



New Mexico Statistical Analysis Center

Correlates of Substance Use Preferences and Prison Revocations

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Introduction

Substance use among the state correctional population is prevalent both nationally and within New Mexico. Nationally, 83% of state prisoners reported having used one or more drugs in their lifetimes, and 69% reported using drugs regularly (Mumola and Karberg, 2007). Consistent with these findings, a Risk Needs Assessment identified 84% of parolees released in 2004-2005 as having a substance abuse problem (Denman et al., 2010). In a more recent study, the New Mexico Statistical Analysis Center found that over half (59%) of those under state supervision (probationers and parolees) between 2011 and 2012 had a documented substance abuse problem (Denman, Willits, and Dole, 2017). A recently completed study shows that after cannabinoids, opioids and stimulants (primarily methamphetamines) are the most commonly used illegal substances among those under state supervision in New Mexico (Denman and Beal, 2018).¹

Opioid use is a particular concern in New Mexico, as it is nationally. New Mexico has one of the highest rates of opioid-related overdose deaths in the United States. Between 2013 and 2014, New Mexico experienced a significant increase in the rate of heroin-related overdose deaths (Rudd, Aleshire, Zibbell, and Gladden, 2016). In 2014, New Mexico had the second highest rate of heroin deaths in the nation. At the same time, the rate of methamphetamine-related overdoses has increased dramatically in New Mexico. According to the New Mexico Department of Health (as cited by Uytterbrouck, 2015) in 2008, there were 23 overdose deaths attributed to methamphetamines; in 2014 that number increased nearly fivefold to 111.

Some subpopulations, such as those recently released from detention like parolees, are at increased risk of opioid overdose due to reduced tolerance (Binswanger et al., 2007; Binswanger et al., 2011; Binswanger et al., 2013; Leach and Oliver, 2011; Merrill et al., 2010). Besides the impact on individuals who use substances like heroin, the use of illicit substances can have broader societal impacts. For example, the National Drug Intelligence Center has linked the distribution of heroin with criminal gangs in New Mexico, suggesting a potential for increased violence (National Drug Intelligence Center, 2002).

Substance use is associated with reduced success on supervision. A study of parolees in New Mexico found that among those with one or more technical violations, the most frequent type of violation was drug-related, either due to failing a drug test or for using, possessing, or distributing a controlled substance (Denman et al., 2010). Indeed, nearly half (48%) of the initial technical violations were drug-related (ibid.). In a more recent study that included both probationers and parolees, 60% of violations involved a drug offense and another 39% involved alcohol (Denman, Willits, and Dole, 2017). Clearly, substance use impairs supervision success.

While we know that the criminal justice population is at increased risk for substance use and abuse, and we know that heroin and opioid overdose rates are high in New Mexico, we really know very little about the factors that influence opioid use among those under state community supervision in New Mexico.

¹ Alcohol was the most common substance detected. While alcohol is legal to consume for those over age 21, its use is prohibited during supervision.

Moreover, while we know that substance use is associated with decreased supervision success, we do not know whether this differs by substance *type*. It is important to understand the correlates of opioid use as well as other substances by both probationers and parolees in order to plan for their needs. For parolees, it is imperative to design interventions likely to assist them to be successful upon release; for probationers, programs must be designed to minimize the risk of incarceration. It is important, therefore, to understand who is at greatest risk for using which substances and to understand how the use of particular substances relates to supervision success.

Current Study

The objectives of this study are twofold. First, we explore *whether there are characteristics that distinguish opioid users from others who are under state supervision*. Specifically, we examine whether demographic characteristics (i.e., age, gender, race/ethnicity), criminal history, supervision characteristics, social capital, and stability are associated with the use of particular types of substances. This analysis can help us understand who is most at risk of using opioids or other substances, and whether these factors equally predict types of substance used.

Second, we examine whether supervision outcomes differ for those who use opioids compared to those who use other substances or no substances. Specifically, *are those who test positive for opioids more likely to be revoked from supervision than those who do not use opioids?* For this analysis, we control for demographics, social capital, stability, criminal history, risk, and supervision characteristics. These results from this exploratory study could help criminal justice stakeholders to better craft interventions designed to reduce recidivism among opioid and other substance users.

Sample

The sample includes a cohort of individuals who began supervision between January 1, 2011 and December 31, 2013. Some people completed one term of supervision and began a new supervision term during this period. In those instances, we used their first probation/parole term. We followed the cohort for a period of 36 months. We chose this period because the majority of parolees serve a sentence of one or two years and the average probation sentence is approximately three years. Thus, while some individuals may still be under supervision after three years, most should have served all or most of their time on parole or probation.

Data Sources

This study uses two sources of data. First, we utilize data from the New Mexico Correction Department's Case Management Information System (CMIS). The CMIS data used here includes prison admissions, releases, probation and parole violations, risk/needs assessments (RNA), and urinalysis (UA) results data. NMCD provided these data in Excel spreadsheets. We converted these to SPSS and prepared the data for use for this study. Each dataset required different levels of cleaning and preparation. All NMCD data include an offender number, which we used to join the information from the various datasets together.

Prison admission and release data have one line of data per person per intake. Admission data include admission type, most serious offense, demographic information, and various dates (intake date, projected release date, sentence date, etc.). Release data include the information available in the admissions file as well as release type, release date, and arrest date.

Supervision violation data records all known violations of probation or parole supervision terms. Each line of data records the offender number, location of supervision, date of the violation, category of violation, description of the violation, and the response to the violation. There is one line of data for each violation type.

The RNA provides useful information about social capital, stability, and risk level. To garner this information, we first identified the RNA that corresponded to the probation/parole supervision start date of interest. Occasionally, the date of the RNA and the date supervision began were not comparable. In these cases, we manually checked for the best RNA available. Different RNA tools were used to assess risks and needs between 2011 and 2013. Thus, we had to standardize the variables across the RNA tools to use this information for analyses. Once this was complete, we aggregated the data to the person level and merged it with the other data we received for analysis.

UA data is a key source of information for the current study. These data include which substances were tested, whether the tests were positive or negative, and various dates (e.g., date collected, date tested, date refused). The data records UA results between 2001 and 2016, though the data are relatively sparse prior to 2004.

The second source of data used for this study is the New Mexico Department of Public Safety (DPS). The DPS records an individual's criminal history, tracking custody change and arrest or incarceration. We matched personal identifiers (name, date of birth, last four digits of the Social Security number) from the NMCD data to the DPS data. Linking procedures occur in multiple iterations in order to maximize the pool of possible matches, beginning with most restrictive criteria (perfect match on all four identifiers) to less restrictive criteria (e.g., match in first name, date of birth, Social Security number) in various combinations of variables. Staff score each variable according to the strength of the match (i.e., perfect match to no match). Finally, we check questionable matches manually to determine whether the match is a true one.

Dependent Variables

This study includes two dependent variables corresponding to our research questions. First, we examine substance use during the selected probation/parole period. Second, we examine returns to prison.

Substance Use

We created a variable that captures **substance use** during the probation/parole period of interest. This variable summarizes substance use over the three-year follow-up period or the end of supervision, whichever came first. The primary source was UA data. We also used probation/parole violation data.

In some cases, the violations data indicated that a substance violation (illicit substance or alcohol) occurred but there was no UA recorded. In these instances, we scoured the violation data comments field for indications of the type of substance involved and coded that information. We combined the UA data with the violation data to create a variable indicating the type(s) of substance involved.

The variable includes seven categories: opioids (alone or with another substance other than stimulants), opioids and stimulants, stimulants (alone or with a substance other than opioids and excluding crack/cocaine), alcohol only, crack/cocaine, other substances, and no substances. We chose these groupings for several reasons. First, we are especially interested in understanding whether, and in what ways, opioid users differ from others under state supervision. Second, while opioid use is the focus of much attention currently, the use of methamphetamines and other amphetamines has been increasing precipitously among the supervised population (Denman and Beal, 2018) as have methamphetamine-related overdoses among New Mexicans generally (New Mexico Department of Health, 2018). Thus, we wanted to understand stimulant use as well. We chose to include a category summarizing use of both opioids and stimulants to assess whether and in what ways they may differ from those who do not use these substances together. We included a category capturing crack/cocaine (this excludes stimulant and opioid use). We expect that those who test positive for alcohol only may differ from those who use illegal substances alone or in combination with alcohol. Thus, we created a category for this group. Finally, all other substances are captured in the last category. This consists mostly of cannabinoids, but also includes substances like depressants, hallucinogens, and inhalants.

