2012

Risky Business: Prior Experience and Substance Users' Perception of Risk

Sema Taheri
Loyola University Chicago

Follow this and additional works at: https://ecommons.luc.edu/luc_theses_6mos

Part of the Criminology Commons

LOYOLA UNIVERSITY CHICAGO

RISKY BUSINESS:

PRIOR EXPERIENCE AND SUBSTANCE USERS'

PERCEPTION OF RISK

A THESIS SUBMITTED TO

THE FACULTY OF THE GRADUATE SCHOOL

IN CANDIDACY FOR THE DEGREE OF

MASTER OF ARTS

PROGRAM IN CRIMINAL JUSTICE

BY

SEMA A. TAHERI

CHICAGO, IL

MAY 2012

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

Individuals incarcerated for both drug-defined crimes and non-drug defined crimes are often substance users. In fact, the percent of arrestees in the United States that test positive for any drug at intake range from a low of 52% in Washington, D.C., to a high of 83% in Chicago, IL (ONDCP, 2011). Prior research has noted the negative relationship between risk perception and actual behavior. This study examined the influence of prior experiences and social environment on substance users' perceived risk of substance use. The sample consisted of adults indicating use of any illicit substance in the past year (N=9,277) in the 2009 National Survey of Drug Use and Health. Responses to risk perception of use of marijuana, cocaine, heroin and LSD were correlated with past experiences of mental health treatment, substance use treatment, arrest, depression and social environment variables. Past year treatment involvement was not found to be a predictor of risk perception. The social environment variables of age at first use, and ease of obtaining illicit drugs were found to be the strongest predictors of risk perception across all drug-types.

INTRODUCTION

In 2008, 251, 400 individuals were incarcerated in state prisons for drug-defined crimes (BJS, 2009). Since the emergence of the War on Drugs, the number and length of sentences as well as the population of incarcerated individuals for drug-defined crimes have increased (BJS, 2009). Individuals with drug-defined charges constituted 26% of the probation population in 2010, and of the 309,513 inmates released from state prisons in 2009, 28.7% reported drug-law violations as their most serious charge (BJS, 2010). In addition to incarcerated individuals, in 2006, the rate of substance abuse and dependence in the United States for non-institutionalized adults ages 18-25 was 21.3%, considerably higher than the percentage of such disorders among adolescents ages 12-17 (8%), and adults older than 26 years of age (7.2%) (BJS, 2009). These rates do not include individuals addicted to and using alcohol.

Increases in the number of illicit drug users in the United States' criminal justice system demanded an increase in the number of treatment programs available in jails and prisons. However, the primary goals of treatment are thwarted when those who complete treatment relapse and violate their terms of release. Researchers have been examining the effectiveness of short-term treatment techniques designed to lower recidivism and encourage recovery. In addition, studies have attempted to identify the correlates of treatment success. It is therefore important to study the relationship between perception of the risk of drug use and the behavior itself (Kilmer, Hunt, Lee, and Neighbors, 2007).

The purpose of the current study is to examine the correlates the risk perception among current substance users.

Individuals using substances face medical, psychological, and social consequences, including criminal justice system involvement. These risks are well documented. The factors influencing risk perception and drug use behavior should be understood so that better treatment or interventions can be developed to address the needs of the drug-using population. To contribute to a relatively small body of work on risk perceptions and drug use, this research examined the influence of prior experience on the perception of risk of varying illicit substances. Using data from a nationally representative sample, this study attempted to identify differences among substance users to determine whether prior experiences, such as treatment involvement or prior arrest, influence perception of risk.

CHAPTER ONE

BACKGROUND

History of the War on Drugs

In 1971, President Nixon called national attention to the problem of drug use and its effects (NPR, 2007). The nation was growing fearful of illicit drug-use and its effects on criminal behavior. President Nixon created the Drug Enforcement Agency in 1973, to investigate drug trafficking under the U.S. Department of Justice. In 1981, First Lady Nancy Reagan began her "just say no" campaign and, as a result, the federal government continued its engagement in anti-drug use initiatives. Arrests for illicit drug use rose in the early 1980s, and steadily climbed between 1984 and 1989.

President Reagan signed the Anti-Drug Abuse Act in 1986, appropriating more than 1.7 billion dollars from the federal budget to fight the war on drugs, including additional funds to build prisons and develop drug education programs. Mandatory minimum sentences were imposed on drug offenders (Time, 2009), with a great crackdown on cocaine use at the local and national levels (Benson, 2009). The National Guard jumped in to support the effort, and stated its reasons for actively participating in the "war" to the Border Alliance in 1989 (Vital Speeches, 1989). Their reasons, expressed by Lieutenant General Temple, listed lowered work ethic, child abuse, and crime as the most problematic consequences of drug use among Americans. The 1989, drug arrests hit a peak that was "higher than any year in the history of drug

criminalization" (Benson, 2009). In the thirty years since the act was signed, the number of individuals arrested for drug offenses has increased from fewer than 800,000 in 1986 to more than 1.5 million in 2007 (BJS, 2011). Between 1980 and 2009, the national adult arrest rate for drug offenses grew more than 138%. In 2009, the number of federal arrests for possession and use of illicit substances rose to 1,207,780 - almost five times the number of arrests for distribution (BJS, 2011). Both rates increased from previous years.

The War on Drugs has come under recent attack, however. Specifically, the Global Commission on Drug Policy (GCDP) (2011) found the "War on Drugs" to be a failure. Though it supports the health-related goals of eradicating illicit drug use, the commission found that the policymakers could show no evidence of achieving their goals. The use of drugs has increased in the past 10 years (GCDP, 2011). In addition, the Office of National Drug Control Policy (ONDCP) (2000) found that heroin has become more potent, rather than having been eradicated. Policy makers in the United States, developing policy to govern illegal activity, were criticized for ignoring empirical evidence, and relying too heavily on ideologies.

The War on Drugs has shown little progress in the past forty years. It has resulted in racial bias and growing prison populations. The punishments for illicit drug crimes have increased and caused uproar within communities. It has been labeled a failure, and has been discussed in policy arenas. The policies may be considered highly questionable. However, the actual risks of illicit substance use, and how these true health risks affect risk perception still raise concerns.

Actual Risks of Illicit Substance Use

Physical Risks

The medical risks involved in illicit substance use are well documented. Each year the National Council on Alcoholism and Drug Abuse provides fact sheets on the most common illicit drugs used in the United States (2009). Risks are considered for each drug, for example, documenting the increased blood pressure and reduced ability to combat infection due to cocaine use, as well as the loss in muscular coordination due to marijuana use. Stimulants and depressants have different effects on the body and central nervous systems. The differences in medical risk and psychological effects of different types of drugs are acknowledged by this study. Therefore, this study provides information on drug-specific risks, and separates the results of the data analyses by drug type (Rosenberg, 2009).

Marijuana

There have been many calls across the nation for the decriminalization of marijuana and promotion of its use for medical purposes. Sixteen states have legalized marijuana for medical use in the past few years (NIDA, 2011). Its effects on relaxation and pain stem from tetrahydrocannabinol's (THC), the active chemical in marijuana, impact on the amygdala. There are, however, long-term, dangerous effects of marijuana. THC limits short-term memory and promotes lung damage among long-term users (Inaba & Cohen, 2011). The fear of marijuana is rooted in its nickname "the gateway drug." There is a significant association between marijuana and the use of other illicit drugs (Degenhardt, Dierker, Chiu, et. al, 2010). A study examining Australian twins found

there to be significant increases in drug dependence among those who used marijuana before the age of 17 (Lynskey, Heath, Bucholz, et. al, 2003). This correlation emphasizes the development of "hard" drug use after first using marijuana.

Euphoria is the most common effect of smoking or ingesting marijuana, which encourages use. Although euphoria is a positive effect of the drug, THC causes that feeling by changing the brain chemistry to release dopamine in the reward center of the brain. THC disrupts coordination and balance, and has long-term effects, like tobacco cigarettes, on the human lungs (NIDA, 2011). Regular and heavy use of cannabis also has been associated with a number of negative consequences, including emotional, physical, psychological, social, and legal repercussions (Cascone, Zimmermann, Auckenthaler, Robert-Tissot, 2011). Permanent negative effects on the brain caused by marijuana disrupt memory, and attention, and lead to poor academic achievement (NIDA, 2011).

Cocaine

The physical consequences worsen with the use of cocaine, heroin and LSD. Use of these drugs takes many forms, all of which are physically harmful. Cocaine blocks the natural reuptake of 60-70% of dopamine, and can limit inhibitory functions of the temporal lobes, which leads to aggression and violence, and severe withdrawal (Inaba & Cohen, 2011). Cocaine is an addictive stimulant, and causes permanent alterations to the brain, although the euphoric effects of the drug are short-lived. The five to ten minute high produced by cocaine comes with the possibility of arrest, contracting HIV/AIDS through infected needle use, significant malnourishment, and risks of internal gangrene (NIDA, 2011).

Heroin

Heroin users are often unaware of the potency in a dose of heroin until it has entered their body. Rapidly entering the brain, the drug attaches to opioid receptors, and causes a rush/high, and then a drop into lethargy. Long-term effects include vulnerability to infectious diseases and bacterial infections, as well as collapsed veins (NIDA, 2011). Withdrawal is intense for heroin users, but is rarely fatal.

Heroin is ingested in various ways; snorting and injection are the most popular. It can cause convulsions, coma, and a lack of oxygen to the extremities. An overdose can be fatal. The DEA classifies Heroin as a schedule I substance. Schedule I substances have high potential for abuse. This classification also specifies that the substances have no "accepted safety for use under medical supervision" (DEA, 2011, p. 36).

Lysergic acid diethylamide (LSD)

LSD is a synthetic drug, manufactured from acid into a stimulant and hallucinogen. The drug was common in the 1960s, and is best known for the "trips" it causes its user to have. These "trips" are comprised of rapid mood swings and hallucinations. Small doses can last more than six hours. The complexity of LSD's effect on the brain is still not fully understood (NIDA, 2011). Also listed as a Schedule I drug, LSD is not considered safe for medical use. Flashbacks are a common long-term effect, and can occur many years after the use of LSD (National Drug Intelligence Center, 2006). Although not considered addictive, the long-term effects of LSD are great, and contribute to the ultimate decision to use.

Social Risks

As noted above, the medical risks of illicit substance abuse are well-documented (e.g. Rey, J., 2007; NCADA, 2009; Milin, Manion, Dare, Walker, 2008; O'Brien, 2008). Illicit substance use also has legal and social repercussions. Drug arrests accounted for 12% of all arrests in 2008. Marijuana related arrests in particular, rose from 401,982 in 1980 to twice that in 2008 (Drug War Facts, 2009). First-offense possession of small amounts of cocaine, heroin, and LSD results in no less 10 months of incarceration at the federal level (US Sentencing Commission, 2011). Crack, smokable cocaine, possession is associated with much harsher penalties than powder cocaine. Marijuana possession carries a lower penalty as a first offense, but can cost an individual up to $250,000 in fines (DEA, 2011). Conviction for any felony-level drug-law violation also carries with it the stigma and restricted access to a wide variety of government services, employment opportunities, and voting rights.

Costs to a user's family and social support network are much more difficult to measure, but also involve great harm. Social peer networks are predictive of illicit drug use among adolescents (Cascone, Zimmermann, Ackenthaler, and Robert-Tissot, 2011; Litt & Stock, 2011). Peer norms and perception of social norms shape the behavior of adolescents and adults, but the social risks an individual takes by using illicit substances are difficult to measure. In some situations, the social consequences of an individual's use can be protective. A study of individuals in prison (Woodall, 2011) found that many inmates are pressured to use illicit drugs. Not conforming to the social norm of drug use isolates the inmate and puts him at a greater risk for prison violence. On the other hand,

most adolescent group studies have found risks to social development and academic achievement, among adolescents who abuse illicit substances (Cascone, et. al, 2011).

Despite the consequences to physical, social, and legal well-being, illicit drug use among adults is high. In 2001, 55.6% of adults ages 18-25 reported having ever used illicit drug, approaching the 1979 high of 69% (ONDCP, 2001). The National Survey on Drug Use and Health (SAMHSA, 2009) found that 28.5 million Americans age 12 and older had used marijuana at least once in the past year. In addition, the Arrestee Drug Abuse Monitoring 2010 report found that a high percentage of arrestees in the United States test positive for any drug, ranging from a low of 52% in Washington, D.C. to a high of 83% in Chicago (ONDCP, 2011). The heavy use of illicit substances and the risks involved in such use has resulted in the creation of number of treatment programs and sanctions. This study seeks to understand the relationship between prior experiences or sanctions and risk perception of illegal drug use.

CHAPTER TWO

LITERATURE REVIEW

Rehabilitation and Treatment

In response to the growing numbers of drug offenders, substance use treatment programs have been implemented in many jails and prisons. Treatment for substance abuse is also available to individuals in community correctional programs. Treatment participation can be mandated by the courts or it can be voluntary. Researchers have examined the effectiveness of treatment for target populations.

Research has considered the types of substance abuse treatments available and their ability to alleviate abuse or dependence. At the forefront are therapeutic communities (TC) and their influence on cognitive behavioral change (e.g., Dekel, Benbenishty, Amram, 2004; Stout, 2005). The National Institute on Drug Abuse (2002) defines a TC as a "residential program that uses a hierarchical model with treatment strategies that reflect increased levels of personal and social responsibility" (pg. 1). TCs often increase treatment length among substance users (Chandler, 2009). The purpose is to encourage personal responsibility for substance use, foster an understanding of addiction, and reduce illicit drug use (Chandler, 2009). TCs have reduced reoffending (Mitchell, Wilson, MacKenzie, 2007), and additional techniques such as Motivational Interviewing (MI) have enhanced treatment engagement during incarceration (Stein, Colby, Barnett, Monti, & Golmbeske, 2006).

Individuals arrested and booked are also provided substance abuse treatments. Brief interventions, in correctional and institutional settings, including MI, are able to reduce substance use (Stein, et al., 2006). An American Medical Association's meta-analysis (2009) found evidence that TCs and counseling approaches reduce recidivism among incarcerated populations. The analyses indicated the cost-effectiveness and unique opportunity of targeting those held captive for treatment. Research on treatment must examine the engagement of the participant and the steps needed to minimize negative outcomes, especially among incarcerated individuals (Stein, et. al, 2006). Treatments, including numerous self-help groups, adopt a general curriculum that helps participants acknowledge they have a problem, using the support network readily available to them to manage their addiction. Self-help groups, however, are designed to assist the individual in overcoming addiction, by using social capital and recognition of the risks involved in drug use post-treatment (Daniels, 2011).

In 2009, 1.2 million individuals age twelve or older reported receiving treatment for marijuana use in the past year. Although the level of use was lower for "hard drugs," the numbers were still disturbing. Treatment for cocaine involved an estimated 787,000 individuals, the number of individuals in treatment for hallucinogens was in the hundreds of thousands (SAMHSA, 2009). Substance abuse treatment aims to help the user recognize the risks involved in use, or limit continued use. Therefore, these individuals are expected to perceive greater risk in use with greater experience in treatment for addiction.

