found, but none were found for offense severity and mental disorders. The findings regarding offense type and mental disorders were contrary to what was expected based on current literature. As discussed in the previous section, those with mental disorders were more likely to be charged with a violent or non-violent crime than those without, and were less likely to be charged with a substance-related offense than those without a mental disorder. Research has indicated a positive correlation between mental disorders and substance dependence (Thornton, Baker, Lewin, Kay-Lambkin & Kavanagh, 2012; Liang, Chikritzhs & Lenton, 2011; Kessler, 2004; Compton, Thomas, Stinson & Grant, 2007; RachBeisel, Scott & Dixon, 1999), so it would be

expected that those with mental disorders would be more likely to be arrested for a substance-related offense than those without.

Findings from current literature on the relationship between mental disorders and crime are mixed; though a link between mental disorders and crime has been found (Friedman, 2006), some studies have not found a consistent relationship between the two (Swanson et al., 2002; Munetz, Grande & Chambers, 2001; Elbogen & Johnson, 2009). It is suggested that one reason for this is that any pattern pertaining to mental disorders and offense type is likely due to other factors, such as being a victim of a violent crime or not complying with medication regimens (Swanson et al., 2002). The current study supports a relationship between mental disorders and offense type; however, more research needs to be done to make a definitive conclusion as to the reasons behind the trends.

No significant associations were found between mental disorders and offense severity. This is contrary to the third hypothesis, which predicted that those with mental disorders would have more severe offenses. However, current literature has found mixed support for the link between mental disorders and crime; some indicate a positive correlation, while others lack significant associations between the two (Swanson et al., 2002; Munetz, Grande, & Chambers, 2001; Elbogen & Johnson, 2009).

Research Question Four

The results of the statistical analyses performed in this study lend partial

support for the fourth hypothesis. Although there is a significant relationship

between mental disorders, drug dependence, and offense type, the nature of the

correlations are contrary to what was predicted. The hypothesis for the fourth

research question indicated that those with both mental disorders and drug

dependence would be most likely to engage in serious, violent crime. The results

of the cross tabulation indicated that those with neither condition were most likely

to be arrested for a violent crime, followed by those with both, those with mental

disorders only, and those with drug dependence only. Those with a mental

disorder only were most likely to be arrested for a non-violent crime, followed by

those with both, those with drug dependence only, and those with neither.

Participants with drug dependence only were most likely to be arrested for a

substance-related offense, followed by those with neither, those with both, and

those with a mental disorder only. The exact mechanisms behind these trends

are not known; further research is needed to form a clear understanding of the

nature of the relationship between mental disorders, drug dependence, and

offense type.

The analysis indicated a significant relationship between mental disorders,

drug dependence, and offense severity. Those with drug dependence only were

most likely to be arrested for a felony, followed by those with neither, those with

both, and those with a mental disorder only. Those with a mental disorder only

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were most likely to be arrested for a misdemeanor, followed by those with both, those with neither, and those with drug dependence only. Those with drug dependence only may have been most likely to commit a felony because possession of most controlled substances is a felony. However, it is not entirely clear how the patterns emerged.

The findings of the current study partially support what has been found in the literature. Specifically, there are more significant relationships between offense type/severity and both mental disorders and drug dependence than in the analysis that looked at offense type/severity and only mental disorders. The significance indicates that there is more of a connection between crime and both mental disorders and drug dependence than mental disorders alone. However, the nature of the trends present in the cross tabulation is contrary to what was expected. For instance, it was surprising that those with neither condition were most likely to have a violent offense, as it was predicted that those with both would be most likely to be arrested for that type of crime.

Research indicates that those with both mental disorders and crime have the highest risk for engaging in crime, compared to those with only one or neither (Van Dorn, Volayka & Johnson, 2012; Volavka & Swanson, 2010; RachBeisel, Scott & Dixon, 1999; Elbogen & Johnson, 2009; Munetz, Grande & Chambers, 2001; Swanson et al., 2002; Friedman, 2006; Mulvey et al., 2006). It should be noted that the current study does not assess participants' risk for engaging in crime; since the sample was based on a population of arrested individuals, all

participants have already engaged in crime. It was postulated in the fourth

hypothesis that those with the highest risk of engaging in crime would commit

crime more often, and have a greater likelihood of engaging in more serious

crimes. Thus, it was expected that those with the greatest risk of engaging in

crime would be more likely to have felonies. Based on this reasoning, the results

of the current study did not support findings of existing literature in which those

with both mental disorders and substance dependence would have the highest

risk for engaging in crime, since they were not the most likely group to be

arrested for a felony.

Limitations

One potential limitation of the current study is the possibility that the

participants did not provide accurate answers during the self-report interviews. It

should be noted that the state of mind of an individual who has just been arrested

and is in the booking process at a jail facility may have an altered state of mind.