Importantly, some individuals test positive for multiple substances. Therefore, the categories listed above may include the use of substances in addition to the primary ones listed. The category opioids, for example, includes positive tests for opioids alone or with some other substance except for stimulants. Likewise, the category stimulants (primarily methamphetamines) includes positive tests for stimulants alone or with other substances except opioids. The category for other substances includes positive tests for all substances including alcohol, but does not include any positive tests for stimulants or opioids. The only category that includes a single substance only is the one measuring positive UAs for alcohol.

[Return to Prison](#)

The second research question examines **return to prison**. This includes all state prison admissions that occurred after the supervision start date and within 90 days of the supervision end date in the prison admissions file. We manually checked the admissions that occurred after the supervision end date to make sure they were associated with the supervision term. While we tried to limit the returns to prison to those admissions related to a revocation or new stay, the court may have ordered some individuals to prison for a diagnostic assessment only.

[Independent Variables](#)

The primary objectives of this study are to understand whether there are characteristics that differentiate the choice of substance, and to understand what role substance use plays in revocations. In order to answer these questions, we include seven sets of independent variables. These include

demographics, social ties, stability, current offense, criminal history, supervision characteristics, and prior substance use. This is an exploratory study. As such, while we offer hypotheses about the relationship between these variables and substance use generally, we do not offer hypotheses about the relationship between each of these variables and specific substance type (e.g., opioids, stimulants).

Demographics

We include the following demographic variables as controls: **age**, **gender**, and **race/ethnicity**. We captured these data from the NMCD datasets if available; if not available, we supplemented with data from DPS. **Age** represents the age at the time the individual began supervision. **Gender** is a binary variable coded as “0” if male and “1” if female. In some cases, neither dataset included the gender of the individual. We imputed gender based on name unless the name is common for either sex (e.g., Kelly). **Race/ethnicity** is coded as White non-Hispanic, African-American non-Hispanic, Native-American non-Hispanic, Hispanic (primarily White race), and other non-Hispanic.

Social Capital

Prior research suggests that those who have more prosocial ties are more likely to desist from criminal activity (Petersilia, 2005; Uggen, Wakefield, and Western, 2005). Thus, we hypothesize that offenders with weaker prosocial ties or who have strong antisocial ties will have worse outcomes, both in terms of substance use and returns to prison. We include the following measures of social capital, all garnered from NMCD’s RNA data: **employment**, **gang membership**, and **negative associations**. We chose the most complete RNA closest to the supervision date to construct these measures. **Employment** is coded as “1” if the individual was identified as unemployed or underemployed in the last 12 months (or the 12 months prior to prison admission for parolees) and “0” if not identified as such. **Gang membership** is coded as “1” if there was any suspected or confirmed gang membership and “0” otherwise. The variable **negative associations** measures the quality of companions. There are two responses: no adverse relationships and occasional or completely negative associations. Negative associations is coded as a “1” if negative associations are indicated and “0” if not. Thus, weaker prosocial ties are all coded as “1.”

Stability

We anticipate that individuals who are less stable would be more likely to use substances and to violate the terms of their supervision leading to revocation. We include two measures of stability, gathered from the RNA data. First, we include the **number of address changes**. If there were 2 or more in the last year, it was coded as “1” and “0” if one or none. Second, we include a variable that records whether the individual has a **history of absconding**. This is coded as “1” if indicated and “0” if not indicated.

Current Offense

We expect that different offense types will influence both substance use and return to prison. For example, we anticipate that those with a current offense involving a drug or property offense will be more likely to use substances (see, e.g., Craddock, Collins, and Timrots, 1994). Further, studies suggest

that property and drug offenders have higher recidivism rates than those with violent crimes (e.g., Grattet et al., 2009). Thus, we anticipate property offenders are at greater risk for revocation.

The current offense is available for parolees in the NMCD release files and reflects the most serious offense. The current offense for probationers is located in a separate file, and it includes all of the conviction charges. The NMCD assigns a severity code to each statute; we used this information to determine the most serious offense to ensure comparability across supervision types. We include a single variable measuring the **most serious current offense**. The types of offenses captured are violent, drug, property, DWI, and all other offenses. In multivariate analyses, we compare each category of offending to violent offenses.

Criminal History

Criminal history is typically a strong and consistent predictor of poor criminal justice outcomes. We anticipate that individuals with a more extensive criminal history will be at increased risk for substance use and revocation to prison. Here, we measure criminal history with a variable that measures the **total number of prior arrests** as recorded in the DPS data. This is a continuous variable ranging from 0 to 34.

Supervision Characteristics

We expect more serious offenders will be at greater risk to use substances and to return to prison. We measure offender seriousness with two variables. First, we extracted the **assessed risk level** at the beginning of supervision from the RNA. The risk in this assessment is the risk that the individual will recidivate. It is administered at the time of intake and at regular intervals thereafter. The RNA scores include a variety of static and dynamic risk factors (e.g., address changes, academic skills, substance use, criminal history). Second, we include **supervision type**. This variable measures whether the individual is serving a probation, parole, or a dual term of supervision (both probation and parole). We expect that probationers are less serious offenders, and therefore compare parolees and those under dual supervision to probationers.

In addition, we expect that supervision violations will increase the risk that someone will return to prison. We include three variables describing the number of violations by type of violation. These variables are included *only* in the analyses assessing return to prison. First is the number of **arrest-related violations**. This variable includes all violations related to arrests and violations of state law. Second is the number of **absconding-related violations**. This includes violations categorized as reporting violations. Finally, we include the number of **other violations**. Other violations include all other types of violations (e.g., employment, curfew, associations). None of these variables include substance-related violations because it would be redundant to the substance use variable described below. All of the variables are continuous, and begin at zero. The maximum varies by violation type, ranging from six (arrest-related) to ten (other violations).

Substance Use History

We expect that those who have a **history of substance use** problems will be more likely to use substances in the future, and that they may be more likely to return to prison due to violating supervision. The RNA tool assesses prior known history of alcohol or drug use. Problems with one or more substances are coded as “1” if indicated and “0” if not.

A key question in this study is whether substance use type, particularly the use of opioids, is associated with revocations. Therefore, we include the variable measuring **substance use** as an independent variable in the return to prison analyses. Substance use consists of the seven categories as described above (opioids, opioids and stimulants, stimulants, crack/cocaine, alcohol, other, and none). This variable measures substance use from the time supervision started to revocation, the end of supervision, or the end of the three-year study period, whichever comes first.

Methods

In all analyses, the unit of analysis is the individual under state supervision. In addition to univariate and bivariate analyses (available in Appendix A), the current study includes two sets of multivariate analyses. First, we use multinomial logistic regression to determine *whether there are characteristics associated with type of substance used*. Multinomial logistic regression models are appropriate for nominal level (categorical) dependent variables with three or more values. The analysis provides the relative risk (odds ratio) of an event occurring (e.g., use of opioids) for each independent variable.

Second, using binary logistic regression, we assess *whether revocation is related to positive drug tests*. This model is appropriate when the outcome of interest is dichotomous (e.g., revoked or not). The independent variables include the substance for which the individual tested positive (e.g., opioids, opioids and stimulants, cannabinoids). In this model we control for demographics, social capital, stability, current offense, criminal history, supervision characteristics, and prior substance use.

Results

We begin with a description of the sample. Next, we explore the correlates of substance use by type of substance. Finally, we examine revocation from state supervision by type of substance used. The main body of this report focuses on the key findings. Additional results are available in the appendices.