Substance abuse and mental health problems often co-occur. Mental health interventions can include substance abuse treatment (Herbstman & Pincus, 2009; Chan, Dennis, and Funk, 2008). In many cases when mental health diagnoses include substance abuse, individuals are offered a substance abuse treatment program to supplement their mental health treatment. Comorbid cases often require more intensive treatment and have poorer clinical course than other cases (Glantz, Anthony, Berglund, Degenhardt, Dierker, and Kalaydjian, 2009). Glantz, et al. (2009) estimated the possible effects of treating mental disorders on substance abuse. Finding that anxiety disorders were likely to precede illegal drug dependence in 81.7% of their sample, they emphasized the need for recognizing substance abuse disorders among those seeking mental health treatments.

The prevalence of depression in substance using populations is also high. Daniels (2010) found major depression among offenders to have a greater impact on post-treatment drug use than bipolar disorder. Poulin and colleagues (2004) also identified a relationship between depressive symptoms, age, and substance use. The findings indicated that students using marijuana weekly were 40% more likely to have elevated depressive symptoms. In another study, cocaine dependent outpatients seeking treatment reported "substantial depressive symptomology" associated with their drug use severity (Stultz, Thase, Gallop, Crist-Cristoph, 2011, p. 45). The study assessed drug use of 487 individuals undergoing a 6-month treatment for cocaine dependence. Depressive symptoms increased the likelihood of cocaine use, with cocaine use decreasing as depressive symptoms were reduced. The model did not find the relationship to be true in reverse, as drug use did not increase future depressive symptoms. Stultz, et. al (2011),

also found that depressed cocaine users, compared with non-depressed users, experienced greater euphoria, and were more likely to continue using.

The relationship between self-medicating substance use and depressive symptoms is unclear. Hunt (2008) found a positive relationship between delinquency and substance use and between depression and delinquency. However, the relationship between depression and substance use was not significant. This was supported by a finding of a modest relationship between heavy cannabis use and depression, but no relationship between light use and depressive symptoms (Degenhardt, Hall, & Lynskey, 2003). The relationship between depression and substance use remains unclear, and more research into the relationship between depression and substance use is needed. This study is interested in knowing if perception of risk is a mediating factor between the two.

Regardless of these inconsistencies, it is important that mental health professionals working with individuals with a substance abuse disorder be aware of co-morbidity and have the ability to provide the best methods of treatment. The significance of mental health's relationship with substance use should not be ignored. This study intends to explore if mental health treatment or substance abuse treatment encourage an increase in risk awareness.

<div align="center">

Risk Perception

</div>

Despite the high incarceration rates for drug-related or drug-defined crimes, and the availability of treatment for substance use, many individuals continue to use and abuse illicit substances. Studies have identified relationships between risk perception and drug use. The literature contains inconsistent findings in this area. Health studies on the

relationship between risk and practice is considered in depth in Rational Choice Theory.

Proposed by Cornish and Clarke in 1987, the theory posits that an individual will engage

in a behavior that benefits him or her. This means weighing the benefits and

consequences of an action, and choosing the most beneficial result (Vito & Maahs, 2012).

In the context of this theory and the actual risks involved in substance use, the number of

individuals reporting illicit substance use in the past year is surprising. Thus, it is

important to understand the relationship between perception of risk of use and actual use,

and the factors that actually affect those perceptions.

Researchers have examined such a relationship. To do so, they have often relied

on convenience samples and compared substance using individuals to non-users.

Perceived risk, in many studies, as indicated by the Health Belief model, has been found

to be a primary component in determining whether someone will or will not engage in

health related behaviors (Kilmer, Hunt, Lee, and Neighbors, 2007; White, Degenhardt,

Breen, Bruno, Newman, and Proudfoot, 2005; Leung, Abdallah, Copeland, and Cottler,

2010). These studies have found a negative correlation between perceived risk of illicit

substance use and actual use. Such results are in line with rational choice theory,

indicating that as perceptions of risk increased, substance use decreased.

Among ecstasy users, in a 2008 study, 71% approved of both marijuana and

ecstasy use. Ecstasy users were more likely to think that there is no risk in using

marijuana or ecstasy, compared with non-drug using youth (Martins, Storr, Alexadre, and

Childoat, 2008). Another sample of college students with low perceived harmfulness of

prescription stimulants were more than ten times more likely to use stimulants non-

medically than their high-risk perceiving counterparts (Arria, Caldeira, Vincent, O'Gady, Wish, 2008). In most of the studies, the likelihood of use increased as the level of perceived harm decreased. The literature suggests that perceived risk of use of a specific substance acts as a protective factor against illicit substance use. Substance abuse treatment has been found to reduce use by increasing the perception of risk (Lopez-Quintero & Neumark, 2010). Arrest and interaction with the criminal justice system have become part of these risks. Experience with the criminal justice system should increase the perception of risk of an individual. According to Rational Choice Theory (Cornish & Clarke, 1987), the frequency of use should decrease among those persons who had treatment or were arrested.

Research on risk perception and behavior has produced conflicting findings, however. Some research has shown that injection drug users had higher perceptions of risk, which positively correlated with their use. Marsch, Bickel, Badger, and Quesnel (2007), asked individuals, both drug users and non-drug users, to indicate the risk someone incurs when engaging in injection drug use. Their findings showed that injection drug users' perceptions of risk were either at the same level or higher than the control group. The control group, once again, was non-drug users. This led the researchers to hypothesize that it was due to the injection drug users' involvement with the risky behaviors that led them to have higher perceptions of risk. The study included only injection drug users who were already in substance abuse treatment, which could have possibly brought them to a realization of their risks. A study replicating Marsch, et al. (2007) in Hungary, found similar results. The evidence supported that even those who

perceived injecting drug use as being very risky, took few or no steps to prevent risk involved in unsterile needle use (Marvanykovi, Melles, and Racz, 2009).

An additional concern lies in whether actual risks are understood by the substance user. Kilmer, et. al, (2007) proposed that the risk perception of substance use by college students was unrealistic. Measuring perceived risk of marijuana use in pre-college students, the research team found that if participants denied past marijuana use, they also reported fewer academic or social consequences. There were generally no differences in risk perception between those who had and had not experienced consequences in their social or academic lives. Many marijuana users do not see their use as particularly risky or problematic (Kilmer, et al., 2007), and ecstasy users showed more concern for potentially laced substances than their actual ecstasy use (White, et al., 2005). Sherman, Nelson and Steele (2000) argued that the reduced perception of risk among individuals asked to rate their vulnerability acted as a function of preserving a positive self-image. As a result, calling attention to the actual risks associated with illicit substance abuse among nonusers might contribute to their continued avoidance of substance abuse. Those that have engaged in substance use may reduce dissonance between risk and use by changing their attitudes about risk.

If substance users accurately perceive the actual risks of their behavior, perhaps they can identify alternatives to their use. A study reviewed the value of perception of risk on certain behavior or decision making. Bickel and Marsch (2001) found that drug-dependent individuals expressed future stable desires, such as higher education and long-term employment, but continued to abuse drugs and abandoned future goals when faced

with a craving or withdrawal symptoms. Although Bickel, et al. (2001) used hypothetical rewards and therefore their results are less representative, a similar study found that many heroin users agreed that they would share a needle with a friend when injecting drugs if a sterile needle was unavailable at the time (Odum, Madden, Badger and Bickel, 2000).

Another study of perceived risk (Martins, et al, 2008) also found ecstasy users to be less likely to find risk in using marijuana or ecstasy than non-users. However, Perron and Hoard (2008) found that, although 90% of adolescents in the study perceived regular inhalant use as moderately to highly risky, their perception of harm was uncorrelated with their use. This could be indicative of an addiction, which adjusts the frame of reference regarding the benefits and consequences of a behavior. When an addicted individual weighs the costs and benefits of engaging in use, they are limited to their own knowledge of costs and benefits (Cornish & Clarke, 1987). This includes background factors, as well as previous experiences. The perceived risk of harm was uncorrelated with drug use, whereas among these adolescents social network was correlated.

Perceived risk of illicit and addictive substances is similar among residents of some communities (Petronis & Anthony, 2000) and found to be associated with perceived group norms (Crawford, 2010). Such research showed that social influence and risk-minimization through familial and community ties increase substance use (Borland, Yong, Balmford, Fong, Zanna, Hastings, 2009; Daniels, 2011; Lewis & Mobley, 2010). Many college students perceive campus drinking norms regarding use to be higher than their own use, and Lewis & Mobley (2010) found that the perception of a friend's marijuana use was more important in predicting personal use than group norms alone.

Social context is also a factor in substance use (Neighbors, Lindgren, Knee, Fossos, & DiBello, 2011). Age of onset is a constant factor in predicting perceived risk. The literature suggested that the younger an individual is when he or she first used an illicit substance, the more likely he or she was to continue abusing the substance (e.g. Chen, Storr, & Anthony, 2009; Cascone, Zimmermann, Auckenthaler, & Robert-Tissot, 2011). If rational choice theory is correct, the social context of the individual is an important factor in the risk perception of illicit use (Lewis & Mobley, 2010).

Much of the literature compares substance-using individuals to non-users. What these studies fail to consider is the differences *among* substance abusers in regards to their risk perception. Previous experiences might have an effect on risk perception, controlling for race, gender, and future goals. Prior treatments for mental health or substance abuse, and prior experiences with the criminal justice system could change risk perception among substance users. These prior experiences may even increase perception of risk within a group that is still using substances. If so, it would be necessary for policy makers to reconsider the dependence of the system of punishment on deterrence and rational choice theories.

Current Study

The current study seeks to extend prior research by measuring the effects of prior experiences with treatment, the criminal justice system, mental health characteristics, and social environment on perceptions of risk of substance abuse. Past studies have indicated a difference in substance abuse risk perception between substance users and non-drug

users. By focusing only on substance users, this research sought to examine differences among individuals with substance use based on their past experiences.

Much of the illicit drug use that occurs in the United States goes undocumented because it is neither reported nor detected by law enforcement agencies (SAMHSA, 2009). When policies are created to handle drug use and abuse in the United States, they often focus on treatment effectiveness and programs for younger populations in order to combat the onset of illicit drug use. These preventative policies ignore those that are already abusing substances. Research must identify factors that can encourage current users to participate in treatment or to desist from illicit drug use. This research could suggest strategies for reaching out and providing substance abuse treatment to those that need it most. As a result, increasing the perception of risk using different means may increase the awareness of need for treatment.

Evaluating the variables that affect perception of risk of substance use using the 2009 National Survey on Drug Use and Health dataset does not allow for determinations of causal relationships. However, exploring the correlates of risk perception could identify whether or not the current criminal justice system and engagement in treatments affect perceptions of risk. The literature suggests that the perception of risk of a behavior is related to the behavior itself. Therefore, the correlates of risk perception could possibly affect the behavior itself through altering perceptions of risk.

<div align="center">Hypotheses</div>

The illicit substance types used in this study were selected for because of their use in the National Institute on Drug Abuse as the basic substances for drug testing. NIDA

provides testing materials for the metabolites that indicate drug use for what are known as the "NIDA-5" drugs, including THC, Cocaine, Amphetamines, Opiates and PCP. The National Survey on Drug Use and Health (NSDUH), the data used for this study, provides consistent questions for drugs in only four of these categories. Therefore, NIDA's THC was represented in this study by marijuana, Cocaine by Cocaine, Opiates by heroin, and PCP by another hallucinogen, LSD. The physical and psychological effects the types of drugs have when used are different from one another. Stimulants such as cocaine, and analgesics such as heroin, have different central nervous system and psychological effects. In addition, marijuana and LSD vary greatly in their physical effects. Therefore, it makes sense to evaluate the correlates of risk perception of the use of the different drugs separately (Rosenberg, 2009). For each type of substance and frequency of illicit drug use, the relationships between risk perception and the independent variables were predicted, with non-directional hypotheses, as follows:

- Hypothesis 1. Substance users who have undergone substance abuse treatment in the past year will perceive different risk in using each illicit substance than will those who have not participated in treatment. When addicts were in treatment, they had often experienced worse consequences of their drug use and could recognize their need for treatment (Marsch, et al., 2007). However, perceptions of risk that are inconsistent with actual risk have been found to be a means of maintaining a positive self-image and that minimization of risks can occur as exposure to them increases (Kilmer, et. al, 2007).

- Hypothesis 2. Substance users that have reported previous mental health treatment compared to those who have had no mental health treatment will perceive different risk of using illicit substances. Often when clients of mental health clinics are indicated to have substance abuse disorders, they were enrolled in substance abuse counseling as part of their mental health treatment (Glantz, et al, 2009).

- Hypothesis 3. Substance users who reported contact with the criminal justice system in the past year compared to those who reported no contact will differ in their perceptions of risk of illicit substances. Those who had previous contact with the criminal justice system might be more aware of the risk and costs of their drug use, supporting Marsch, et al.'s (2007) finding that injection drug user perceptions of risk were higher because of their greater experiences with the items they were asked to rate as risky. Also, Rational Choice Theory (Cornish & Clarke, 1987) suggests that individuals weigh the benefits and consequences of an action before engaging in it. If arrest or incarceration is a consequence of illicit substance use and considered risky, the system would expect that the individual would not engage in such behavior (substance use). However, recidivism rates show otherwise - that those who were previously arrested do not change their perceptions of risk and continue to engage in the behavior.

- Hypothesis 4. Substance users with depression will indicate different risk perceptions than non-depressed respondents. Despite more realistic perceptions by individuals suffering from depression, found by Alloy and Abramson (1979),

depressed persons were at risk for use of illicit substances as self-medication and other factors (Hyman & Sinha, 2009). This affects their ability to make judgments about the actual risks of illicit drug use. Support for the self-medication hypothesis was additionally found among young marijuana users who indicated higher levels of anxiety than non-users (Dorard, Berthoz, Phan, Coros, and Bungener, 2008). Due to the lack of consistent research findings as to what effect depression has on risk perception, this hypothesis is non-directional.

An individual's social environment has been shown as an important factor in use and perception of risk in previous studies (Crawford & Novak, 2010; Borland, et al, 2009; Lewis & Mobley, 2010). The following directional hypotheses are based on previous studies of social influences on substance use and perceived risk of substance use behavior.

- Hypothesis 5. Substance users who received illicit substances from friends or family compared to those who received drugs from acquaintances or strangers will be less likely to indicate that using illicit drug use is a great risk to health and welfare. Close relationships with substance using peers and family members is strongly correlated with substance use (Cascone, et al., 2011).

- Hypothesis 6. Substance users who believe an illicit substance is fairly or very easy to obtain will perceive less risk of using each of the illicit drugs than will those who reported the drugs were not very easy to obtain. The literature suggests that among adolescents, social norms were a significant factor in illicit drug use. Adolescents tend to believe "If most of my peers are using [drug], it must be

okay" (Litt & Stock, 2011). The current study examines if this social process was similar among the adult sample.