This may be based on fear, or mistrust of law enforcement and anyone perceived

as an authority figure, including research staff conducting the interviews; as well

as the possibility that the arrestee may be under the influence of drugs and/or

alcohol at the time of the interview. Also, the participants could potentially be

quite angry or apathetic due to their current circumstance, and provide random

and/or incorrect answers out of spite or lack of caring. Though the UNCOPE

scale has been found to be reliable and valid, even when used on incarcerated

individuals (Hoffman, Hunt, Rhodes & Riley, 2003; Campbell, Hoffman, Hoffman & Gillaspy, 2005), there is still the possibility that the accuracy of the interview answers may have been compromised by participants' potentially altered state of mind.

Another limitation of the study is that the cutoff age of fourteen for early onset of drug use may be too low, when taking the demographics of participants into consideration. The mean ages of onset for cocaine, heroin, and methamphetamine, respectively, are 21.02, 23.82, and 22.21. This indicates that most participants commenced use in their early twenties, and very few would be considered early onset based on the criteria used in this study. A total of 7.2% of participants reported early onset use of cocaine, 6.4% reported early onset use of heroin, and 10.8% reported early onset use of methamphetamine. Different results may be obtained with a higher cutoff, because the early onset group size would be larger and potentially more representative of this cross section of the population.

Another limitation of the study was that the variables were of nominal level of measurement, which prevented the use of more advanced statistical analyses than chi square, such as regression. All of the variables were nominal, except for age of onset. However, in order to distinguish between early onset and late onset, it was necessary to create two nominal groups. The use of nominal variables was a significant limitation, because it would have been highly beneficial to control for other variables, such as employment status, marital

status, and prior arrest history. However, due to the nature of the data this limitation was unavoidable.

Recommendations

Based on the results of the current study, it may be useful to incorporate the following into future criminal justice policy changes. First, when taking a preventative approach to reducing crime, it would be helpful to increase the existing focus on preventing drug use by adolescents. The results indicate that not only do early onset drug users run a higher risk of drug dependence, but also of being arrested for serious crimes. Continuing to focus on educating youths on the dangers of using drugs and inspiring them to remain drug free (e.g., Red Ribbon Week) will potentially reduce rates of both drug dependence and serious crime. In addition, it may be beneficial to require all school employees to report observed or suspected drug use by students. Furthermore, educating the public with regard to the dangers of early drug use (e.g., through the use of informative commercials on television or radio) would help parents to be informed and therefore more likely to be proactive in preventing their children from using drugs. A special focus ought to be taken regarding the prevention of youths engaging in marijuana use, due to the widespread and increasing availability of the drug. This is especially important given recent policy changes regarding the decriminalization of marijuana. Establishments which sell marijuana must be held to strict guidelines against sales to minors. It would be useful to employ tactics

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similar to those used in the enforcement of alcohol and tobacco products, such as the use of undercover personnel to ensure vendors are diligent in checking identification of customers and do not sell to minors. By taking such measures, policy makers could potentially reduce the rates of drug dependence and serious crime.

The results also indicate a trend among individuals with mental disorders that is useful in considerations for policy changes. Those with mental disorders were not found to be more likely to commit serious offenses than those without; but those with both mental disorders and drug dependence were more likely to commit serious offenses than those with neither. This shows that individuals with mental disorders alone may not be more likely to commit serious offenses, but they are when also dependent on drugs. It would be beneficial for those with mental disorders to also be screened for drug dependence and if needed, offered treatment. It would be useful for this to occur both in mental health treatment settings, as well as in court proceedings.

Directions for Future Research

The following are recommendations for future research based on the findings of the current study. First, it may be informative to perform subsequent studies with a higher cutoff for determining early onset of drug use, such as age sixteen, rather than fourteen, to see if different results are obtained. There was a large difference between early onset and late onset groups for cocaine, heroin,

and methamphetamine. For example, 5,849 participants reported late onset of cocaine use, while only 452 reported early onset of cocaine use. While this difference is to be expected, since it is not common for those fourteen and under to use cocaine, heroin, or methamphetamine, it would be useful to perform an analysis with a larger number of early onset users. In addition, it may be useful to use a lower cutoff age as well, such as age twelve, to see what effect the difference has on the results.

An additional recommendation for future studies is to use longitudinal data to examine the relationship between offense type and severity and age of onset, mental disorders, and drug dependence. As mentioned in the previous section, a participant's current charge does not provide an overall picture of their criminal career. A better understanding of the relationship between offense type and severity, age of onset, mental disorders, and drug dependence may be provided by a study based on longitudinal data of participants' arrest records.

Another important consideration for future studies is the level of measurement of the data used. The current study used nominal level variables, and this limited the types of statistical analyses that could be performed. Though the data being used makes it difficult or impossible to use anything other than nominal level variables (for example, the variable "Mental Disorders" cannot be conceptualized in a numerical way, it is either "yes" or "no"), when designing future studies, researchers would likely benefit from using higher level variables whenever possible.

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