Description of Sample

The initial sample included data on 25,816 people under state supervision; however, substance use data were missing for 5,396 individuals during the study period. The final sample thus consists of 20,420 individuals. Table 1 provides a description of the sample. The majority of those in the sample are male (76%), and over half (56%) are Hispanic of all racial categories. Non-Hispanic Whites comprise 26% of the sample, followed by Native Americans (9%), African Americans (5%), and finally “other” (3%). The average age of those in the sample is 34 years old. The majority of the sample is under the age of 35, with the largest age categories being 18-24 (23%) and 25-34 (37%). People aged 35-44 make up 21% of the sample, and those aged 45-54 comprise 14%. Just 5% of the sample are older than 55.

Based on the RNA administered by PPD, the majority (68%) of the sample were under- or unemployed, and over half (54%) had negative associations. Just 9%, though, had known or suspected gang ties. Generally, these measures suggest that the majority of those in our sample display inadequate social capital. However, measures of stability were positive for most people in the sample. Under half (43%) experienced two or more address changes in the prior year, and only 7% had a documented history of absconding.

On average, those in the sample had 5.6 prior arrests. More than half of the sample had a prior arrest for either a violent (56%) or a property offense (57%). The next most common offense history was for a drug-related crime (44%), followed by DWI (31%). However, the vast majority (74%) of those with one or more prior arrests had a public order or other offense. These include traffic-related arrests, unspecified warrants, and other offenses.

The current offense, the offense that led to the sample's state supervision, tends towards more serious crime than prior criminal history. Violent crime represents the largest category with 35%, followed closely by property offenses (30%). Drug offenses represent 22% of our sample while 8% are under supervision for a DWI offense. In contrast to the prior criminal history, only 5% are under supervision for public order or any other offense.

The majority of those in the sample (81%) were on probation, and another 8% were under both probation and parole (dual) supervision. The remaining 11% were on parole. Our sample also includes the NMCD measure of assessed risk and needs. The PPD uses this assessment to guide supervision level. The most common assessed risk level for those in this sample was medium (45%), followed by high risk (25%). Approximately 20% of the sample were minimal risk, and 11% were classified as maximum risk for re-offense.

The final variable, substance use problems, originates from the RNA assessment. Most of the sample has known substance use problems (68%). This indicates that the use of drugs, alcohol, or both interferes with functioning.

While the final sample closely resembles the overall sample, the final sample differs in some ways from those omitted. Perhaps most notable are that our sample has fewer Native Americans; a greater percentage of people who have a history of absconding; fewer DWI offenders, but more property and drug offenders; more people on probation or dual supervision; greater number of average violations; and greater rates of known substance use problems. Details are available in Appendix A.

Table 1. Sample Description.

	Variable	In final sample (N=20,420)
Demographics	Gender***	(N=20,274)
	Male	75.9%
	Female	24.1%
	Race***	(N=20,420)
	Hispanic	55.6%
	White	26.3%
	African American	5.5%
	Native American	9.4%
	Other	3.2%
	Age of Offender	(N=20,251)
	Average Age (sd)***	33.84 (10.99)
	Grouped Age***	
	18-24	22.9%
25-34	37.0%	
35-44	21.5%	
45-54	13.6%	
55 and over	5.0%	
Social Capital	Measures of Social Capital	(N=20,268)
	Under- or unemployed***	68.2%
	Negative associations**	53.7%
	Gang membership**	8.9%
Stability	Measures of Stability	(N=20,268)
	Two or more address changes**	43.4%
	History of absconding***	7.1%
Criminal history	Prior Arrests	(N=20,274)
	Average number of prior arrests (sd)*	5.55 (4.50)
	Prior Offense Type	(N=20,274)
	Property**	56.6%
	Drug***	44.1%
	Violent**	56.3%
	DWI	31.3%
	Other	74.0%
Current Offense	Current Offense Type***	(N=19,931)
	Property	29.6%
	Drug	22.4%
	Violent	34.6%
	DWI	8.5%
	Other	4.9%

	Variable	In Final Sample (N=20,420)
Supervision Characteristics	Risk Level***	(N=20,268)
	Minimum	19.6%
	Medium	45.0%
	High	24.6%
	Maximum	10.8%
	Supervision Type***	(N=20,420)
	Probation	81.0%
	Parole	10.7%
	Dual	8.3%
Violations	Average Number of Violations	(N=20,420)
	Arrest-related ***	.22 (.54)
	Reporting***	.47 (.82)
	Other, non-drug***	.32 (.71)
Substance Use History	Known Substance Use Problem	(N=20,268)
	Alcohol or drug problem*	68.1%*
Return to Prison	Yes*	21.0%

* p<.05, ** p<.01, *** p<.001

The use of opioids, other substances, and no substances

As shown in Table 2, over half of the individuals in our sample (55%) tested positive for one or more substances. Approximately one-third of the sample tested positive for opioids, stimulants, or both.² Approximately 5% of the sample tested positive for alcohol only and another 5% tested positive for crack/cocaine but not opioids or stimulants. The remaining 13% tested positive for some other substance or combination of substances. Of these, the most common class of substances by far was cannabinoids (N=2,275).

Table 2. Substance Use by Type.

	%	N
Opioids	13.3%	2,714
Stimulants and opioids	5.5%	1,133
Stimulants	13.8%	2,819
Alcohol only	4.9%	1,003
Crack/cocaine	5.3%	1,078
All other substances	12.7%	2,591
No positive tests	44.5%	9,082

In order to better understand differences between those who test positive for opioids relative to those who test positive for other substances and those who never test positive for any substances (including

² Those who tested positive for opioids, stimulants, or both could have tested positive for other substances as well.

alcohol), we calculated a multinomial logistic regression.³ The dependent variable includes six categories of substance use relative to the reference category of no known substance use.

In Table 3 below, we present the odds ratio (OR) calculated for each independent variable. This can be interpreted as the odds (or risk) of an event occurring (e.g., testing positive for opioids) in relation to the reference category. For example, take gender as an independent variable coded as male as the outcome of interest (1) and female as the reference category (0). If the odds ratio were 1.3, this would indicate that an increase of one unit in this independent variable (i.e., being male) is expected to increase the odds of opioid use by a factor of 1.3 times. Odds ratios greater than one indicate increased odds of experiencing the outcome. Conversely, odds ratios less than one are associated with decreased odds of experiencing the outcome. If the odds ratio equals one, there is no difference.

All measures of significance are reported using p-values. P-values are a measure of statistical significance. The lower the p-value, the more confident one can be that the observed difference is not due to chance. We selected a significance level (α) of .05; anything at or below that level statistically significant.

Demographics

The results indicate that gender is a significant predictor of substance use, but differs by substance. The odds that a female will test positive for opioids, stimulants, or the combination of the two is greater than males, holding all other factors constant. The risk of opioid and stimulants use for females is 2.264 higher than the odds for males. Furthermore, the odds that females will test positive for both stimulants and opioids are greater than for opioids alone (OR=1.382) or stimulants alone (OR=1.594).

Conversely, the odds that a female will test positive for alcohol or any other substance (not opioids or stimulants) are significantly lower than males (OR=.787 and .813, respectively). Thus, females have a greater risk of testing positive for opioids, stimulants or the combination of the two while males have a greater risk of testing positive for some other substance. There was no significant difference by gender for using crack/cocaine, though the OR was below one.

Most or all of the race/ethnicity categories were statistically significant, but differ somewhat by substance type. The odds of testing positive for opioids, stimulants, or both was significantly lower for Native Americans relative to Whites. However, their odds of testing positive for alcohol was significantly higher (OR=1.676). Individuals identified as Black have increased odds of testing positive for alcohol only (OR=2.088) or other substances (OR=2.330) relative to Whites. Note that once other factors are taken into account, the likelihood that someone identified as Black will test positive for alcohol are even greater than the likelihood that someone identified as Native American will test positive relative to Whites (OR=2.088 versus OR=1.676). This is in contrast to bivariate analyses, where a significantly greater proportion of Native Americans tested positive for alcohol relative to any other race/ethnic group.

³ Bivariate analyses are available in Appendix B.

Those identified as Hispanic have significantly higher odds (OR=1.530) of testing positive for opioids alone or with some substance other than stimulants. Regardless of race/ethnicity, odds ratios for stimulants, with or without opioids, were all below one and most values were statistically significant. Generally, this indicates that Whites are more likely to test positive for stimulants although there was no significant difference between Whites and Hispanics for the combination of opioids and stimulants.