- Hypothesis 7. As the age at first use of any illicit drugs increases, the perceived risk of using illicit drugs also increases. Prior literature linked perception of risk to actual behavior. Age at first use was negatively correlated with continued use (Chen, et. al, 2009; Cascone, et. al, 2011). Therefore, it was reasonable to hypothesize that the perception of risk of an individual with an earlier age of onset will be less and encourage continued use.

This study also examines if prior experience changed the perception of risk of regular illicit drug use, but had no effect on the perception of risk of occasional or one time use of illicit drugs. Unexpected results appeared in Europe in 2009, when for most of the illicit substances measured, the risk perception of regular substance use increased in most countries, but the risk assessment of trying the illicit substance once or twice decreased over eight years (Elekes, Miller, Chomynova, & Beck, 2009). The factors that individuals used to assess risks were effective in increasing risk perception for regular use but not at all for one time use. The findings suggest a need for further study of the relationship between frequency of use and risk perception.

The seven listed hypotheses of this study apply to each risk perception outcome variable. The analyses for each outcome variable, however, are run separately. Results and discussion of the findings are organized by illicit drug type, as each drug is different, and therefore may have had different perceptions of risk.

CHAPTER THREE

METHODOLOGY

Data Used

The data set used was the 2009 National Survey on Drug Use and Health (NSDUH). The primary purpose of the survey was to measure the prevalence and correlates of drug use in the United States. Data collection was done by the research office of the Substance Abuse and Mental Health Services Administration (SAMHSA), which is responsible for the federal improvement of quality and availability of substance abuse prevention, mental health services, and alcohol and drug addiction treatment.

Sampling Method

The target population for the 2009 survey was the civilian, non-institutionalized population of the United States who were 12 years of age or older at the time of the survey. Each year, SAMHSA uses a probability sampling technique to sample the U.S. population. For the 2009 survey, SAMHSA used a multistage, deeply stratified cluster sample design. The 50 states and the District of Columbia were sampled, divided into state sampling regions, further breaking the areas down to 48 census tracts, which were the primary sampling unit. Eight of these census tracts were used for the 2009 sample. The eight census tracts were randomly selected for inclusion in the final sample (SAMHSA, 2009).

Each of the 8 census tracts was further divided into smaller segments. Segments were defined using aggregations of census blocks. From each census block, dwelling units were randomly selected. Individuals within the dwellings were then selected using a computer generated set and all questions were answered using Computer-assisted interviewing. Respondents were given $30 for their participation in the survey. Although the 2009 survey involved 68,700 persons, the resulting public data file contained 55,772 records. The field investigators were members of the Research Triangle Institute and were trained to collect data using computer-assisted interviewing methods. Questions that asked for more personal data were answered using the audio computer-assisted self-interviewing system, providing respondents with private and confidential means of responding, thus increasing honest reporting.

Sample

The response rate of the 2009 survey was 88.8% (n = 68,700). The publicly available file of the 2009 NSDUH is comprised of records stripped of any state or individual identifiers as well as records that could compromise respondent confidentiality. The data used for this research uses the public file (n= 55,772), and focuses only on adults aged 18 or older, for a total of 38,067 subjects (68.3%), with 9,277 indicating having used illicit substances in the past year (16.7%). Therefore, all analyses will be conducted using the sample of 9,277 adults with past year use of illicit substances. Illicit substance use was measured using positive responses to the nominal variable "Have you used an illicit substance in the past 12 months?" For each substance (heroin, cocaine, marijuana, and LSD), respondents indicated yes or no to answer the question,

"Have you ever, even once, used [illicit substance]?" A response of "yes" to any illicit drug use includes the case in the final sample used in this study.

Measures

Outcome Variables

Risk perception was measured separately for heroin, cocaine, marijuana and LSD. Respondents were asked separately how much people risk harming themselves, physically and in other ways, when they use heroin, cocaine, marijuana or LSD once or twice a week. This was considered "regular use" in this study. Respondents were also asked to indicate how much people risk harming themselves, physically and in other ways, when they use heroin or LSD once or twice ever, and marijuana or cocaine once or twice a month. These were considered "trying" or "occasional use," respectively, for this study.

The risk perception variables of regular cocaine use, regular heroin use, and regular LSD use were dichotomized as "Great risk" and "moderate to no risk," to make the variables more amenable to logistic regression. Dichotomizing these variables also allowed for a less disparate distribution of cases between the two categories. All dichotomous outcome measures were dummy coded with "no risk" coded as zero, and "moderate to great risk" coded as one. Distributions are provided in the results section.

Regular marijuana use, occasional marijuana use, occasional cocaine use, trying heroin, and trying LSD were grouped into limited ordinal scales of "slight to no risk" (coded as 1), "moderate risk" (coded as 2), and "great risk" (coded as 3). This allowed for performing categorical multivariate analyses.

Predictor Variables

All dichotomous predictor variables were dummy coded with absence coded as zero, and presence coded as one. Distributions are provided in the results section.

Substance Use Treatment

Substance abuse treatment participation was measured by combining positive indications ("yes") to the separate questions of having ever received treatment at any location in the past year, including doctor's offices, hospitals, jails, in and outpatient clinics, etc. Participants that had not received treatment responded "no" to the questions. A negative response to all of these questions resulted in a "no" value for the treatment variable. A total of 551 (5.9%) respondents had received substance use treatment in the past year.

Mental Health Treatment

Visits to a mental health clinic or other mental health treatment facility for psychological health concerns were measured for occurrences for the past 12 months. Respondents were asked if in the past twelve months they had visited or stayed at a hospital or other facility for treatment or counseling for any problem they were having with their emotions, nerves, or mental health – not including drug or alcohol use. Responses were either yes (24.4%) or no (75.6%), coded as one or zero, respectively.

Criminal Justice System Interaction

Criminal justice system involvement was measured as a dichotomous variable, using positive indications ("yes") to the questions "have you ever been arrested and booked for breaking the law" and "Were you on probation at any time during the past 12

months?" Those who were neither arrested nor on probation in the past year were coded as "no." Over one-third of respondents (34.6%) indicated having been arrested or on probation in the past year.

Depression

If the individual had depression in the past year, paired with a positive indication of suicidal thoughts, plans or attempts, and any other indication of major depressive episodes in the past year, the respondent scored "yes" on the depression variable. The dichotomous responses allowed the positive responses to the separate questions to be combined into a depression variable. Hence, any indication of a major depressive episode resulted in "yes" to depression. If the individual did not respond with "yes" to any of the questions included in this variable, their response was categorized as "no" (79.5%), and coded as zero.

Social Context

Research has shown that social influence and risk-minimization was mediated by familial and community norms in increases in substance use (Borland, et al, 2009; Daniels, 2011; Lewis & Mobley, 2010).

Ease of Obtaining Illicit Drugs

Individuals were asked how easy it would be for them to obtain an illicit drug if they wanted it. This question was asked for marijuana, heroin, LSD and cocaine. Responses were scored on a 5-point Likert scale from Fairly easy to very difficult. Responses were then dichotomized into either "Fairly Easy" or "Otherwise difficult." The variable was dummy coded with "otherwise difficult" as zero, and "fairly easy" as one.

The dichotomized variable was provided as part of the public file for each drug-type. Distributions are provided in the results section.

Age of First Drug Use

Participants were asked at what age they first used any illicit drug, which was analyzed as a continuous variable (Mean=15.9 yrs). The NSDUH survey found that age at first use of marijuana is associated with abuse of illicit drugs. Earlier age at first use predicted higher rates of drug abuse (SAMHSA, 2009). SAMHSA has also found this to be true for almost all drugs.

In addition, studies have indicated drug use initiation, both injection drug use and cannabis use, to be a result of peer norms and social environment (Harocopos, Goldsamt, Kobrak, Jost, & Clatts, 2009; Ridenour, Tarter, Reynolds, Mezzich, Kirisci, & Vanyukov, 2009; Khobzi, Strike, Cavalieri, Bright, Myers, Calzavara, & Millson, 2008; Hayatbakhsh, Najman, Bor, & Williams, 2009). As Khobzi, et. al (2008) found, the initiation of injection drug use was did not occur until participants gained access to a social group with knowledge and expertise in injection drug use. Because age at first drug use is related to the social environment of the individual, it is listed under the social context variables of this study.

Source of Illicit Drugs

Respondents were asked to indicate from whom they obtained their last illicit drug, including marijuana, cocaine, heroin and LSD. Responses ranged from friends or family members to other individual means. The response options were narrowed to four

sources of illicit substances; friends/family (76.0%), professionals (6.1%),

stranger/dealers (12.3%), and "other" means not listed (5.6%).

<div align="center">Control Variables</div>

Consistent with variables found to influence substance use and perceptions of its

risks, five control variables were used to reduce any extraneous variance in the models:

age, gender, race, employment status, and educational attainment. A brief review of

research provides a justification of their inclusion as controls.

Gender differences in perceptions and use of illicit drugs were studied in prior

research (e.g. Neighbors, Lindgren, Knee, Fossos, & DiBello, 2011; Cascone, et. al,

2011). In the 2007 NSDUH, men indicated greater illicit drug use, but the rate of female

users increased in 2008 by 5.8% (NSDUH, 2008). Age has been found significant in

development of perceptions of risky behaviors as well as engaging in the behavior,

including drug use (Fergusson, Boden, & Horwood, 2007; Palmer, Young, Hopfer,

Corley, Stallings, Crowley, & Hewitt, 2009). One study found a clear indication that as

age increased, stigma associated with drug use decreased (Adlaf, Hamilton, Wu, & Noh,

2009). The relationship between age and stigma of drug use was curvilinear, however,

and around late adolescents, the stigma associated with drug use began to increase again.

In 1989, African Americans were arrested for drug offenses at a rate

approximately 4 times higher than whites. Still, the 2009 rate of arrests of African

Americans for drug offenses was over 200% of what it was in 1980 (BJS, 2011). The

War on Drugs has affected African Americans disproportionately from its beginning.

Racial differences also predicted different experiences with treatment. African American

and Latino youth were more likely than White youth to be referred to treatment in the criminal justice system (Burlew, Larios, Suarez-Morales, Holmes, Venner, & Chavez, 2011).

The more educated an individual, the greater their likelihood of treatment participation or risk perception (Rapp, 2008). Full time employees were found to have a lower percentage of cocaine and marijuana use (Office of National Drug Control Policy, 2011).

CHAPTER FOUR

DATA ANALYSIS PLAN

Descriptive Statistics

Descriptive univariate statistics are generated for each outcome, predictor, and control variable. With the exception of education, age, and the predictor variable of age at first use, the variables are categorical, and the mode and variation ratio are determined for each. The education and age variables are ordinal variables, and their measures of central tendency and dispersion are their median value and quartile divisions. The "age at first use" variable is continuous, and is evaluated for normality. Continuous variables that are highly skewed are not amenable to parametric tests, and therefore must be transformed if they violate the assumption of normality. The mean and the standard deviations were calculated as measures of central tendency and variability.

Bivariate Analysis

Chi-square tests are used to measure the bivariate relationship among the categorical independent predictor variables and categorical control predictor variables. Highly correlated variables (effect size greater than 0.90) may cause multicollinearity issues in the multivariate analyses, which might render an unstable solution, inflate the size of the residuals, and reduce the precision of the coefficients (Tabachnick & Fidell, 2007). Because the study uses a large sample size, the threshold for significance is established at the 0.001 alpha level (Bachman & Paternoster, 2009).

A Phi, Cramer's V or Somer's D strength effect of association value of 0.08 or higher was considered practically significant. Phi and Cramer's V statistics allowed for an analysis of strength for the nominal outcome variables. Strengths of association equal to or higher than 0.08 approach weak significance (Bachman & Paternoster, 2009), and are therefore considered practically significant for this study. Phi was utilized for the predictor variables of substance use treatment, mental health treatment, criminal justice interaction, depression, and ease of obtaining drugs on the dichotomous outcome variable. It was also evaluated for gender. Phi was used for these variables because each has two categories.

Phi statistics are calculated for a 2x2 analysis of association, thus it is utilized here to measure the association between the dichotomous outcome variable and all dichotomous predictor variables: substance use treatment, mental health treatment, criminal justice interaction, depression, ease of obtaining drugs, and gender. Cramer's V statistic is used to test the strength of relationships between nominal variables in asymmetric contingency tables (2x3, 2x4, etc.). In the case of both Phi and Cramer's V, an effect size equal to or greater than 0.3 is considered to be of moderate strength. This study utilizes this strength threshold to discuss practical significance.

Somer's d was used to identify the strength of the relationship between risk perception variables and education level and employment status. Somer's d is a more stringent criterion for strength of association for ordinal level outcome variables (Giventer, 2008). It is a Proportion of Reduction in Error (PRE) measure, which allows this study to identify the percent reduction in error obtained when using the predictor

variable to explain variance in the outcome variable. Therefore, a Somer's d value of 0.08 will suggest that using the predictor variable to explain the variance in the outcome variable reduces error in prediction by 8%. The Somer's d statistic is appropriate for ordinal variables of asymmetric relationships.

Age differences in risk perception variables were tested using t-tests and one-way Analyses of Variance (ANOVA). The dichotomous outcome variables were analyzed using t-tests, the limited ordinal with ANOVAs. The statistical significance was set at the .001 alpha level. Post-hoc significance values in ANOVAs were less than the .001 level were considered as to the size of the difference in the means. Statistical assumptions for the independent t-tests and one-way ANOVAs were met, and the homogeneity of variance was evaluated with the Levene's test. When that assumption was not met (Levene's p<.05), the adjusted values were reported. These adjusted values were given in analyses as an adjusted t-value, and as the Brown-Forsythe robust tests in ANOVA. LSD and Games-Howell post-hoc analyses were used to test pair-wise differences in significant ANOVA results. The Brown-Forsythe tests and Games-Howell post-hoc analyses were used only when the assumption of homogeneity of variance was not met, as indicated by the Levene's test. Results were presented by risk perception of type of illicit drug and frequency of use.

Multivariate Analysis

After initial bivariate analyses, multivariate tests were run to determine if the independent predictors explain unique variance in the risk perception variables. Demographic variables, whether they were found to be statistically significant or not in

bivariate tests, were included in the multivariate models. The demographic variables were included in multivariate models because they were found to be significant in prior research.

Logistic regression is an appropriate multivariate technique when the outcome variables are categorical. Multiple linear regression is inappropriate in this case because categorical variable violate the assumptions of linearity and homoscedasticity. Logistic regression focuses on estimating the probability of an outcome for each observation (Tabachnick & Fidell, 2007).

Binary Logistic regression was utilized for those dependent variables that were dichotomized. The remaining five outcome variables were analyzed using Multinomial logistic regression because of their limited ordinal nature. Multinomial logistic regression for the tri-level ordinal variables consists of two comparisons. The comparisons were between "no risk" and "great risk," and "moderate risk" and "great risk" for each regression. The Bonferroni adjustment for multiple comparisons requires a p-value of below .003 to maintain a desired alpha level of .05 (0.05 overall alpha/16 tests per drug type = .003). Therefore, statistically significant measures in this study were those that meet the p<.001 requirement. Wald statistics were compared among significant predictors to indicate the best predictors in each regression.