Age was a significant predictor only for alcohol and other substances. The odds that someone will test positive for alcohol increases with age. For every one-year increase in age, the odds of testing positive for alcohol increases by a factor of 1.007. Conversely, the odds of testing positive for other substances decrease by a factor of .965 for every one-year increase in age. In other words, younger individuals are at greater risk for testing positive for other substances. Age was not a significant predictor of opioid use, stimulant use, both, or crack/cocaine in this model.

Social Capital

The model included three measures of low social capital: employment problems (under- or unemployed), negative associations, and suspected or validated gang involvement. In each instance, the reference category is none. Values over one for these variables would indicate that decreased social capital would increase the odds of using a particular substance. Unemployment is a significant predictor of stimulant use. The odds of testing positive for opioids and stimulants or stimulants without opioids (alone or with other substances other than opioids) were higher for those who had been under- or unemployed for the past 12 months (OR=1.204 and 1.355, respectively). Conversely, those who have employment problems are significantly less likely to test positive for other substances than those who do not have employment problems (OR=.862).

The risk of using stimulants is higher for those with negative associations. The odds that someone will use stimulants (but not in conjunction with opioids) are 1.218 higher than those who do not have negative associations identified. This variable is not a significant predictor for any other substances.

The odds of testing positive for opioids or opioids and stimulants are significantly higher for those who have suspected or validated gang associations relative to those who do not (OR =1.526 and 1.727, respectively). Gang ties are not a significant predictor for use of any of the other substances.

Stability

One measure of decreased stability, two or more address changes, was a significant predictor for each of the substance categories except alcohol. However, contrary to expectations, the odds ratios were all less than one. Thus, holding all other factors constant, those with two or more address changes had decreased odds of testing positive for opioids (OR=.699), opioids and stimulants (OR=.675), stimulants (OR=.791), crack/cocaine (.725) or other substances (OR=.818). This indicates that those who move frequently are more likely to have a negative UA result than a positive one. The second measure of stability, history of absconding, was a significant predictor of other substance use only. Like address changes, this was not in the direction expected. Those who have prior absconding identified were less likely to test positive for other substances than to test negative.

Current Offense

The most serious current offense is a significant predictor of substance use in all substance categories. However, public order and other offense did not significantly differ from violent offenses. The odds of the use of opioids, opioids with stimulants, and stimulants were higher for those with either a drug or a property offense relative to those with a violent offense. Especially notable is that the odds of testing positive for both opioids and stimulants are 2.072 times higher for those with a proximate drug offense than those with a violent offense. Drug offending is also associated with increased odds of testing positive for all other substances except alcohol. The odds of testing positive for all substances except alcohol were lower for those with a DWI offense. The odds that a DWI offender test positive for alcohol were not significantly different from violent offenders.

Risk and Supervision Characteristics

The model includes two supervision characteristics. One is the assessed level of risk (medium to extreme risk compared to low) and the second is type of supervision (parole or dual supervision compared to probation). Relative to those who are low risk, those assessed at a higher risk level generally have greater odds of testing positive for a substance than test negative, except for those who used alcohol only. However, there are some differences across substance types. Although the OR for testing positive for opioids or crack/cocaine are greater than one for those assessed as an extreme risk, this is not statistically significant. Thus, this group is no more likely to test positive for opioids or crack/cocaine than those assessed at low risk. All risk ORs were significant for opioids and stimulants and stimulants without opioids indicating that compared to low risk, those assessed at any higher risk level have significantly greater odds of testing positive for these substances. The OR were especially high for those who tested positive for both opioids and stimulants. The odds that someone assessed at medium risk will test positive for these substances was 3.493 times higher than those assessed as low risk.

Parolees are more likely to produce a positive UA than probationers, regardless of the substance type. Those under dual supervision have significantly increased odds of testing positive for all substances except alcohol relative to probationers.⁴ It is notable that the odds that a parolee will test positive for both opioids and stimulants rather than test negative for any substances are 3.677 times higher than are probationers. This was the largest OR for this variable across all substance categories included in the model.

Substance Use History

The model includes a variable measuring a history of problematic use of substances, either drugs or alcohol. Those with a noted history of substance use that interferes with functioning were at increased risk of testing positive for any substance. The odds were highest, though, for the combination of opioid and stimulant use (OR=2.142) followed by crack/cocaine (OR=2.137).

⁴ Although the odds that someone under dual supervision would use alcohol were greater than one (OR=1.253), this was not statistically significant.

Criminal History

Finally, this model measures criminal history with total number of prior arrests. The odds ratio is significant for all substances. The odds ratio for all substances except “other” substances is over one. Thus, for every one-unit increase in the number of arrests, the likelihood that the individual will produce a positive UA increases by a factor of anywhere between 1.022 (alcohol) to 1.055 (stimulants and opioids). However, holding all other variables constant, criminal history is associated with decreased odds of testing positive for other substances. For every additional arrest, the odds that someone will test positive for “other” substances decreases by a factor of .985.

Table 3. Multinomial Regression Predicting Substance Type.

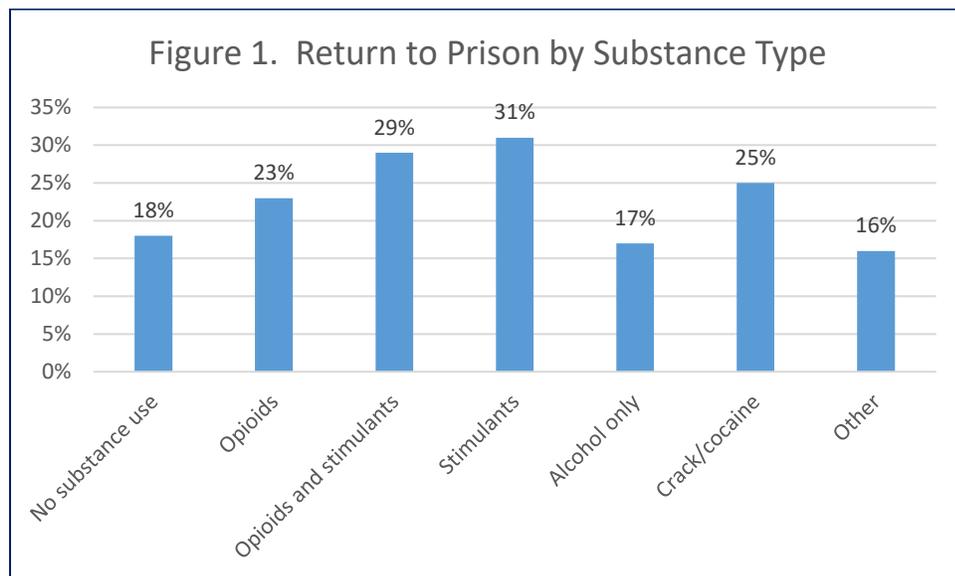
	Variable	Opioids	Opioids and Stimulants	Stimulants	Crack/Cocaine	Alcohol Only	Other
Demographics	Gender (Reference = Male)						
	Female	1.382***	2.264***	1.594***	.869	.787**	.813***
	Race/Ethnicity (Reference = White)						
	Native American	.436***	.253***	.249***	.384***	1.676***	1.054
	Black	.799	.678*	.765*	5.594***	2.088***	2.330***
	Hispanic	1.530***	.971	.826**	1.871***	1.132	1.129*
	Other Race	1.441**	.583*	.704*	1.186	.612	1.076
Age	1.000	.994	.996	1.005	1.007*	.965***	
Social Capital	(Reference = None)						
	Unemployment	1.079	1.204*	1.355***	.880	1.030	.862**
	Negative Associations	1.038	1.087	1.218***	1.053	.978	.947
	Gang	1.526***	1.727***	1.009	.939	.813	1.139
Stability	(Reference = None)						
	Two or More Address Changes	.699***	.675***	.791***	.725***	1.026	.818***
	Prior Absconding	.866	1.119	.954	.930	1.061	.813*
Current Offense	(Reference = Violent Offense)						
	Other	.853	.814	.969	.988	.881	1.110
	DWI Offense	.546***	.271***	.261***	.523***	.984	.575***
	Drug Offense	1.554***	2.072***	1.959***	1.464***	.789*	1.17**
	Property Offense	1.472***	1.710***	1.563***	1.134	.786**	1.000
Risk and Supervision Characteristics	Assessed Risk Level (Reference = Low Risk)						
	Medium	1.875***	3.493***	1.659***	1.443*	.905	1.235
	High	1.455***	2.622***	1.752***	1.552***	.897	1.434***
	Extreme	1.076	1.710***	1.334***	1.168	.924	1.155*
	Supervision Type (Reference = Probation)						
	Parole	2.145***	3.677***	1.869***	2.155***	1.571***	2.329***
	Dual	1.856***	2.226***	1.686***	1.555***	1.253	2.154***
Substance Use History	History of Problems (Reference=No)						
Has History	1.740***	2.142***	1.710***	2.137***	1.267**	1.658***	
Criminal History	Number of Prior Arrests	1.052***	1.055***	1.042***	1.036***	1.022**	.985*

***p<.001, ** p<.01, * p<.05

Revocation

Most of the individuals in our sample did not return to prison; just 21% (n=4,298) did. This varied, though, by substance use. Those who never tested positive for any substances, had violations for

alcohol only, or for “other” substances (primarily cannabinoids) were less likely to return to prison compared to the overall average. Those who used stimulants returned to prison at rates that exceeded all other groups regardless of whether opioids were also detected. Those who used opioids without stimulants or who used crack/cocaine returned to prison at rates that exceeded the overall proportion of returns, but less than users of stimulants. Figure 1 illustrates these results.



It is important to understand whether the relationship between return to prison and substance type holds once we consider other factors. In Table 4 below, we present the results of nested logistic regression models that explore the characteristics that are associated with returns to prison. Each model adds one or more independent variables, grouped by category. This resulted in eight different models. This nesting method allows us to determine whether the addition of the variable(s) adds value to the model. We begin with the set of variables measuring substance use, which is the set of variables we are most interested in for this analysis. As with the multinomial regression presented above, the binary logistic regression produces odds ratios (OR). We report these measures for each model.

Model 1

In the first model presented, we examine the relationship between substance use type and return to prison. The odds of returning to prison are significantly higher for those who used opioids, opioids and stimulants, stimulants, and crack/cocaine. The odds were lower for those who used cannabinoids or other substances. There were no differences in the odds for those who used alcohol only relative to those who had no known substance use. The odds were particularly high for stimulant users at over twice (OR=2.023) that of those with no substance use. These results indicate that substance use is associated with returns to prison, but that it varies somewhat by substance type.

Model 2

In model 2, we add demographic characteristics. The difference between the -2LL values indicate that the addition of these variables significantly improves the model.⁵ This model produces statistically significant findings for race/ethnicity, gender, and age. Gender is a strong effect. The odds of a female having supervision revoked are significantly lower than the odds of a male (OR=.461). In terms of race and ethnicity, individuals identified as Hispanic (OR=1.421), Black (OR=1.845), or Native American (OR=1.260) have greater odds of having their supervision revoked than that of White individuals. Individuals classified as “other” (OR=.241), on the other hand, were less likely than White to have their supervision revoked. Age is negatively associated with supervision revocation, suggesting that older individuals are less likely to return to prison. Specifically, each year older lowers the odds of revocation by a factor of .989. While this a seemingly small effect, the additive effect can be quite strong for relatively older offenders. While the values of the odds ratio change somewhat for the substance use type variable, the relationships and significance levels remain the same in this model.

Model 3

In this stage, we add variables that reflect an individual’s social capital. Generally, measures of social capital have a significant effect on the return to prison. Both insufficient employment in the past year and gang involvement increase the odds of having supervision revoked. Specifically, being underemployed or unemployed increases the odds of revocation by a factor of 1.666, while gang involvement increases odds by 1.819. Surprisingly, the presence of negative associations is not a substantive predictor of supervision revocation. The substance type and demographic variables from Model 2 remain stable in Model 3. The patterns of effect and significance remain quite similar.

Model 4

Model 4 adds measures of personal stability, namely two or more address changes in the past year and if an individual has ever absconded from state supervision in the past. As predicted, both significantly increase the odds of having state supervision revoked. Specifically, two or more address changes increases the odds of revocation by a factor of 1.1 compared to those who do not have multiple address changes, while prior absconding increases the odds by 1.942 over those who have never absconded, holding all other factors constant. Once again, the previous model remains quite stable. The direction of the OR and significance remain the same for all variables.

Model 5

Next, we add the current offense to the model. We operationalize an individual’s current offense as the most serious charge for which the individual is under supervision. Using violent offenses as the reference category, we compare the odds of property offenses, drug offenses, DWI offenses, and all other offenses. As predicted, those with a current violent offense are the most likely to have their supervision revoked. Specifically, the odds that a property offender will return to prison are .804 that of

⁵ Each model produces a statistic called the negative two log likelihood (-2LL) which is a measure of the goodness of fit of the model. Subtracting the -2LL value of one model from the next model results in a chi-square value, that can be used to assess whether the addition of the variables in the second model add to the value of the model/improves the goodness of fit.

a violent offender. Drug offenders are even less likely to be revoked than violent offenders; the odds are .678. The odds that a DWI offender will be revoked are .477, and those with “other” offenses have .416 times the likelihood of violent offenders to be revoked. The remainder of the model still displays notable stability, as all patterns and significance remain consistent. Such consistent results would suggest that revocation is influenced by more than contemporary offense.

Model 6

We add supervision characteristics in Model 6. This includes assessed risk level, supervision type, and technical violations. In terms of risk level, individuals assessed as medium, high, or extreme risk level are significantly more likely to have their state supervision revoked. The odds that an individual assessed as a medium risk level will return to prison are 1.620 greater than an individual assessed as low risk. The odds increase with each increase in assessed risk level. The odds that someone assessed as extreme risk will return to prison are 4.610 greater than those who are low risk. This would suggest that the state’s risk assessment program to be reasonably accurate. We also find that there are significant differences by type of state supervision. The odds of revocation increase by a factor of 11.406 for parolees relative to probationers. The odds are slightly lower for those under both parole and probation supervision (OR=8.075).

As would be expected, the number of technical violations one incurs significantly increases the odds of returning to prison. For every one-unit increase in the number of absconding violations, the odds of return to prison increases by a factor of 1.394 relative to those who do not have any absconding violations. The odds are nearly identical for those who have an arrest-related violation (OR=1.395). The odds of returning to prison for those with any other (non-substance related) violation are slightly lower (OR=1.298).

It is notable that the odds of returning to prison are so high for parolees and those who are high or extreme risk even when we take into account documented violations. Note that these do not include substance-related violations. This is because the substance type variable entered in Model 1 indicates that a substance-related violation has occurred, so it would be redundant to include those here.

The rest of the model experiences some variation from Model 6. Notably, the category reflecting the documented use of cannabinoids and other substances (hallucinogens, depressants, inhalants, etc.) is no longer statistically significant. This indicates that once serious offending and performance while on supervision are taken into account, there is no meaningful differences between those who use these substances and those who do not use any substances during the study period.

Besides this change, there were changes to some of the variables in the analyses. Specifically, negative associations become statistically significant, but not in the direction expected. The odds that someone who has negative associations will return to prison are reduced by a factor of .887 relative to those who do not have negative associations, controlling for other factors in the model. Additionally, gang involvement and frequent address changes are no longer significantly related to revocation.

Model 7

Model 7 adds known history of substance use that interferes with daily functioning. Contrary to expectations, a known history of alcohol or illicit substance problems was not significantly related to revocations. Not only is the odds ratio not significant, the difference in the -2LL indicates that including this variable does not improve the fit of the model. Thus, a history of alcohol and/or drug use is not associated with revocations when other factors are taken into account.

Model 8

The final model takes into account criminal history by adding the number of prior arrests to the model. Unsurprisingly, individuals with more extensive criminal records are more likely to have their supervision revoked. Specifically, each prior arrest increases an individual's odds of revocation by a factor of 1.090. This effect can be quite substantial, especially given that the sample has an average of 5.61 prior arrests.