CHAPTER FIVE

RESULTS

Descriptive Statistics

Outcome Variables

Risk perception was measured for marijuana use, cocaine use, heroin use, and LSD use. Respondents were asked to rate how much people risk harming themselves physically and in other ways when they use marijuana regularly, marijuana occasionally, cocaine regularly, cocaine occasionally, heroin regularly, heroin once, LSD regularly, or LSD once. "Regular use" was considered once or twice a week. "Occasional use" was considered once or twice a month.

When asked about their perceived risk of regular marijuana use, the responses that the drug-using sample examined for the current analyses indicated that 70.3% perceived there to be no/slight risk. When asked the same question about regular cocaine use, 77.0% responded that there was *great risk* in using cocaine once or twice a week. Only in the case of marijuana did most respondents find there to be less than great risk associated with regular or occasional use. Respondents were almost unanimous (93.4%) that there was great risk in using heroin once or twice a week. The variable itself is close to becoming a constant. This is an interesting finding in itself, as the sample is comprised of adults having used illicit substances in the past year.

Table 1. Descriptive Statistics of Outcome Variables

	Description	Central Tendency	Dispersion	Min	Max
Risk Perception	**Physical and other risk of:**				
*Regular Marijuana use	Using Marijuana once or twice a week	No to Slight Risk (n=6,507, 70.3%)	Q1=No Risk, Q4=Moderate to Great Risk	1	3
*Occasional Marijuana Use	Using Marijuana once or twice a month	No to Slight Risk (n=7,406, 80.1%)	Q1=No Risk, Q4=No Risk to Great risk	1	3
Regular Cocaine Use	Using Cocaine once or twice a week	Great Risk (n=7,076, 77.0%)	Variation Ratio: 0.23	0	1
*Occasional Cocaine Use	Using Cocaine once or twice a month	Great Risk (n=4,601, 50.1%)	Q1=No to Moderate Risk, Q4=Great Risk	1	3
Regular Heroin Use	Using Heroin once or twice a week	Great Risk (n=8,564, 93.4%)	Variation Ratio: 0.066	0	1
*Trying Heroin	Trying Heroin once or twice	Great Risk (n=7,041, 76.9%)	Q1=No risk to Great Risk, Q4=Great Risk	1	3
Regular LSD Use	Using LSD once or twice a week	Great Risk (n=6,959, 76.5%)	Variation Ratio: 0.235	0	1
*Trying LSD	Trying LSD once or twice	Great Risk (n=4,545, 50.0%)	Q1=No to Moderate Risk, Q4=Great Risk	1	3

* Ordinal variables. The Median is given, as well as the dispersion in Quartiles.

Predictor Variables

All predictor variables were categorical, with the exception of age at first illicit drug use. The age at first drug use was continuous, and the measures of central tendency and variation are presented in Table 2 as the mean and the standard deviation, respectively. The variable was negatively skewed, but the three measures of central tendency are very similar. Transformations did not alter the very slight skewness, but the assumption of normality for bivariate analyses were relaxed given the very large sample size (N=9,277). The average age at first use in the sample was 15.9 years. The median was 16 years of age. The source of illicit drug had 4 categories, with 76% of respondents indicating that they received their illicit drugs from a family member or friend.

The other predictor variables were dichotomous. Respondents could answer yes or no to the variable, and the most common responses for each are presented in Table 2. Most notably, 88.2% of individuals responded that it was fairly easy to obtain marijuana, where almost the same percentage indicated that it would be otherwise difficult to obtain LSD and heroin. Bivariate results showed that predictor variables identified different results for regular versus occasional use. In addition, most individuals had not been depressed (79.5%), had not received mental health treatment (75.6%), or received substance abuse treatment (94.1%) in the past year. The small variability in the substance abuse treatment variable might have limited the practical implications of the predictor, as well as the ability to find significant results for the relationship between the variable and the outcome risk perception variables. Almost two-thirds (65.4%) of individuals had not been arrested or on probation in the past year.

Table 2. Descriptive Statistics of Predictor Variables

	Description	N	Central Tendency	Dispersion	Min	Max
Depression	Depressed in the past year (1=Yes, 0=No)	9,277	No (n=7,371, 79.5%)	0.205	0	1
Mental Health Treatment	Tx in the past 12 months (1=Yes, 0=No)	9,277	No (n=7,010, 75.6%)	0.244	0	1
Substance Abuse Tx	Tx in the past 12 months (1=Yes, 0=No)	9,277	No (n=8,726, 94.1%)	0.941	0	1
CRMJ system involvement	Ever arrested or on probation (1=Yes, 2=No)	9,277	No (n=6,065, 65.4%)	0.346	0	1
*Age at first use	Age of first illicit drug use	9,277	Mean= 15.95, Md=16.0	Std. Dev.= 4.087	1	68
Source of Drug	Source of illicit drugs for use (4 categories)	8,845	Friend/Family (n=6,721, 76.0%)	0.056	1	4
Ease of obtaining Marijuana	How easy it is to obtain the illicit drug (1 = Easy, 0=Otherwise	9,220	Fairly easy (n=8,136, 88.2%)	0.118	0	1
Ease of obtaining Cocaine	How easy it is to obtain the illicit drug (1 = Easy, 0=Otherwise	9,084	Otherwise (n=4,854, 53.4%)	0.466	0	1
Ease of obtaining Heroin	How easy it is to obtain the illicit drug (1 = Easy, 0=Otherwise	8,969	Otherwise (n=7,226, 80.6%)	0.194	0	1
Ease of obtaining LSD	How easy it is to obtain the illicit drug (1 = Easy, 0=Otherwise	8,977	Otherwise (n=7,327, 81.6%)	0.184	0	1

*Continuous variable. The mean and standard deviation are given.

Control Variables

Based on previous literature, education, age, employment status, gender, and race of the respondent were held constant for analysis. The majority of participants were white (65.8%) and male (54.2%). Most were also employed full time (40.9%). Age and education were ordinal variables, and therefore their quartile divisions are listed as measures of dispersion in Table 3. Twenty-five percent of respondents received a high school diploma or less, with the most individuals having received only their high school degree (34%). The median age of respondents was between 22.5 years of age, with 75% of individuals younger than 26 years of age.

Table 3. Descriptive Statistics of Control Variables

	Description	Central Tendency	Dispersion	Min	Max
*Education	4 categories of education levels (e.g. 4=College graduate)	High School graduate (n=3,151, 34.0%)	Q1=High school grad or less, Q4=Some college or College graduate	1	4
*Age	11 categories (e.g. 7=18 years)	22-23 years old (n=1,565, 16.9%)	Q1=20 years or younger, Q4=26 years or older	7	17
Employment Status	4 categories	Full time (n=3,797, 40.9%)	Variation Ratio: 0.146	1	4
Gender	Gender (1=Male, 2=Female)	Male (n=5,030, 54.2%)	Variation Ratio: 0.458	1	2
Race	4 categories (e.g. 1= White)	White (n=6,102, 65.8%)	Variation Ratio: 0.086	1	4

*Ordinal variables, median and quartiles are presented.

Bivariate and Multivariate Analyses

Marijuana

To examine the relationship between the outcome variables of risk perception of marijuana frequency of use and numerous predictors, bivariate tests were run as a preliminary step. All assumptions were met for the chi-square analyses. All of the variables were categorical. The expected cell frequencies met the requirements of being greater than 1 and all of the expected frequencies were greater than 5. Predictor variables that were not found to be significant in any bivariate analyses were not included in multivariate analyses.

Table 4 shows a weak, statistically significant association between prior criminal justice system involvement and risk perception of regular marijuana use (V=0.096). Of those that indicated having been arrested or on probation in the past year, 76.1% reported slight to no risk in regular marijuana use. A statistically significant association was also found between source of illicit drug and risk perception of regular marijuana use. Age at first use was also positively associated with perception of risk of regular marijuana use. The significant difference in means was found across all groups (Games-Howell). That is, there was a significant difference between the age at first use of individuals responding "no to slight" risk of regular marijuana use (Mean=15.49), and "moderate risk" (Mean=16.59) and "great risk" (Mean=17.62). The difference between of age at first use between "moderate risk" and "great risk" was also statistically significant. The bivariate analyses did not find any association between employment status, the treatment variables, depression or ease of obtaining marijuana.

Table 4. Regular Marijuana Use Bivariate Results

	Regular Marijuana Use Risk Perception		
	No to Slight Risk	**Moderate Risk**	**Great Risk**
Substance Abuse TX			
No	70.20%	19.50%	10.30%
Yes	73.00%	16.90%	10.20%
	x^2 (2)=2.458, V=0.016ns		
Mental Health TX			
No	71.20%	18.80%	9.90%
Yes	67.70%	21.00%	11.30%
	x^2 (2)=10.129, V=0.033ns		
CRMJ involvement			
No	67.30%	20.80%	11.90%
Yes	76.10%	16.60%	7.30%
	x^2 (2) = 85.407, V=0.096***		
Depression			
No	70.60%	19.50%	10.00%
Yes	69.40%	19.10%	11.50%
	x^2 (2) =4.181, V=0.021ns		
Age at first use	15.49 yrs.	16.59 years	17.62 years
	F (2,1960.5)=81.11***		
Source of Drug			
Friends/Family	71.30%	19.70%	9.00%
Professional	55.70%	21.20%	23.10%
Stranger/dealer	76.80%	16.00%	7.20%
Other	73.50%	15.50%	11.00%
	x^2 (6) = 144.661, V=0.091***		
Ease of obtaining MJ			
Easy	69.50%	18.40%	12.10%
Otherwise	70.70%	19.60%	9.70%
	x^2 (2)=8.963, V=0.032ns		

***Significant at the p<.001 level.

Table 5 shows that a statistically significant association was found between prior criminal justice system involvement and risk perception of occasional marijuana use (V=0.058). A statistically significant association with risk perception of occasional marijuana use was also found with source of illicit drug and ease of obtaining marijuana.

On average, the age at first use was significantly different for respondents that found different levels of risk perception of regular and occasional marijuana use. The difference in means suggests that those who had indicated different risk perceptions in occasional marijuana use had significantly difference in age at first use. The difference in mean age at first use lies between "no risk" (Mean=15.67) and "moderate risk" (Mean=16.72) and between "no risk" and "great risk" (Mean=17.27).

Table 5. Occasional Marijuana Use Bivariate Results

	Risk Perception of Occasional Marijuana Use		
	No to Slight Risk	Moderate Risk	Great Risk
Substance Abuse TX			
No	80.10%	12.90%	7.00%
Yes	79.70%	11.30%	9.10%
	x^2 (2)=4.304, V=0.022ns		
Mental Health TX			
No	80.50%	12.80%	6.70%
Yes	78.80%	12.90%	8.30%
	x^2 (2)=7.079, V=0.028ns		
CRMJ involvement			
No	78.40%	13.70%	7.90%
Yes	83.10%	11.20%	5.60%
	x^2 (2)=30.647, V=0.058***		
Depression			
No	80.20%	13.00%	6.80%
Yes	79.60%	12.20%	8.20%
	x^2 (2)=4.715, V=0.023ns		
Age at first use	15.67 yrs	16.72 years	17.27 years
	F (2,148.08)=35.63***		
Source of Drug			
Friends/Family	82.00%	12.50%	5.60%
Professional	62.90%	16.20%	20.90%
Stranger/dealer	84.20%	10.90%	5.00%
Other	80.00%	11.40%	8.60%
	x^2 (6)=215.520, V=0.110***		
Ease of obtaining MJ			
Easy	77.10%	13.50%	9.40%
Otherwise	81.00%	12.60%	6.40%
	x^2 (2)=21.187, V=0.049***		

***Significant at the p<.001 level.

The control variables were also significantly associated with risk perception of both regular and occasional marijuana use. The control variables of respondent age, race, gender and education were statistically significant in chi-square analyses with perception of risk of regular marijuana use. Age and education were ordinal variables, and were evaluated using the Somer's d measure of association. The relationship between the two ordinal variables was statistically significant in terms of both regular and occasional marijuana use. In the chi-square tests of association, educational level presented the strongest association (d=0.142) with risk perception of occasional marijuana use, which was still weak. The association measure also indicates a 14.2% reduction in error.

The risk perceptions of marijuana, both for regular use and occasional use, were analyzed at the multivariate level with multinomial logistic regression. In both analyses, the control variables of Age, Race, Sex, Education, and Employment status were used only to define the subpopulation but not constructing the model. Therefore, the significance of the independent predictor variables within the model are significant when controlling for the other independent predictor variables, as well as for age, race, sex, education, and employment status. Regardless of their significance in bivariate chi-square analyses, the control variables are held constant for analysis of the predictor variables in the models. The significance of the control variables appeared in prior studies, which justified their inclusion in the final analyses. The assumptions of multinomial logistic regression have been met. The interaction term of the age at first use and its log was not significant in the analysis, satisfying linearity of the logit, and the multicollinearity statistics were within acceptable ranges. Multi-collinearity statistics were generated by

running a linear regression on the same model of predictors and examining VIF and tolerance values.

Perception of Risk of Regular Marijuana use

The model predicting the perception of risk of regular marijuana use, including past year substance abuse treatment, past year criminal justice system involvement, age of first drug use, source of illicit drug, and ease of obtaining marijuana as predictors, was significant (x^2 (14)=458.04, p<.001). The chi-square analysis tested the decrease in unexplained variance from the null model (-2LL =12,130) to the final model (-2LL=11,672), which was a difference of 458 points in deviance. This change was significant, which means that the final model explained a significant amount of the original variability. The deviance statistic was not significant, indicating that the model was a good fit. While the Pearson goodness-of-fit statistic was significant, it indicates a possible dispersion concern rather than a bad fit. The pseudo-R^2 value suggests that there the model predicts 6.4% of the variance of the perception of risk of marijuana use (Nagelkerke R^2 = .064). The dispersion of the predictor variables was a concern among all analyses, and was reviewed as to its limitations. Participants did not vary greatly in their responses to the risk perception variable. The lack of variability may cause statistical errors, which is adjusted for by using a lower alpha level. Expected cell counts were also very low in the multinomial logistic regression, which causes concern for overall analysis.

The likelihood ratio tests indicate that all of the predictors, with the exception of substance abuse treatment, had significant main effects on perception of risk in regular

marijuana use. The test compared pairs of outcome categories, with "Great Risk" as the reference category. Whether substance users had participated in substance abuse treatment in the past year did not significantly predict whether they responded no risk in regular marijuana use or great risk in regular marijuana use (b=.399, Wald=6.014). As noted in Table 6, recent criminal justice system involvement, age at first use, and source of illicit drugs were significant in predicting whether the individual reported no risk rather than great risk of regular marijuana use. As respondents reported having been arrested or on probation in the past year, the odds of responding "great risk" rather than "no risk," increased (b=-.459, W=26.3), when controlling for all other predictors. Thus, prior involvement in the system increased the perception of risk associated with regular marijuana use after statistically controlling for the other characteristics and factors.