The inclusion of criminal history disrupts some of the model consistency. Several variables that had been statistically significant are no longer so in the final model. Specifically, those identified as Native American are no more likely to return to prison than their White counterparts, once all other factors are taken into account. Negative associations and prior absconding are also no longer statistically significant predictors of revocation in the final model. Conversely, the variable measuring two or more address changes returns to statistical significance. The OR is less than one, indicating that more frequent address changes is associated with decreased returns to prison holding all other factors constant. Throughout these analyses, this variable (address changes) has had inconsistent OR and significance levels. This suggests that this variable is not a stable predictor of return to prison.

Despite these irregularities, the variable measuring substance use type, our primary variable of interest, produced similar results in this final model. Specifically, those who were known to use opioids, stimulants, opioids and stimulants, or crack/cocaine were all significantly more likely to return to prison than those who had no recorded substance use. There were no differences between those who used alcohol alone or those who used cannabinoids and/or other substances compared to those who had no known substance use.

Table 4. Logistic Regression Predicting Return to Prison.

Variable	Model 1 Substance Use	Model 2 Demographics	Model 3 Social Capital	Model 4 Stability	Model 5 Current Offense	Model 6 Supervision Characteristics	Model 7 Drug History	Model 8 Criminal History
Substance Use during Supervision (Reference = None)								
Opioid	1.348***	1.349***	1.280***	1.281***	1.273***	1.249***	1.254***	1.187*
Opioid and Stimulant	1.873***	2.062***	1.892***	1.863***	1.867***	1.940***	1.949***	1.872***
Stimulant	2.023***	2.212***	2.114***	2.111***	2.113***	2.298***	2.305***	2.274***
Crack/Cocaine	1.499***	1.356***	1.363***	1.359***	1.358***	1.526***	1.533***	1.489***
Alcohol	.936	.892	.899	.899	.896	1.007	1.009	.995
Other	.829**	.751***	.758***	.766***	.763***	.999	1.002	1.038
Gender (Reference = Male)								
Female	-	.461***	.469***	.463***	.471***	.659***	.659***	.692***
Race/Ethnicity (Reference = White)								
Native American	-	1.260***	1.178*	1.201*	1.190*	1.293**	1.297**	1.181
Black	-	1.845***	1.717***	1.715***	1.687***	1.464***	1.460***	1.370***
Hispanic	-	1.421***	1.338***	1.353***	1.357***	1.233***	1.233***	1.128*
Other Race	-	.241***	.240***	.242***	.244***	.349***	.350***	.348***
Age	-	.989***	.993***	.991***	.994***	.985***	.985***	.981***
Unemployment	-	-	1.666***	1.603***	1.613***	1.224***	1.232***	1.222***
Negative Associations	-	-	.982	.957	.972	.887**	.898*	.929
Gang	-	-	1.819***	1.575***	1.518***	1.070	1.071	1.052
Two or More Address Changes	-	-	-	1.100*	1.093*	.925	.927	.914*
Prior Absconding	-	-	-	1.942***	1.915***	1.233**	1.240**	1.121

Variable	Model 1 Substance Use (n=19,788)	Model 2 add Demographics (n=19,788)	Model 3 add Social Capital (n=19,788)	Model 4 add Stability (n=19,788)	Model 5 add Current Offense (n=19,788)	Model 6 Supervision Characteristics (n=19,788)	Model 7 Drug History (n=19,788)	Model 8 Criminal History (n=19,788)
Current Offense (Reference = Violent Offense)								
Other/Public Order Offense	-	-	-	-	.416***	.591***	.591***	.549***
DWI Offense	-	-	-	-	.477***	.522***	.528***	.494***
Drug Offense	-	-	-	-	.678***	.786***	.789***	.759***
Property Offense	-	-	-	-	.804***	.857**	.858**	.823***
Assessed risk level (Reference = Low Supervision)								
Medium	-	-	-	-	-	1.620***	1.628***	1.523***
High	-	-	-	-	-	3.006***	3.033***	2.434***
Extreme	-	-	-	-	-	4.610***	4.635***	3.367***
Supervision Type (Reference = Probation)								
Parole	-	-	-	-	-	11.406***	11.373***	10.220***
Dual	-	-	-	-	-	8.075***	8.052***	7.320***
Technical Violations								
Absconding	-	-	-	-	-	1.394***	1.395***	1.354***
Arrest	-	-	-	-	-	1.395***	1.395***	1.341***
All Other	-	-	-	-	-	1.298***	1.298***	1.321***
Substance Use History								
Has History	-	-	-	-	-	-	.952	.930
Criminal history								
Number of Prior Arrests	-	-	-	-	-	-	-	1.090***
Constant	.221***	.289***	.181***	.181***	.206***	.061***	.062***	.055
LL(df)	20078.927(6)	19538.778(6)	19250.898(3)	19132.810(2)	18962.093(4)	15015.960(8)	15015.048(1)	14674.967(1)
Nagelkerke R Square	.024	.065	.087	.095	.108	.370	.370	.390
% Correct	78.9%	78.9%	78.8%	79.0%	79.1%	83.5%	83.5%	83.7%

***p≤.001, ** p≤.01, * p≤.05

Summary and Conclusion

This study examined the correlates of opioid use, stimulant use, both opioids and stimulants, and other substances using a sample of individuals under state community supervision between 2011 and 2012. The second portion of the study examined returns to prison among those in the sample, examining differences by various substance types while controlling for other factors.

Correlates of Substance Use Type

The findings from this study indicate that the factors associated with substance use type vary. Indeed, only two variables included in the analyses consistently predicted increased odds of substance use, regardless of the type of substance. Prior studies (Webster, 2017) indicate that risk factors for opioid use include, among other factors, a history of substance abuse, younger age, and social/family environment that encourage misuse. In this study, we found that a history of substance use is associated with increased odds of substance use regardless of substance type. In other words, a history of substance use is a factor that predicts opioid use as well as all other substances among those under supervision.

Second, parolees were at greater risk for using substances relative to probationers regardless of substance type. Those under dual supervision also had greater odds of using all substances, with one exception: alcohol only. The increased odds of substance use among parolees and those under dual supervision is an important finding. Extant research shows that the risk of overdose-related deaths are elevated among parolees, particularly within the first few weeks of release (Binswanger et al., 2007). However, length of detention may temper this relationship. Binswanger et al., (2011) found that individuals detained longer are at decreased risk for overdose-related deaths compared to those who are detained for a shorter period. Thus, those recently released from prison and who served a relatively shorter period of incarceration may be at elevated risk of overdosing, and perhaps of using substances. It is possible that the risk of overdose is different for incarcerated men and women. Incarceration time is typically shorter for women, and as these results indicate, their odds of using opioids and stimulants are elevated. Together, this suggests that women may be especially vulnerable to substance use and related overdoses within a few weeks of release from prison. Future research should explore this possibility as it has implications for post-release supervision and UA testing policies and procedures for all former prisoners, but especially females.

In addition to the differences by gender, we found there are demographic characteristics that differentiate substance use preferences. For example, younger people have greater odds for testing positive for “other” substances and older people for alcohol. However, age differences for other substances were not significant. The study also shows that racial/ethnic differences continue even after controlling for other variables. For example, Hispanic individuals have increased risk of testing positive for opioids, while White individuals have increased risk of testing positive for stimulants (methamphetamines and amphetamines). While Native Americans are at increased risk for testing positive for alcohol, their odds are actually lower than those of Black individuals once other factors are

taken into account. This differs somewhat from bivariate analyses, where Native Americans tested positive at the highest rates (10%) followed by African Americans (7%).

The measures of social capital included here did not predict substance use type for all substances. The results suggest that reduced social capital in the form of under- and unemployment increases the risk of stimulant use (particularly without opioids). In addition, having negative associations increased the odds of stimulant use. Together, these results indicate that those who use stimulants may have reduced social capital relative to those who test negative or who test positive for other substances. Besides monitoring/assisting with employment, this suggests that it may be especially important to identify and monitor negative social networks among stimulant users. In other words, negative social relationships could reinforce use, and promoting pro-social ties may be especially important among this group.

Suspected and/or validated gang membership was associated with significantly greater odds of both opioid use and opioid and stimulant use. One possible reason could be the nexus between heroin distribution and gangs (as well as other organized crime groups) in New Mexico (Office of National Drug Control Policy, 2009). However, gangs have also been implicated in the distribution of other substances, such as crack/cocaine and methamphetamines (Drug Enforcement Agency Strategic Intelligence Section, 2017). It is unclear, then, why gang involvement would increase the odds of using opioids, but not other substances. Regardless, this suggests that gang prevention and intervention efforts could also have some bearing on opioid use. This is an important area to explore in future studies.

Contrary to expectations, reduced stability did not increase the risk of substance use for any substance type. Instead, those who moved more frequently were less likely to test positive for all substances except alcohol. It is possible that those who move more frequently are less likely to develop and sustain negative social relationships or that frequent address changes are associated with increases socio-economic status. If this were true, this would suggest that frequent address changes reflects improved social capital rather than reduced stability. Some literature suggests that expanded social networks are a protective factor against relapse among those who have substance use problems (Panebianco, Gallupe, Carrington, & Colozz, 2016). However, future research is required to expound on this finding.

While the risk of using particular substances varied by current offense type, the results are largely intuitive and/or are consistent with prior studies. For example, the odds that someone will test positive for stimulants or opioids increase for those with a current drug or property offense relative to those with a violent offense. Studies have linked opioid and methamphetamine use to both property and drug crimes (Gizzi and Gerkin, 2009; Carless, 1993). Those with drug offenses had increased risk of crack/cocaine use or "other" substance use (primarily cannabinoids), while those with a DWI had a greater risk of using alcohol.

Contrary to expectations, though, criminal history did not consistently result in increased odds of each type of substance. Instead, increased number of prior arrests was associated with decreased odds of using "other" substances (primarily cannabinoids) as opposed to testing negative for all substances (or having no known drug violations). Increased number of prior arrests was associated with increased odds of using all remaining substances, though.

Overall, then, these results illustrate that the correlates of substance use are generally not the same for each substance type. Perhaps most important is that these results indicate there may be different risk and protective factors associated with the choice of substance. In particular are the differences found for employment, negative associations, and gang involvement.

Substance Use and Revocation

The second portion of the study examined returns to prison. Our primary interest is to understand whether substance use type, especially opioids, increase the risk of re-incarceration. The odds of return to prison are highest for those who use stimulants, with or without opioids, holding all other factors in the model constant. Those who tested positive for opioids and those who tested positive for crack/cocaine also had significantly greater odds of revocation. Notably, though, the odds of return to prison were smallest for those who had known opioid use (without stimulants) relative to the other “hard” substances. It is possible that with the addition of other factors, this relationship would disappear entirely. Conversely, those who tested positive for alcohol only and those who used cannabinoids or other substances were as likely as those who tested negative for all substances to return to prison. These results suggest that even after controlling for factors that typically predict adverse outcomes, including criminal history, the choice of substance plays a role in revocation.

This study suggests that even after taking into account behavior while on supervision, prior criminal history, and other factors, those who use stimulants (methamphetamines or amphetamines) or crack/cocaine are at increased risk for revocation even more than those who use opioids. Prior research suggests that methamphetamine use is associated with both increased risk of violent behavior and returns to prison (Cartier, Farabee, & Prendergast, 2006). It is possible that individuals who use stimulants in our study are at increased risk of violent behavior, though other studies indicate that those who use alcohol display violent behavior (ibid). It is also possible that some people are at increased risk due to the substance they use in a way that is not captured in these models. For example, stimulant use at higher doses has been associated with agitation, paranoia, impaired reasoning, impaired impulse control, and hallucinations (Cruikshank and Dyer, 2009). These negative effects could increase risk for return to prison. Future research should explore alternative explanations such as these to better understand the relationship between substance type and return to prison.

Although our primary interest in this portion of the analyses was to understand how substance use type influences revocation, most of the variables in the model were significantly related to revocation. Of these, two supervision characteristics were associated with the highest odds among the categorical variables. The likelihood of revocation increased with higher levels of risk relative to those who were low risk. Particularly notable was that the odds of revocation for a parolee are more than ten times higher than the odds for those on probation, controlling for all other factors including substance use, criminal history, current offense, and assessed risk level. Likewise, the odds of revocation among dually supervised individuals were higher than the odds for probationers. Indeed, supervision status was associated with the largest odds coefficients. While one possible explanation is that the level of monitoring for individuals who have been in prison prior to community supervision is higher, resulting in increased detection of infractions, we did include documented violations in the model. We also

included other variables that typically explain return to prison, such as prior offending and current offense. It is possible that violations by parolees and dually supervised individuals are taken more seriously, resulting in revocation.

Limitations and Avenues for Future Research

There are some limitations to this study that are important to note. One of the limitations is that we did not have UA information for all individuals who began supervision between 2011 and 2013. It is unclear why these individuals were excluded from the UA dataset, as everyone who begins supervision is required to undergo an initial UA screening. It is possible that at least some of the individuals who were identified as beginning supervision during this period did not do so. Importantly, the bivariate analyses suggest that those who were not included differed somewhat from those who were included. Besides demographic differences, those included in the analyses here had higher levels of assessed risk; had higher rates of revocation; had more property and drug offenses, social instability and lack of social prosocial ties; and a greater proportion had a history of problematic substance use.

We created groupings to help us understand the characteristics of those who use opioids and stimulants relative to other substances and no substances. This does not mean that the individual would necessarily consider this their primary substance or primary substance of choice. Whether these relationships would hold if this preference were accounted for is unknown. This is a second limitation of this study. Future research should consider methods to operationalize substance of choice in the absence of obtaining that information from each individual. For example, repeated positive UA results for opioids versus a single positive UA for marijuana may suggest opioids are the substance of choice.

Third, this project was undertaken to better understand opioid users and the consequences for those who use opioids when on probation or parole. We were unable to differentiate the type of opioid used with certainty. Therefore, the analyses grouped all opioids together. It is possible that there are differences in the characteristics of opioid users by opioid type. For example, the National Drug Intelligence Center (2002) found prescription opioid users are typically from higher socio-economic status, while heroin users are unlikely to maintain employment (National Drug Intelligence Center, 2002). Further, there could be differences in returns to prison by opioid type. Future analyses should explore these possibilities.

These data were gathered primarily from UA tests. Since most of these tests are administered randomly, there is a high likelihood that individuals who do indeed use substances will not be identified as such. Many substances are no longer detectable within just a few days of use if not used regularly. A further complication is that some individuals may be over identified as substance users due to the frequency of testing. We would expect that those in programs such as Drug Court may test positive more often due to their known substance history, but those in an intensive supervision program may be placed in that program for reasons other than substance use. However, the PPD typically tests those in special programs more often than those who are not in special programs.

Finally, our indicators of social capital and stability are limited. Other indicators of social capital, such as strength of family relationships, religiosity, or community engagement could change the results.

Likewise, including measures of stability such as length of employment, length of marriage, etc. could alter the results. Including spatial context could also alter the results. For example, it may be that those who live in particular areas of the state are more likely to return to prison or that neighborhood characteristics such as social disorganization could play a role in both substance use choice and revocation. Future research should include these variables.

Conclusion

Despite these limitations, the current study adds to our understanding of factors related to substance use choice and the relationship between substance type and revocation. Taken together, the results of these analyses suggest there are some areas for intervention that should be varied by substance type. For example, the risk of revocation is especially high for those who use stimulants, suggesting that engaging with these offenders early to direct them to appropriate treatment may be beneficial. Furthermore, the relationship between gang ties and opioids reinforces the importance of intervening with at-risk individuals to reduce both opioid use as well as gang involvement. While this study included only individuals involved in the criminal justice system, it is likely that many of the risk and protective factors we found here would be applicable to others who are not in the criminal justice system.