The likelihood of responding "great risk," rather than "no risk," also increased as respondents reported receiving their drugs from a licensed professional compared to others (b=-.929, W=24.480). The age at first use was also a significant predictor of whether a respondent reported "no risk," or "great risk" of regular marijuana use, with older respondents being more likely to report "great risk" than their substance using younger counterparts (b=-.093, W=114.9). Age at first use was the most powerful predictor of risk perception (W=114.9): the older the first-time user, the greater the perception of risk associated with regular marijuana use.

The ease of obtaining marijuana also significantly predicted perceived risk of marijuana use. In addition, ease of obtaining marijuana was the only significant predictor of risk of regular marijuana use (b=-.438, W=10.064).

Table 6. Regular Marijuana Use Multinomial Regression Results

N=8,793	Risk Perception of Regular Marijuana Use[a]					
	Odds		SE		Wald	
	No Risk	Moderate Risk	No Risk	Moderate Risk	No Risk	Moderate Risk
Past year Substance Abuse Treatment	1.49	1.495	0.163	0.191	6.014	4.428
Recent Criminal Justice Involvement	0.632	0.795	0.089	0.101	26.349	5.174
Age at first use	0.911*	0.974	0.009	0.008	114.973	10.058
Ease of obtaining Marijuana	0.405*	0.617*	0.098	0.112	84.996	18.74
Source of drug: Family/Friend	1.187	1.503	0.158	0.188	1.178	4.723
Source of drug: Professional	0.395*	0.685	0.188	0.223	24.48	2.876
Source of drug: Stranger/Dealer	1.471	1.509	0.193	0.227	3.99	3.292
	Chi-square (14)=458.05*, p<.001					
	Percentage correct=71.6%					
	Nagelkerke R^2=.064					

*Significant at the p<.001 level.
[a]The model includes control variables of age, race, gender, education, and employment status.

Substance abuse treatment, recent criminal justice system involvement, age at first use, and source of illicit drugs were not significant predictors or "moderate risk," and "great risk," of regular marijuana use, but they were for "no risk" and "great risk." There was, therefore, a difference between the predictors of "no risk" instead of "great risk," and "moderate risk" instead of "great risk."

Perception of Risk of Occasional Marijuana Use

Similar results were found in the multivariate analysis of perception of occasional marijuana use. The model including past year substance abuse treatment, recent criminal

justice system involvement, age at first use, source of illicit drug, and ease of obtaining marijuana, significantly predicted the variability in perception of occasional marijuana use. The model explained 5.7% of the overall variance in the outcome variable (Pseudo-R^2=.057). The model only improved classification of group membership by 0.15% above the null model. Control variables were held constant in multivariate analysis, but did not make up the final model. Variance in the outcome variable is explained using the model with the independent predictor variables, while holding the control variables constant.

Table 7. Occasional Marijuana Use Multinomial Regression Results

N=8,794	Risk Perception of Occasional Marijuana Use[a]					
	Odds		SE		Wald	
	No Risk	Moderate Risk	No Risk	Moderate Risk	No Risk	Moderate Risk
Past year Substance Abuse Treatment	1.873*	2.072*	0.172	0.22	13.374	10.96
Recent Criminal Justice Involvement	0.746	0.872	0.103	0.121	8.004	1.291
Age at first use	0.942*	0.99	0.009	0.1	42.891	1.123
Ease of obtaining Marijuana	0.385*	0.669	0.111	0.131	74.308	9.323
Source of drug: Family/Friend	1.517	1.641	0.176	0.218	5.611	5.181
Source of drug: Professional	0.349*	0.623	0.202	0.253	27.32	3.499
Source of drug: Stranger/Dealer	1.722	1.663	0.219	0.266	6.172	3.668
	Chi-square (14)=360.82*, p<.001					
	Percentage correct=81.2%					
	Nagelkerke R^2=.057					

*Significant at the p<.001 level.
[a]The model includes control variables of age, race, gender, education, and employment status.

All predictors, except for recent criminal justice system involvement, were significant in predicting "no risk" and "great risk" in occasional marijuana use. Respondents who had been in substance abuse treatment in the past year more likely to respond "no risk" than "great risk," compared to those who had not had treatment (b=.628, Wald=13.37).

Similarly respondents with treatment histories had a greater likelihood of reporting "moderate risk," than "great risk," than those who had not had treatment (b=.729, Wald=10.96). Older respondents (b=-.60), respondents who found it easier to obtain drugs (b=-.954), and those who received their drugs from other sources rather than a professional (b=-1.054), all had a greater likelihood of responding "great risk," rather than "no risk." Age at first use was again the greatest predictor (Wald = 42.89) in the model predicting responses of either "no risk" or "great risk" in occasional marijuana use.

Cocaine

Statistically significant bivariate relationships with risk perception of cocaine use were found for substance abuse treatment, prior criminal justice involvement, age at first use, and source of illicit drug. Prior criminal justice involvement (Phi=0.100) and race (V=0.110) were most strongly associated with risk perception of cocaine use.

Although both those who had been arrested and those who had not, perceived there to be great risk in regular cocaine use, 80.1% of those that had not been arrested or on probation in the past year perceived a great risk of cocaine use. This was a 9% difference over those that had been arrested or on probation (71.2%). Age at first use was also a predictor of risk perception of regular cocaine use. Those who indicated great risk

were older, on average, than those that perceived "no risk" in regular cocaine use. The

bivariate analyses of the predictor variables are found in Table 8.

Table 8. Regular Cocaine Use Bivariate Results

	Risk Perception of Regular Cocaine Use	
	No Risk to Moderate Risk	Great Risk
Substance Abuse TX		
No	22.20%	77.80%
Yes	35.50%	64.50%
	x² (1)=51.290, Phi=-0.075***	
Mental Health TX		
No	23.00%	77.00%
Yes	23.00%	77.00%
	x² (1)=0.002, Phi=0.00ns	
CRMJ involvement		
No	19.90%	80.10%
Yes	28.80%	71.20%
	x² (1)=92.054, Phi=-0.100***	
Depression		
No	22.80%	77.20%
Yes	23.60%	76.40%
	x² (1)=0.437, Phi=-0.007ns	
Age at first use	15.10 years	16.17 years
	t (9187)=-10.616***	
Source of Drug		
Friends/Family	21.30%	78.70%
Professional	27.20%	72.80%
Stranger/dealer	29.50%	70.50%
Other	22.40%	77.60%
	x² (3)=42.608, V=0.070***	
Ease of obtaining MJ		
Easy	25.50%	74.50%
Otherwise	22.60%	77.40%
	x² (1)=6.736, Phi=-0.27ns	

*** Significant at the p<.001 level.

Bivariate analyses revealed statistically significant associations at the p<.01 level

between perceived risk of cocaine use and substance abuse treatment (V=0.63), criminal

justice system involvement (V=.095), and age at first use. There was a significant

positive association between criminal justice system involvement and the outcome

variable.

Table 9. Occasional Cocaine Use Bivariate Results

	Risk Perception of Occasional Cocaine Use		
	No to Slight Risk	Moderate Risk	Great Risk
Substance Abuse TX			
No	21.90%	27.30%	50.80%
Yes	31.10%	30.20%	38.70%
	x² (2)=36.088, V= 0.063***		
Mental Health TX			
No	22.30%	26.90%	50.70%
Yes	22.70%	29.20%	48.10%
	x² (2)=5.407, V=0.024ns		
CRMJ involvement			
No	19.70%	27.50%	52.80%
Yes	**27.60%**	27.50%	44.90%
	x² (2)=82.870, V=0.095***		
Depression			
No	22.30%	27.60%	50.10%
Yes	23.10%	27.00%	49.90%
	x² (2)=0.761, V=.683ns		
Age at first use	15.11 years	15.85 years	16.33 years
	F (2,8680)=77.162***		
Source of Drug			
Friends/Family	21.90%	27.90%	50.30%
Professional	22.80%	25.40%	51.80%
Stranger/dealer	24.60%	27.50%	47.90%
Other	21.50%	26.40%	52.10%
	x² (6)= 6.404, V=0.027ns		
Ease of obtaining MJ			
Easy	22.40%	24.70%	53.00%
Otherwise	22.60%	28.30%	49.10%
	x² (2)=10.787, V=0.035ns		

*** Significant at the p<.001 level.

Individuals who were arrested or on probation in the past year were more likely to perceive a greater risk of occasional cocaine use than those not processed in the criminal justice system (p<.001). Ease of obtaining marijuana, source of illicit drug, depression, and past year mental health treatment were not significantly related to risk perceptions of occasional cocaine use (Table 9.).

Perception of Risk of Regular Cocaine Use

The risk perception of regular cocaine use, coded as zero for no risk, and 1 for great risk, was analyzed at the multivariate level with binary logistic regression. Table 10 shows logistic regression coefficients for the odds of perceiving great risk in regular cocaine use as predicted by prior substance abuse treatment, previous arrests, and age at first use. The model was statistically significant but weak (Nagelkerke R2=.071). The model did not improve classification of cases above the null model. On average, and after controlling for the effect of all other variables, including age, race, gender, education, and employment status, age at first use and ease of obtaining cocaine significantly predicted the odds of perceiving great risk in marijuana use, with ease of obtaining cocaine having the strongest effect (Wald=60.12).

When controlling for all other variables, for every additional year in age at first use the odds of perceiving great risk of regular cocaine use increased by 6.5%. Those who indicated it was easy to obtain cocaine were more likely to respond "no risk" than those that indicated "otherwise" (b=.418, Wald=60.12). Neither prior substance abuse treatment nor recent criminal justice system involvement were statistically significant predictors controlling for all other variables. This is a surprising result, as the literature

suggested that recent criminal justice system involvement should be statistically

significant, because increased interaction with the criminal justice system should increase

knowledge of and therefore the perception of risks involved.

Table 10. Regular Cocaine Use Logistic Regression Results

N=8,628	Risk Perception of Regular Cocaine Use[a]		
	Odds	**SE**	**Wald**
Past year Substance Abuse Treatment	**1.357**	**0.102**	**8.906**
Recent Criminal Justice Involvement	**1.152**	**0.060**	**5.667**
Age at first use	**1.065***	**0.009**	**52.858**
Ease of obtaining Cocaine	**1.519***	**0.054**	**60.115**
Source of drug: Family/Friend	**0.964**	**0.120**	**0.092**
Source of drug: Professional	**0.693**	**0.153**	**5.718**
Source of drug: Stranger/Dealer	**0.704**	**0.135**	**6.815**
	Chi-square (27)=410.59*, p<.001		
	Percentage correct=77.0%		
	Nagelkerke R^2=.071		

*Significant at the p<.001 level.
[a]The model includes control variables of age, race, gender, education, and employment status.

Perception of Risk of Occasional Cocaine Use

Multinomial logistic regression was used to analyze the significance of models on

the risk perception of occasional cocaine use. The model predicting the perception of risk

of occasional cocaine use, including past year substance abuse treatment, past year

criminal justice system involvement, age at first drug use, source of illicit drug, and ease

of obtaining cocaine, was significant (x^2 (27)=410.59, p<.001). The decrease in model

deviance fell from 16,156 units in the null model to 15,881 units in the model with the

predictors. The significant change was confirmed with the Pearson statistic's non-

significance, which indicated a good fit. The model with the predictors explained 3.6% of

the variance in the perception of occasional cocaine use risk. The deviance statistic was

significant, and called attention to a variability concern. The majority of participants in

the overall sample reported great risk in occasional cocaine use. The limited variability of

the measure might cause significant deviance statistics, as well as lower explained

variance in the perception of occasional cocaine use.

Table 11. Occasional Cocaine Use Multinomial Regression Results

	Risk Perception of Occasional Cocaine Use[a]					
N=8,627	Odds		SE		Wald	
	No Risk	Moderate Risk	No Risk	Moderate Risk	No Risk	Moderate Risk
Past year Substance Abuse Treatment	0.739	0.771	0.115	0.114	6.944	5.199
Recent Criminal Justice Involvement	0.734*	0.932	0.06	0.057	26.596	1.524
Age at first use	0.933*	0.778*	0.009	0.007	62.531	9.403
Ease of obtaining Cocaine	0.600*	0.979	0.056	0.052	81.722	23.295
Source of drug: Family/Friend	1.11	1.091	0.125	0.115	0.694	0.574
Source of drug: Professional	1.116	0.972	0.165	0.154	0.442	0.34
Source of drug: Stranger/Dealer	1.147	1.084	0.144	0.133	0.906	0.368
	Chi-square (14)=275.14*, p<.001					
	Percentage correct=49.7%					
	Nagelkerke R^2=.036					

*Significant at p<.001.
[a]The model includes control variables of age, race, gender, education, and employment status.

The ease of obtaining cocaine, recent criminal justice system involvement, and the age at first use were statistically significant in predicting the perception of risk of occasional cocaine use. Having been arrested or on probation in the past year significantly predicted "great risk" in occasional cocaine use, compared with "no risk" (b=-.310, Wald=26.596). The likelihood of reporting "no risk" rather than "great risk" also decreases as the age at first use increased (b=-.070, Wald=62.531). As the ease of obtaining cocaine increased, the likelihood of reporting "no risk" rather than "great risk" decreased (b=-.510, Wald=81.722), as did the likelihood of selecting "moderate risk," rather than "great risk" (b=-.251, W=23.295). Ease of obtaining cocaine was the only significant predictor of the likelihood of selecting "moderate risk," rather than "great risk." Ease of obtaining cocaine was the strongest predictor of "no risk" vs. "great risk" of using cocaine occasionally (Wald=81.722).

<div align="center">Heroin</div>

In the bivariate analyses of perceived risk of regular heroin use and the variables of interest, Table 12 shows a weak, statistically significant association between past year substance abuse treatment and risk perception of regular heroin use (Phi=-0.072). Of those who indicated having been in substance abuse treatment in the past year, 86.3% reported great risk in regular heroin use. A statistically significant association was also found between source of illicit drug and risk perception of regular heroin use. Age at first use was also positively associated with perception of risk of regular heroin use with those indicating great risk reporting an older age of onset, on average. The bivariate analyses

did not support any association between risk perception and mental health treatment,

criminal justice system interaction, or depression.

Table 12. Regular Heroin Use Bivariate Results

	Risk Perception of Regular Heroin Use	
	No to Moderate Risk	Great Risk
Substance Abuse TX		
No	6.10%	93.90%
Yes	13.70%	86.30%
	x² (1)= 47.472, Phi= -.072***	
Mental Health TX		
No	6.50%	93.50%
Yes	6.80%	93.20%
	x² (1)= 0.136, Phi = -0.004ns	
CRMJ involvement		
No	6.30%	93.70%
Yes	7.10%	92.90%
	x² (1)=1.831, Phi = -.014ns	
Depression		
No	6.40%	7.10%
Yes	93.60%	92.90%
	x² (1)= 1.160, Phi=-0.011ns	
Age at first use	15.41 years	15.95 years
	t (9166) = -3.203***	
Source of Drug		
Friends/Family	5.40%	94.60%
Professional	10.30%	89.70%
Stranger/dealer	8.60%	91.40%
Other	8.20%	91.80%
	x² (3)=35.453, V=0.064***	
Ease of obtaining MJ		
Easy	9.00%	91.00%
Otherwise	6.00%	94.00%
	x² (1)=20.429, Phi=-0.048***	

***Significant at the p<.001 level.

When the risk of heroin was examined in terms of *trying* the drug, Table 13 shows

that a statistically significant association, albeit weak, was found between substance

abuse treatment in the past year and risk perception of trying heroin (p<.001). A

statistically significant association was also found between risk perception of trying

heroin and age at first use and ease of obtaining heroin. The positive relationship

suggested that those who perceive no risk in trying heroin are younger, on average, than

those who perceived "great risk" in trying heroin.

Table 13. Trying Heroin Bivariate Results

	Risk Perception of Trying Heroin		
	No to Slight Risk	Moderate Risk	Great Risk
Substance Abuse TX			
No	7.70%	15.00%	77.30%
Yes	12.00%	18.80%	69.20%
	$x^2 (2)=21.679, V=0.049$***		
Mental Health TX			
No	7.80%	14.80%	77.40%
Yes	8.20%	16.50%	75.30%
	$x^2 (2)=4.598, V=0.022$ns		
CRMJ involvement			
No	7.70%	15.50%	76.90%
Yes	8.40%	14.80%	76.90%
	$x^2 (2)=1.892, V=0.014$ns		
Depression			
No	7.80%	15.20%	77.00%
Yes	8.40%	15.20%	76.40%
	$x^2 (2)=0.831, V=0.010$ns		
Age at first use	15.33 years	15.90 years	15.98 years
	$F (2,9158)=8.333$***		
Source of Drug			
Friends/Family	7.20%	15.70%	77.00%
Professional	8.60%	12.50%	78.90%
Stranger/dealer	8.40%	15.70%	75.90%
Other	8.80%	12.30%	78.90%
	$x^2 (2)=10.783, V=0.025$ns		
Ease of obtaining MJ			
Easy	10.00%	14.20%	75.80%
Otherwise	7.40%	15.70%	77.00%
	$x^2 (2)=14.845, V=0.041$***		

***Significant at the p<.001 level.

The control variables were related to the outcome variables of regular heroin use and trying heroin. Respondent age however, was not significantly related to either outcome variable. Race, gender and education were statistically significant in chi-square analyses. Education level showed the strongest association with risk perception of regular heroin use, but the relationship was still weak.

Perception of Risk of Regular Heroin Use

Binary logistic regression was the appropriate multivariate analysis technique to examine the risk perception of regular heroin use because of its dichotomous nature. The model including predictors of past year substance abuse treatment, recent criminal justice system contact, age at first use, ease of obtaining heroin, and source of illicit drug, significantly predicted the response of "great risk" of regular heroin use (Table 14). The model explained only 4.7% of the variance, and is weak. The model did not improve classification of cases above the null model.

Table 14. Regular Heroin Use Logistic Regression

	Risk Perception of Regular Heroin Use[a]		
N=8,514	**Odds**	**SE**	**Wald**
Past year Substance Abuse Treatment	**1.962***	**0.152**	**19.643**
Recent Criminal Justice Involvement	**0.857**	**0.106**	**2.118**
Age at first use	**1.011**	**0.014**	**0.642**
Ease of obtaining Heroin	**1.397**	**0.106**	**9.941**
Source of drug: Family/Friend	**1.200**	**0.187**	**0.946**
Source of drug: Professional	**0.639**	**0.231**	**3.739**
Source of drug: Stranger/Dealer	**0.909**	**0.210**	**0.207**
	Chi-square (27)=152.42*, p<.001		
	Percentage correct=93.7%		
	Nagelkerke R^2=.047		

*Significant at the p<.001 level.
[a]The model includes control variables of age, race, gender, education, and employment status.

Only past year substance abuse treatment was significant in predicting perceptions of "great risk" of regular heroin use. Those that indicated not having had substance abuse treatment in the past year had a greater likelihood of responding "great risk" than those that had treatment (b=.674, Wald=19.643). This was a surprising finding, but may be due to the lack of variability within the variable of past year substance abuse treatment.

Perception of Risk of Trying Heroin

Statistically significant results were found in multinomial logistic regression for the model including past year substance abuse treatment, recent criminal justice involvement, age at first use, ease of obtaining marijuana, and source of illicit drugs, on perceptions of the risk of trying heroin (x^2 (14)=50.597, p<.001). However, much like the model predicting the perception of risk of regular heroin use, only past year substance abuse treatment was a significant predictor of risk perception ("moderate risk" vs. "great risk") (b=-398, Wald=10.403). This finding suggests that those who indicated having had treatment in the past year were more likely to answer "great risk" than "no risk" in perceived risk of regular heroin use.

No predictor variables were significant at the p<.001 level in predicting "no risk" and "great risk" perceptions of trying heroin. The significance of the model as a whole, without individually significant predictor variables, was also noted in the very small percentage (Pseudo R^2=.008) of the variance explained in the responses of risk perception of trying heroin. The percentage explained was only 0.8%, indicating a very poor fit of the model as a whole.

Table 15. Trying Heroin Multinomial Regression Results

N=8,511	Risk Perception of Trying Heroin[a]					
	Odds		SE		Wald	
	No Risk	Moderate Risk	No Risk	Moderate Risk	No Risk	Moderate Risk
Past year Substance Abuse Treatment	0.706	0.672*	0.159	0.123	4.783	10.403
Recent Criminal Justice Involvement	1.011	1.096	0.091	0.067	0.014	1.84
Age at first use	0.962	0.999	0.013	0.008	9.417	0.036
Ease of obtaining Heroin	0.748	1.104	0.098	0.08	8.729	1.536
Source of drug: Family/Friend	0.946	1.353	0.178	0.148	0.098	4.188
Source of drug: Professional	1.05	1.035	0.234	0.196	0.043	0.03
Source of drug: Stranger/Dealer	1.036	1.352	0.205	0.167	0.03	3.251
	Chi-square (14)=50.597*, p<.001					
	Percentage correct=77.0%					
	Nagelkerke R^2=.008					

*Significant at the p<.001 level.
[a]The model includes control variables of age, race, gender, education, and employment status.

<div align="center">LSD</div>

Significant bivariate differences in group means were found for age at first use and risk perception of regular LSD use. That is, individuals reporting "great risk" (Mean=16.08 years) in regular LSD use were significantly different in age at first use from those reporting "no risk" (Mean=15.41).

Chi-square analyses revealed no significant associations between the other predictor variables (Prior substance abuse treatment, Mental health treatment, Criminal Justice involvement, Depression, Age at first use, Source of illicit drug, and Ease of

obtaining the illicit drug) and the outcome of risk perception of regular LSD use. The

lack of variability in the outcome variable might have caused the lack of significance.

Table 16. Regular LSD Use Bivariate Results

	Risk Perception of Regular LSD Use	
	No to Moderate Risk	Great Risk
Substance Abuse TX		
No	22.90%	77.10%
Yes	32.10%	67.90%
	$x^2 (1) = 23.25$, Phi=-0.051ns	
Mental Health TX		
No	23.70%	76.30%
Yes	22.60%	77.40%
	$x^2 (1)=1.162$, Phi=0.011ns	
CRMJ involvement		
No	22.50%	77.50%
Yes	25.30%	74.70%
	$x^2 (1)=9.359$, Phi=-0.032ns	
Depression		
No	23.60%	76.40%
Yes	23.10%	76.90%
	$x^2 (1)=0.224$, Phi=0.005ns	
Age at first use	15.41 years	16.08 years
	$t (9091)=-6.582$***	
Source of Drug		
Friends/Family	22.60%	77.40%
Professional	23.70%	76.30%
Stranger/dealer	26.50%	73.50%
Other	23.80%	76.20%
	$x^2 (3)=8.056$, V= 0.030ns	
Ease of obtaining MJ		
Easy	25.80%	74.20%
Otherwise	23.00%	77.00%
	$x^2 (1)=6.297$, Phi=-0.027ns	

***Significant at the p<.001 level.

The lack of variability in the outcome variable, however, should be noted in its

own right. This suggests that although using illicit substances, the sample indicated, in

great majorit, that there was "great risk," in using LSD on a regular or occasional basis.

This is discussed. Gender was the only significant control variable, as well. The other

control variables (age, race, employment status, education level) were not significantly

associated with risk perception in bivariate analyses.

Table 17. Trying LSD Bivariate Results

	Risk Perception of Trying LSD		
	No to Slight Risk	Moderate Risk	Great Risk
Substance Abuse TX			
No	24.30%	25.40%	50.40%
Yes	31.20%	24.20%	44.50%
	x^2 (2)=13.788, V= 0.039***		
Mental Health TX			
No	24.60%	25.20%	50.20%
Yes	24.90%	25.50%	49.60%
	x^2 (2)=0.275, V=0.006ns		
CRMJ involvement			
No	23.70%	26.00%	50.30%
Yes	26.40%	24.10%	49.50%
	x^2 (2)=9.306, V=0.032ns		
Depression			
No	24.60%	25.90%	49.50%
Yes	24.90%	23.10%	52.00%
	x^2 (2)=6.514, V= 0.027ns		
Age at first use	15.42 years	15.88 years	16.19 years
	F (2,8442.9)=30.997***		
Source of Drug			
Friends/Family	24.70%	26.30%	48.90%
Professional	20.90%	20.00%	59.10%
Stranger/dealer	25.60%	24.30%	50.10%
Other	24.20%	23.90%	51.90%
	x^2 (6)=23.456, V= 0.042ns		
Ease of obtaining MJ			
Easy	23.50%	21.80%	54.70%
Otherwise	25.00%	26.30%	48.70%
	x^2 (2)=22.337, V=0.050***		

***Significant at the p<.001 level.

Significant bivariate associations were found among substance abuse treatment, age at first use, and ease of obtaining LSD, and risk perception of *trying* LSD. The average age at first use differed significantly between the "no risk" (Mean=15.42) and "great risk" (16.19) groups. The results are shown in Table 15. Non-significant results for mental health treatment, prior criminal justice system contact, depression, and source of illicit drug, might also have resulted from the lack of variability in the outcome variable. All control variables, excepting employment status, were statistically related at the p<.001 level to risk perception of trying LSD. These included age, race, gender, and education level.

The results of the multivariate analyses of the risk perception outcome variables for LSD were consistent with those reported for the prior risk perception variables. That is, multinomial logistic regression was utilized to examine perceptions of the risk of trying LSD, and binary logistic regression is used for perception of risk of regular LSD use. Age, race, gender, education, and employment status, were held constant in these analyses, as their significance was well researched in association with substance using populations.

Perception of Risk of Regular LSD Use

Risk perception of regular LSD use was analyzed using binary logistic regression, and the model including the predictor variables, including the control variables of age, race, gender, education, and employment status, was significant (x^2(27)=187.88, p<.001). The model correctly classified approximately 77% of the cases, which was only 0.1%

above the null model. However, the model did explain 3.3% of the variance in the

outcome variable of risk perception of regular LSD use as a whole.

Table 18. Regular LSD Use Logistic Regression Results

	Risk Perception of Regular LSD Use[a]		
N=8,476	Odds	SE	Wald
Past year Substance Abuse Treatment	1.355	0.104	8.472
Recent Criminal Justice Involvement	0.981	0.06	0.105
Age at first use	1.04*	0.008	22.589
Ease of obtaining LSD	1.416*	0.065	28.8
Source of drug: Family/Friend	0.999	0.117	0
Source of drug: Professional	0.952	0.154	0.102
Source of drug: Stranger/Dealer	0.872	0.133	1.069
	Chi-square (27)=187.88*, p<.001		
	Percentage correct=76.7%		
	Nagelkerke R^2=.033		

*Significant at p<.001.
[a]The model includes control variables of age, race, gender, education, and employment status.

Table 18 indicates that of the five predictors, age at first use and the social context

variable of ease of obtaining LSD were the only significant predictors of the perception

of "great risk" of regular LSD use. The significance of age at first use indicated that as

age at first use increases, so does the likelihood of responding "great risk." The strongest

predictor was ease of obtaining LSD, which also had a positive relationship with the

perception of regular LSD risk (b=.348, Wald=28.8).

Perception of Risk of Trying LSD

The perception of risk, by substance users, of trying LSD once in a lifetime, was

analyzed using multinomial logistic regression. The model with prior experience

variables, significantly predicted perceptions of risk of trying LSD (x^2 (14) =117.22,

p<.001). The mode explained l 1.6% of the variance in the outcome variable, but did not improve correct classification of cases above the null model.

Table 19. Trying LSD Multinomial Regression Results

N=8,468	Risk Perception of Trying LSD[a]					
	Odds		**SE**		**Wald**	
	No Risk	**Moderate Risk**	**No Risk**	**Moderate Risk**	**No Risk**	**Moderate Risk**
Past year Substance Abuse Treatment	0.758	0.897	0.112	0.119	6.129	0.823
Recent Criminal Justice Involvement	0.974	1.107	0.059	0.059	0.201	2.98
Age at first use	0.952*	0.98	0.067	0.007	37.065	8.198
Ease of obtaining Marijuana	0.706*	0.992	0.008	0.071	26.825	0.014
Source of drug: Family/Friend	1.117	1.169	0.121	0.12	0.842	1.683
Source of drug: Professional	0.753	0.694	0.162	0.164	3.066	4.957
Source of drug: Stranger/Dealer	1.061	1.026	0.139	0.139	0.182	0.035
	Chi-square (14)=117.22*, p<.001					
	Percentage correct=49.4%					
	Nagelkerke R^2=.016					

*Significant at p<.001.
[a]The model includes control variables of age, race, gender, education, and employment status.

As shown in Table 19, age at first use, and ease of obtaining LSD were statistically significant, controlling for all other variables. Those who reported greater ease in obtaining LSD were more likely to report "great risk," and as the age at first use increased, the likelihood of responding "no risk" rather than "great risk" decreased. Age at first use was the greatest predictor of risk perception between "no risk" and "great risk" (Wald=37.07). No predictor variables were significant at the p<.001 level in

predicting the relationship between "no risk" and "great risk" perceptions of trying LSD. This indicates a difference between the responses of "no risk" and "moderate risk."

Overall Results

Bivariate analyses indicated that neither mental health treatment nor depression was related in a statistically significant way to any of the eight risk perception outcome variables. Therefore, for the purpose of multivariate analyses, these variables were removed from the model. This improved the ability of the other predictors to reach significance in the multivariate analysis. The chi-square analyses did, however, find significant associations between each of the predictors with at least one of the outcome variables. The most consistent statistically significant predictors in the bivariate analyses were recent criminal justice system contact, and age at first use.

The model including past year substance abuse treatment, recent criminal justice system involvement, age at first use, source of illicit drug, and ease of obtaining each drug, significantly predicted each of the outcome variables. The models as a whole predicted the response of "great risk" in regular or occasional drug use, however only slightly for each outcome variable. Further research must aim to improve the variability of cases among the predictor variables, so as to improve future models, and increase the ability to discern the influence of each predictor while holding the others constant. Improving data to be more amenable to data analysis should not be forced, however, if the lack of variability is true in the population. The lack of variability in the risk perceptions of regular heroin use and regular LSD use are interesting findings in

themselves. The great majority of this adult substance using sample found there to be "great risk," in the regular use of heroin and LSD.

The exploratory nature of this study called for simultaneous logistic regressions, resulting in age at first use as a significant predictor in each of the eight analyses. In most logistic analyses, binary or multinomial, the age at first use was also the strongest of all predictors in the model, as noted by its high Wald statistics. With the exception of the binary logistic regression of perception of risk of regular heroin use and the multinomial regression of perception of risk of trying heroin, past year substance abuse treatment was also a significant predictor of obtaining the illicit drug in question. This social factor was also the strongest predictor of perception of risk of regular cocaine use, regular LSD use, and occasional cocaine use. The practical significance of these strong predictor variables should be investigated further.

CHAPTER SIX

DISCUSSION

The present study explored the prior experiences of adult substance users and their perceptions of risk associated with use of different types of illicit substances. This study involved a sample of adults who reported using substances in the past year, based on a nationally representative sample. Analyses of risk perceptions were run separately for marijuana, cocaine, heroin, and LSD use, as well as for different frequencies of use of the illicit substances. Despite the actual medical, social, and legal risks involved in illicit substance use, many individuals continue to abuse substances. The analyses suggest that prior experiences, controlling for gender, age, race, education level, and employment status, are associated with risk perception and therefore substance use behavior.

Marijuana

The variability of responses to the risk perception question for regular and occasional use was the greatest for marijuana. This is consistent with the beliefs across the United States of the actual risks and dangerousness of marijuana use. Perception of marijuana and its legalization are becoming more favorable (Gallup, 2011). Bivariate analysis produced three statistically significant ($p<.001$) predictor variables, including prior criminal justice involvement, age at first use, and the source of illicit drugs.

When controlling for age, race, gender, education level, employment, and the other predictors, age at first use, ease of obtaining marijuana, and "professionals" as a

68

source of illicit drugs, were significant in explaining the variance in regular marijuana use risk perception. The age at first use variable was significant in both regular and occasional marijuana use risk perception, as were source of illicit drugs, and difficulty in obtaining marijuana. The significance of these variables for both frequencies of use, lend further support to studies that indicate social norms and prescriptive norms predict behavior (Cascone, et al, 2011; Litt & Stock, 2011, etc.). However, this suggests that with marijuana use, risk perception mediates the relationship between social norms and actual use.

There were differences in risk perception between the two frequencies of use of marijuana in risk perception. The model predicting the choice of "no risk" as opposed to "great risk" of occasional marijuana use also included past year substance abuse treatment, whereas treatment was not a significant predictor in the model for regular marijuana use risk perception. The prediction of "moderate risk" and "great risk" also differed between the two outcomes, with past year substance abuse treatment predicting risk perception of occasional use, and ease of obtaining marijuana predicting risk perception of regular use. Informal and social consequences of illicit marijuana use, regardless of frequency however, appeared to drive the perception of risk of marijuana use.

Cocaine

Cocaine use risk perception had less variability among responses, but still produced both statistically and practically significant bivariate results. Risk perception of regular cocaine use was predicted by past year substance abuse treatment, prior criminal

justice system involvement, age at first use, and source of illicit drugs. Without controlling for any other factors, an older age at first use predicted risk perception selections, and those who have been arrested or on probation had lower risk perceptions. Age at first use suggested the importance of social environment on risk perception.

Similar multivariate results were found for risk perception of cocaine regular use and occasional use. In predicting "no risk" and "great risk" of regular cocaine use, age at first use was a significant predictor. However, ease of obtaining cocaine emerged as a significant predictor, though not significant in bivariate tests. It was also stronger than age at first use. This is in line with Litt and Stock's (2011) results that individuals see the behavior of their peers as models for their own behavior. Criminal justice involvement was significant in predicting the selection of "no risk" vs. "great risk" of occasional cocaine use, though in comparison to age at first use and ease of obtaining drugs, its influence was quite small. However, there were differences in predictors between risk perception of regular and occasional use.

Heroin

The prediction of risk perception of regular use of heroin, and the risk perception of trying heroin was constrained by the small differences in the percentages of those that perceived great risk in using heroin, and those that perceived no risk in its use. The data therefore limits the ability of the study to find great theoretical strength of the relationship that can be achieved between the predictors, and risk perception of heroin use. Although it is quite notable that there was so little variability in the perception of risk of heroin use, findings should be considered with this limitation in mind.

Past year substance abuse treatment significantly predicted the selection of "great risk" compared to "no risk." Hence, the analyses suggest that treatment is associated with the perceived risk of using this "hard drug," either through education about the drug, or through exposure to heroin users facing withdrawal. It is important to use treatment as a means to changing perceptions of risk. However, treatment should be paired with a greater understanding of the other correlates of risk perception outside of treatment itself. Treatment cannot exist in a vacuum, as perceptions are influenced by many other factors, and it is just as likely that those who perceived less risk were more likely to have past treatment, as they had more serious problems with their use (Marsch, et. al, 2007).

LSD

Risk perception of regular and occasional LSD use differed in the predictor variables that resulted in significant bivariate results. Only age at first use was significantly associated with risk perception of regular LSD use. Age at first use, substance abuse treatment, and ease of obtaining LSD were all statistically significant in predicting risk perception of occasional LSD use. However, no bivariate results achieved strong associations. Although statistically significant, practical implications of the findings are minimal. No differences were found in predicting risk perception of regular LSD use, and risk perception of occasional LSD use, in multivariate analyses. Interestingly, age at first use, and ease of obtaining LSD were the significant predictors of risk perception. Age at first use was the strongest predictor in both analyses, and as a predictor of risk perception of all substances.

The lack of variability of the risk perception of LSD use is likely a main factor in the very weak prediction of the variables by any model. However, it is notable in itself that the sample of substance using adults found there to be such "great risk" in using LSD on a regular or occasional basis.

Overall Discussion

Consistent Findings across Drugs

In bivariate analyses, age at first use was consistently related to perceptions of risk of illicit drug use, both regularly and occasionally. Although practical significance was only reached for age at first use in regular marijuana or cocaine use risk perception, and occasional marijuana and cocaine use, the predictor was statistically significant in every analysis. Only with respect to heroin analysis was the age at first use not significant when controlling for all other variables. This is consistent with research on the effect of age at first use on actual substance use.

Source of illicit drug, particularly family member or friend, and ease of obtaining the drug in question, were also consistently significant in all analyses. As Litt and Stock (2011) found in their research, the significance of source of illicit drug supports the importance of a social environment in decisions to engage in a specific behavior. The maxim of "If my friends are doing it, it must be okay," held weight among adults as well as adolescents as previously found. The additional significance of ease of obtaining a drug, wherein the easier it is to purchase or find the drug predicts lower perceived risk, further underscores the importance of the social environment in substance abuse and substance abuse risk perception.

Evidence of age at first use in significantly predicting perception of risk of illicit drug use was the most consistent result of the current study. However, except for age at first use, an interesting difference was notable in comparing regular to occasional use of marijuana. Formal sanctions (i.e. substance abuse treatment, arrest) appear to be more significant in risk perception of regular use, whereas informal/social norms (i.e. ease of obtaining the drug, source of the drug) was significant in predicting risk perception of occasional use or trying the drug. With larger numbers of cocaine, heroin, and LSD users, the extent of the different influences should be investigated further.

This exploratory analysis suggests the necessity of measuring risk perception among substance users, and what influences these perceptions. The present results might have important implications for therapeutic interventions, formal sanctions, and reductions in recidivism. Understanding the correlates of perceptions of risk for different drugs affords policy makers and treatment providers the opportunity to reach out to drug-using populations and identify pathways to desistance.

Theoretical Implications

The findings of this exploratory study support Rational Choice theory (Cornish & Clarke, 1987), which posits that the rational person will engage only in behaviors that are beneficial to him or her. Therefore, the individual will weigh the benefits, either tangible (i.e. physiological dependence, money) or intangible (i.e. social acceptance, an emotional thrill), and the consequences (e.g. loss of job, arrest) of a behavior, and decide to engage in that which brings the most benefits and fewest consequences (Vito & Maahs, 2012).

Cornish and Clarke's (1987) theory assumes the rationality of the decision-maker. However, as law enforcement officers, and anyone who has witnessed a teenager in love, knows, rationality is supplemented by emotionality or other factors in decision-making. Addiction, and its effects on the rewards system of the brain (NIDA, 2011), complicates the decision-making process, and how the individual weighs the benefits and consequences of drug use. In addition, criminal acts are often made hastily and based on immediate need, rather than after an arduous process of thinking through the benefits and consequences, as the theory suggests (Vito & Maahs, 2012). The perceptions of risk involved in illicit drug use also depend on the perception of risk of actual punishment in the criminal justice system, as well as the perceived benefits of the social acceptance of such use.

Prior experience with the criminal justice system was statistically significant in multivariate analyses. Those who had been arrested or on probation in the past year indicated higher perceived risk of illicit drug use. This finding was consistent across frequency of use of the illicit drugs. Though the arrest or probation experience had an effect on the perception of risk of those individuals, they were members of a substance-using sample, and therefore not deterred from drug use. The concept that Cornish and Clark (1987) named "bounded rationality," weighing benefits and consequences based on one's cognitive abilities and one's prior experiences, undermines the ability of any policy to reach a broad group of individuals. However, programming and policy must do just that, which makes research on perception, and its relationship to behavior, so imperative.

Strengths and Limitations of Methodology

The study had strengths and limitations. The National Survey on Drug Use and Health is the only study that annually produces estimates of drug use among civilian members of the non-institutionalized population of the United States (SAHMSA, 2008). Most drug use would not ordinarily come to the attention of administrative, medical or correctional authorities. In-person interviews generate better data, as well as higher response rates. With a cluster sampling design, the survey ensures a probability sample, which in turn, increases its generalizing ability. The 88.8% response rate the 2009 survey obtained also increases the external validity of the data. The sample used in this research focused on adults.

The target population of the survey was the civilian members of the non-institutionalized population of the United States. The survey excludes any active-duty military personnel, as well as any person currently in institutional group homes or hospitals. This excludes the jail and prison populations. If the drug use or other variables are significantly different in these excluded populations (less than 2% of the entire population), the survey has weaker generalizability.

The survey is cross-sectional rather than longitudinal. Since the survey did not follow up with respondents, it does not offer any temporal order, so it does not allow analysis to identify causal factors. It indicates only the prevalence of drug use at a specific point in time, therefore only producing correlations of prior history with substance abuse. This decreases the internal validity of the data.

Random selection helped eliminate selection bias. However, the data consists of self-reports of drug use, and might underestimates illegal behavior in the population. Although the privacy of responses increases honesty, the data still depends on memory, which can be hindered by drug abuse or time. An additional concern is the testing bias. A study was conducted in 2008 to examine the ability of the NSDUH to accurately estimate drug use (Jordan, Karg, Batts and Epstein, 2008). Since 2000, the NSDUH has assessed both substance abuse and dependence, and has defined dependence using the DSM-IV criteria since 1994. Comparing the validity of the interview to two validated assessment tools – Structured Clinical Interview and Pittsburgh Adolescent Alcohol Research Center's Structure Clinical Interview – the study found that the level of agreement was substantial for cocaine, and fair to moderate for marijuana and other substances. There was better agreement for dependence for the adult comparisons.

The number of comparisons was high. Hence, the likelihood of the groups differing based on chance only, increases. Therefore, each result section (each drug type) has a type I error analysis based on the number of statistical tests. The family-wise error rate for each separate drug is calculated as alpha=1-(1-alpha) ^number of tests run. For each drug, seven predictor variables were run against risk perception of regular use, as well as risk perception of occasional use/trying the drug, and two multivariate tests. This results in an N for each section of 16. The resulting family-wise error rate (FWER) for each separate section is 0.015. This means that the likelihood of finding a significant difference of at least one variable in the drug group increases by approximately 1.5%. This is the likelihood overall of a type 1 error by alpha inflation; finding significance

where it is not. In 16 statistical analyses, the study expects to reject the null hypothesis where it is true approximately 1.5 times above chance. Statistically significant associations were found in each analysis between multiple predictor variables and the outcome variables of risk perception of drug use. For each drug-type, the number of statistically significant associations exceeded the number expected by chance calculated by the FWER. The testing bias is the main limitation of this study, and future research should aim to reduce these biases in analysis.

<div align="center">Future Research</div>

Bivariate analyses found no significant effects for depression or mental health treatment, on any of the risk perception outcome variables. This was a notable finding, as prior research indicated relationships between depression and mental health treatment with actual substance use (e.g. Herbstman & Pincus, 2009; Dorard, et. al, 2009, etc.). The non-significance of these variables may have been due to the difficulty to measure mental illness in self-report measures. Mental illness or depression may have clouded the respondent's ability to answer the questions accurately. The non-significant bivariate results excluded the predictor variables of depression and mental health treatment from the multivariate analyses. However, future research should consider the interaction between mental health treatment, depression, and risk perception of substance use and abuse in a similar model. It might be beneficial to study the effect of these predictors among substance users who received both substance abuse and mental health treatment. Future studies should also examine the perception of risk of illicit substance use among individuals who indicate using specific drugs.

The strongest predictors in the models predicting risk perception of use were the social context predictors of age at first use and ease of obtaining the illicit substance. These results are consistent with prior research findings indicating that age at onset of drug use differed significantly, with less risk associated with the use of the drug. This is not in line with the Marsch, et. al (2007) findings that the greater exposure one has to a risk, the more realistic the risk perception. However, it is notable that the age at first use predicts risk perception of illicit drug use, among past-year substance users. Regardless of their perception of risk, the 9,277 subjects of this research engaged in substance use in the past year. The continued drug use of the sample, regardless of their perceived risk, deserves in-depth examination in future research.

This study suggests that prior experiences have a statistically significant relationship, however small, with the perception of risk of illicit drug use. Understanding these relationships with prior experiences allows policy to target populations that might benefit from treatment, from arrest, or from preventative programming. Age at first use and the social context of an individual were the strongest predictors in this research, as well as the predictors that reached practical significance in bivariate analysis, and might be the starting point for programming in schools and communities to contribute to the decrease in the future substance use in the adult population. Addressing these social effects with current users through treatment, programming, and the criminal justice system, can also affect the actual negative consequences of substance use.

REFERENCES

Adlaf, E., Hamilton, H., Wu, F., & Noh, S. Adolescent stigma towards drug addiction: effects of age and drug use behavior. *Addictive Behaviors,* 34 (4), 360-364.

Alloy, L. & Abrahmson, L. (1979). Judgment of contingency in depressed and non-depressed students: sadder but wiser? *Journal of Experimental Psychology*: General, 108(4), 441-485.

Arria, A., Caldeira, K., Vincent, K., O'Garady, K., & Wish, E. (2008). Perceived harmfulness predicts nonmedical use of prescription drugs among college students: interactions with sensation-seeking. *Preventative Science*, 9, 191-201.

Bachman, R. & Paternoster, R. (2009). *Statistical Methods for Criminology and Criminal Justice.* New York, NY: McGraw Hill.

Benson, Bruce L. 2009. "Escalating the War on Drugs: Causes and Unintended Consequences." *Stanford Law & Policy Review* 20(2). Working paper available at: http://www.coss.fsu.edu/economics/sites/coss.fsu.edu.economics/files/users/bbenson/escalating- stanford.pdf.

Bickel, W., & Marsch, L. (2001). Toward a behavioral economic understanding of drug dependence: delay discounting processes. *Addiction*, 96, 73-86.

Borgois, P. (2008). Mystery of marijuana: science and the U.S. war on drugs. *Substance Use and Misuse*, 43, 581-583.

Borland, R., Young, H., Balmford, J., Fong, G., Zanna, M., & Hastings, G. (2009). Do risk-minimizing beliefs about smoking inhibit quitting? Findings from the international tobacco control four-country survey. *Preventive Medicine*, 49, 219-223.

Bureau of Justice Statistics. (2011). Estimated Arrests for Drug Abuse Violations by age group 1970-2007. Washington, DC: US.

Bureau of Justice Statistics. (2011). Arrests in the United States: 1980-2009 (NCJ 234319). Washington, DC: U.S. US Department of Justice.

Burlew, K., Larios, S., Suarez-Morales, L., Holms, B., Venner, K., & Chavez, R. (2011). Increasing ethnic minority pariticpation in substance abuse clinical trial: lessons learned in the national institute on drug abuse's clinical trials network. *Cultural Diversity and Ethnic Minority Psychology,* 17 (4), 345-356.

Cascone, P., Zimmermann, G., Auckenthaler, B. & Robert-Tissot, C. (2011). Cannabis dependence in Swiss adolescents: exploration of the role of anxiety, coping styles, and psychosocial difficulties. *Swiss Journal of Psychology,* 70 (3), 129-139.

Chan, Y., Dennis, M., & Funk, R. (2008). Prevalence and co-morbidity of major internalizing and externalizing problems among adolescents and adults presenting to substance abuse treatment. *Journal of Substance Abuse Treatment*, 34, 14-24.

Chandler, R., Fletcher, B., & Volkow, N. (2009). Treating Drug Abuse and Addiction in the Criminal Justice System: Improving Public Health and Safety. *Journal of the American Medical Association*, 301 (2), 183-190.

Cornish, D., & Clarke, R. (1987). Understanding crime displacement: an application of rational choice theory. *Criminology*, 25(4), 933-947.

Crawford, L. & Novak, K. (2010). Beliefs about alcohol and the college experience as moderators of the effects of perceived drinking norms of student alcohol use. *Journal of Alcohol and Drug Education*, 69-86.

Daniels, D.R. (2010). Post treatment drug use and crime among probation and parole offenders. (Unpublished doctoral dissertation). Walden University, Minneapolis, MN.

Degenhardt, L., Dierker, L., & Chiu, W.T. (2010). Evaluating the drug use "gateway" theory using cross-national data. *Drug and Alcohol Dependence*, 108 (1-2), 84-97.

Degenhardt, L., Hall, W., & Lynskey, M. (2003). Exploring the association between cannabis use and depression. *Addiction*, 98, 1493-1504.

Dekel, R., Benbenishty, R., & Amram, Y. (2004). Therapeutic communities for drug addicts: Prediction of long-term outcomes. *Addictive Behaviors*, 29, 1833-1837.

Dorard, G., Berthoz, S., Phan, O., Corcos, M, & Bungener, C. (2008). Affect dysregulation in cannabis abusers: a study in adolescents and young adults. *European Child and Adolescent Psychiatry,* 17, 274-282.

Drug War Facts. (2009). Drug War Facts (6th Ed.). http://www.drugwarfacts.org/cms/. Accessed July 15, 2011).

Elekes, Z., Miller, P., Chomynova, P., & Beck, F. (2009). Changes in perceived risk of different substance use by ranking order of drug attitudes in different ESPAD-countries. *Journal of Substance Use*, 14(3-4), 197-210.

Fergusson, D., Boden, J., & Horwood, J. The developmental antecedents of illicit drug use: Evidence from a 25-year longitudinal study. *Drug and Alcohol Dependence,* 96(1-2), 165-177.

Gallup. (2011, October 17). *Record-high 50% of Americans favor legalizing marijuana use.* Retrieved from http://www.gallup.com/poll/150149/record-high-americans-favor-legalizing-marijuana.aspx

Giventer, L. (2008). *Statistical analysis: for public administration* (2nd Edition). Sudbury, MA: Jones and Bartlett Publishers, Inc.

Glantz, M., Anthony, J., Berglund, P., Degenhardt, L., Dierker, L., & Kalaydjian, A., et al. (2009). Mental disorders as risk factors for later substance dependence: estimates of optimal prevention and treatment benefits. *Psychological Medicine*, 39, 1365-1377.

Global Commission on Drug Policy (2011). War on Drugs. Rio de Janero.

Harocopos, A., Goldsamt, L., Kobrak, P., Jost, J., & Clatts, M. (2009). New injectors and the social context of injection initiation. *International Journal on Drug Policy,* 20(4), 317-323.

Hayatbakhsh, M., Najman, J., Bor, W., Williams, G., (2009). Multiple risk factor model predicting cannabis use and use disorders: A longitudinal study, *The American Journal of Drug and Alcohol Abuse,* 35, 399-407.

Herbstman, B., & Pincus, H. (2009). Measuring mental healthcare quality in the United States: a review of initiatives. *Current Opinion in Psychiatry*, 22, 623-630.

Hyman, S., & Sinha, R. (2009). Stress-related factors in cannabis use and misuse: implications for prevention and treatment. *Journal of Substance Abuse Treatment,* 36, 400-413.

Inaba, D.S. & Cohen, W.E. (2011). Uppers, downers, all arounders: physical and mental effects of psychoactive drugs. 7th ed. Medford, Oregon: CNS Publications, Inc.

Jordan, B. K., Karg, R., Batts, K., Epstein, J., & Wiesen, C. (2008). A clinical validation of the national survey on drug use and health assessment of substance use disorders. *Addictive Behaviors*, 33, 782-798.

Kilmer, J., Hunt, S., Lee, C., & Neighbors, C. (2007). Marijuana use, risk perception and consequences: Is perceived risk congruent with reality? *Addictive Behaviors*, 32, 3026-3033.

Khobzi, N., Strike, C., Cavalieri, W., Bright, R., Myers, T., Calzavara, L., & Millson, M. (2008). A qualitative study on the initiation into injection drug use: Necessary and background processes. *Addiction Research and Theory,* 17(5), 546-559.

Leung, K., Abdallah, A. B., Copeland, J., & Cottler, L. (2010). Modifiable risk factors of ecstasy use: Risk perception, current dependence, perceived control, and depression. *Addictive Behaviors*, 201-208.

Lewis, T. & Mobley, A. (2010). Substance abuse and dependency risk: the role of peer perceptions, marijuana involvement, and attitudes toward substance use among college students. *Journal of Drug Education*, 40(3), 299-314.

Linskey, M.T., Heath, A., Bucholz, K. (2003). Escalation of drug use in early-onset cannabis users vs. co-twin controls. *Journal of the American Medical Association*, 289(4), 427-33.

Litt, D. & Stock, M. (2011). Adolescent alcohol-related risk cognitions: the roles of social norms and social networking sites. *Psychology of Addictive Behavior*, 25 (4), 708-713.

Lopez-Quintero, C. & Neumark, Y. (2010). Effects of risk perception of marijuana use on marijuana use and intentions to use among adolescents in Bogotá, Colombia. *Drug and Alcohol Dependence*, 109, p. 65-72.

Marsch, L., Bickel, W., Badger, G., & Quesnel, K. (2007). The Anatomy of Risk: A Quantitative Investigation Into Injection Drug users' Taxonomy of Risk Attitudes and Perceptions. *Experimental and Clinical Psychopharmacology,* 15 (2), 195-203.

Martins, S., Storr, C., Alexandre, P., & Childoat, H. (2008). Do adolescent ecstasy users have different attitudes towards drugs when compared to marijuana users? *Drug and Alcohol Dependence*, 94, 63-72.

Marvanykovi, F., Melles, K., & Racz, J. (2009). Sex and Drugs: The Correlations of Injecting Drug Users' Risk Perception and Behavioral Patters. Substance Use and Misuse, 44, 569-577.

Mitchell, O., Wilson, D., & MacKenzie, D. (2007). Does incarceration-based drug treatment reduce recidivism? A meta-analytic synthesis of the research. *Journal of Experimental Criminology*, 3, 353-375.

National Council on Alcoholism and Drug Abuse (2009). Heroin, Marijuana, Cocaine, Inhalants. St. Louis: NCADA.

National Drug Intelligence Center (2006). LSD Fast Facts: questions and answers. Johnstown, PA: US Department of Justice.

National Institute on Drug Abuse. (2011). Topics in brief. Washington, DC: National Institute of Health.

National Institute on Drug Abuse. (2011). Research Report Series. Washington, DC: National Institute of Health.

National Institute on Drug Abuse. (2002). Research Report Series. Washington, DC: National Institute of Health.

Neighbors, C., Lindgren, K., Knee, C., Fossos, N., & DiBello, A. (2011). The influence of confidence on associations among personal attitudes, perceived injunctive norms, and alcohol consumption. *Psychology of Addictive Behaviors,* 24 (4), 714-720.

NPR Radio. (2007, April). Timeline: America's war on drugs. National Public Radio. Retrieved from http://www.npr.org/templates/story/story.php?

Odum, A., Madden, G., Badger, G., & Bickel, W. (2000). Needle sharing in opioid-dependent outpatients: psychological processes underlying risk. *Drug and Alcohol Dependence*, 60, 259-266.

Office of National Drug Control Policy. (2000). Estimate of heroin availability 1995-1998). Washington, DC: Office of National Drug Control.

Office of National Drug Control Policy. (2011). National drug control strategy: 2011 data supplement. Washington, DC: Office of National Drug Control.

Palmer, R., Young, S., Hopfer, C., Corley, R., Stallings, M, Crowley, T., & Hewitt, J. (2008).Developmental epidemiology of drug use and abuse in adolescence and young adulthood: evidence of generalized risk. *Drug and Alcohol Dependence,* 102(1-3), 78-87.

Perron, B., & Howard, M. (2008). Perceived risk of harm and intentions of future inhalant use among adolescent inhalant users. *Drug and Alcohol Dependence*, 97, 185-189.

Petronis, K., & Anthony, J. (2000). Perceived risk of cocaine use and experience with cocaine: do they cluster within US neighborhoods and cities? *Drug and Alcohol Dependence*, 57, 183-192.

Poulin, C., Hand, D., Boudreau, B., & Santor, D. (2004). Gender difference in the association between substance use and elevated depressive symptoms in a general adolescent population. *Addiction*, 100, 525-535.

Rapp, R., Otto, A., Lane, D., Redko, C., McGatha, S., & Carlson, R. (2008). Improving linkage with substance abuse treatment using brief case-management and motivational interviewing. *Drug and Alcohol Dependence*, 94, 172-182.

Ridenour, T., Tarter, R., Reynolds, M., Mezzich, A., Kirisci, L. & vanyukov, M. (2009). Neurobehavior disinhibition, parental substance use disorder, neighborhood quality and development of cannabis use disorder in boys. *Drug and Alcohol Dependence,* 102(1-3) 71-77.

Rosenberg, H. (2009). Clinical and laboratory assessment of the subjective experience of drug craving. *Clinical Psychology Review*, 29, 519-534.

Sherman, D., Nelson, L., & Steele, C. (2000). Do messages about health risks threaten the self? Increasing the acceptance of threatening health messages via self - affirmation. *Personality and Social Psychology Bulletin*, 26, 1046-1058.

Stein, L., Colby, S., Barnett, N., Monti, P., & Golembeske, C. (2006). Enhancing Substance Abuse Treatment Engagement in Incarcerated Adolescents. *Psychological Services*, 3 (1), 25-34.

Stout, D. (2005). Therapeutic community: A history, overview, and critical analysis of the effectiveness research in adolescent and young adult substance abuse. *Dissertation Abstracts International: Section B, The Sciences and Engineering*, 66 (1), 577.

Stultz, N., Thase, M., Gallop, R., & Crist-Cristoph, P. (2011.) Psychosocial treatments for cocaine dependence: the role of depressive symptoms. *Drug and Alcohol Dependence*, 114, 41-48.

Substance Abuse and Mental Health Services Administration. (2010). Results from the 2009 National Survey on Drug Use and Health: Volume I. Summary of National Findings (Office of Applied Studies, NSDUH Series H-38A, HHS Publication No. SMA 10-4856Findings). Rockville, MD.

Sudath, C. (2009, March). The war on drugs. Time Magazine. Retrieved from
http://www.time.com/time/world/article/0,8599,1887488,00.html.

Tabachnick, B. & Fidell, L. (2007). *Using Multivariate Statistics* (5th Edition). Boston,
MA: Pearson, Inc.

U.S. Sentencing Commission. (2011). F*ederal sentencing guidelines manual.*
Washington: Government Printing Office.

White, B., Degenhardt, L., Breen, C., Bruno, R., Newman, J., & Proudfoot, P. (2005).
Risk and benefit perceptions of party drug use. *Addictive Behaviors*, 31, 137-142.

Woodall, J. (2012). Social and environmental factors influencing in-prison drug use.
Health Education, 112 (1), 31-46.

VITA

Sema Taheri attended Loyola University Chicago for her undergraduate (2006-2010) degree. She majored in Psychology and Criminal Justice, and received her Bachelor of Science in 2010. She began her studies in Criminal Justice and Criminology at Loyola University Chicago in August, 2010. While in the Graduate program at Loyola, Sema was President of the Graduate Criminal Justice Organization, as well as a representative of the department on the Graduate Student Advisory Council. She also acted as a tutor, and eventually Teaching Assistant, for the graduate level Statistics course taught in the Spring semester.

Her work in the field of corrections and process evaluation began with Dr. Arthur Lurigio that same fall. She was awarded a research assistantship with Dr. David Olson in 2011, and has worked with the Sheriff of Cook County office of Chicago until May, 2012. She conducted her master's thesis on the perception of risk of substance use among substance using adults under the direction of Drs. Arthur Lurigio, David Olson, Gipsy Escobar, and Loretta Stalans. Her research interests include substance abuse, corrections programming, mental health in corrections, and program evaluation. She will begin a doctoral program in Criminology and Criminal Justice Policy in the Fall of 2012 at Northeastern University in Boston, Massachusetts.