We also hope that the current study provides insights into the revocation process. While the NMCD's assessed risk level was shown to be a strong predictor of revocation, we find robust relationships beyond assessed risk level that should be highlighted. Notably, the racial category remains a significant predictor of revocation, even when controlling for relevant variables such as known criminal history and personal stability, suggesting a racial bias in revocation. Similarly, women are much less likely to face revocation for reasons not easily explained in this study. In a different vein, employment should be a key concern for those under state supervision, as a lack of employment plays a significant role in both substance use and revocation, even when prior substance and criminal history is taken into consideration.

The intention of this report is to provide useful information to the NMCD, other criminal justice stakeholders, treatment providers, and others concerned with substance use issues. Understanding the correlates of the use of particular substances can be useful when planning intervention and prevention strategies, and investing in resources to address substance abuse. In addition, increasing our understanding of revocations, including how substance type and other factors play a role in returns to prison, is important. We are hopeful that readers of this study will use this information to promote success among the supervised population and ensure community safety.

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Appendices

Appendix A. Description of Sample

Table A.1. Comparison of Sample in Study, Omitted from Sample, and Overall Sample

		In final sample (N=20,274)	Not in final sample (N=5,309)	All cases (N=25,583)
Demographics	Gender***	(N=20,274)	(N=5,309)	(N=25,583)
	Male	75.9%	78.7%	76.5%
	Female	24.1%	21.3%	23.5%
	Race***	(N=20,420)	(N=5,396)	(N=25,816)
	Hispanic	55.6%	49.1%	54.2%
	White	26.3%	27.7%	26.6%
	African American	5.5%	4.9%	5.4%
	Native American	9.4%	13.6%	10.3%
	Other	3.2%	4.7%	3.5%
	Age of Offender	(N=20,251)	(N=5,292)	(N=25,543)
	Average Age (s.d.)***	33.84 (10.99)	34.68 (11.16)	34.02 (11.03)
	Grouped Age***			
	18-24	22.9%	20.2%	22.4%
25-34	37.0%	36.8%	37.0%	
35-44	21.5%	23.1%	21.8%	
45-54	13.6%	14.3%	13.7%	
55 and over	5.0%	5.6%	5.1%	
Social Capital	Measures of Social Capital	(N=20,268)	(N=4,709)	(N=24,977)
	Under- or unemployed***	68.2%	71.8%	68.9%
	Negative associations**	53.7%	51.5%	53.2%
	Gang membership**	8.9%	7.7%	8.7%
Stability	Measures of Stability	(N=20,268)	(N=4,709)	(N=24,977)
	Two or more address changes**	43.4%	41.2%	43.0%
	History of absconding***	7.1%	5.4%	6.8%
Current Offense	Offense Type***	(N=19,931)	(N=5,147)	(N=25,078)
	Property	29.6%	28.8%	29.5%
	Drug	22.4%	19.9%	21.9%
	Violent	34.6%	33.8%	34.5%
	DWI	8.5%	12.3%	9.2%
	Other	4.9%	5.2%	5.0%
Criminal history	Prior Arrests	(N=20,274)	(N=5,311)	(N=25,585)
	Average prior arrests*	5.55 (4.50)	5.39 (4.83)	5.52 (4.57)
	Prior Offense Type	(N=20,274)	(N=5,311)	(N=25,585)
	Property**	56.6%	54.3%	56.1%
	Drug***	44.1%	38.7%	43.0%
	Violent**	56.3%	53.9%	55.8%
	DWI	31.3%	32.3%	31.5%
	Other	74.0%	74.1%	74.0%

		In final sample (N=20,274)	Not in final sample (N=5,309)	All cases (N=25,583)
Supervision Characteristics	Risk Level***	(N=20,268)	(N=4,709)	(N=24,977)
	Minimum	19.6%	18.8%	19.4%
	Medium	45.0%	49.1%	45.8%
	High	24.6%	22.4%	24.2%
	Maximum	10.8%	9.7%	10.6%
	Supervision Type***	(N=20,420)	(N=5,396)	(N=25,816)
	Probation	81.0%	77.8%	80.3%
Parole	10.7%	15.4%	11.7%	
Dual	8.3%	6.8%	8.0%	
Violations	Average Number of Arrest-Related Violations***	(N=20,420)	(N=5,396)	(N=25,816)
		.22 (.54)	.14 (.43)	.21 (.52)
	Average Number of Reporting Violations***	.47 (.82)	.32 (.65)	.44 (.79)
	Average Number of Other Violations***	.32 (.71)	.16 (.48)	.29 (.67)
Substance Use History	Known Substance Use Problem	(N=20,268)	(N=4,709)	(N=24,977)
	Alcohol or drug problem*	68.1%*	66.4%	67.8%
Return to Prison	Yes*	21.0%	22.5%	21.3%

***p<.001, ** p<.01, * p<.05

Appendix B. Bivariate analyses of substance use type

Table B.1 Bivariate relationship between substance use and independent variables

	Variable	Opioids	Opioids and stimulants	Stimulants	Crack/cocaine	Alcohol only	Other
Demographics	Gender***						
	Male	12.9%	4.5%	12.3%	5.6%	5.3%	13.5%
	Female	14.7%	8.8%	18.7%	4.1%	3.6%	10.2%
	Race/Ethnicity***						
	White	10.8%	6.3%	17.9%	4.2%	3.4%	11.4%
	Native American	5.9%	1.9%	5.1%	1.6%	9.8%	15.3%
	Black	7.1%	3.5%	11.1%	14.9%	6.8%	20.2%
	Hispanic	16.3%	6.1%	13.7%	5.9%	4.3%	12.1%
	Other Race	13.7%	3.9%	12.5%	3.4%	4.6%	13.3%
	Age						
Average age (sd)	33.63 (11.18)	32.49 (9.27)	33.16 (9.40)	34.70 (11.10)	36.11 (11.21)	30.17 (10.21)	
Social capital	Unemployment***	13.6%	6.2%	15.3%	5.1%	4.9%	11.9%
	Negative Associations***	14.1%	6.6%	16.0%	5.5%	4.5%	12.7%
	Gang***	20.1%	9.3%	13.3%	5.5%	3.3%	13.2%
Stability	Two or More Address Changes***	12.7%	5.8%	14.8%	5.0%	5.0%	11.9%
	Prior Absconding***	15.8%	9.3%	16.3%	5.9%	4.4%	9.1%
Current offense	Current Offense***						
	Violent	11.7%	4.0%	10.6%	5.1%	6.0%	13.8%
	Other/public order	10.4%	3.6%	11.3%	5.0%	4.8%	17.2%
	Current DWI	8.3%	1.2%	3.5%	3.8%	9.3%	8.3%
	Current Drug	15.1%	7.7%	19.2%	6.6%	3.3%	12.5%
	Current Property	15.9%	7.3%	16.8%	5.0%	3.6%	12.2%
Criminal history	Average Number of Prior Arrests (sd)	6.45 (4.99)	6.40 (4.80)	5.93 (4.36)	6.11 (4.70)	5.58 (4.18)	4.70 (3.92)
Risk and supervision characteristics	Assessed risk level***						
	Low	11.6%	3.0%	9.7%	4.6%	6.0%	12.7%
	Medium	11.9%	5.2%	13.8%	5.1%	5.0%	13.7%
	High	15.1%	7.4%	17.1%	4.2%	6.1%	12.4%
	Extreme	18.0%	7.6%	13..6%	5.5%	4.3%	8.8%

Variable	Opioids	Opioids and stimulants	Stimulants	Crack/cocaine	Alcohol only	Other	
Supervision Type***							
Probation	13.6%	5.9%	14.2%	5.4%	4.9%	13.9%	
Parole	11.3%	3.2%	11.7%	4.3%	5.2%	7.6%	
Dual	13.0%	5.2%	12.7%	5.8%	5.1%	7.5%	
Violations							
Average Number of Reporting Violations***	.67 (.96)	.95 (1.02)	.78 (.99)	.54 (.83)	.36 (.69)	.44 (.77)	
Average Number of Arrest-Related Violations***	.28 (.60)	.28 (.59)	.28 .58)	.26 .61)	.21 (.51)	.26 (.58)	
Average Number of Other Violations***	.36 (.77)	.58 (.89)	.53 .91)	.38 .74)	.30(.65)	.32 (.77)	
Substance Use History	History of Problems***	14.4%	6.5%	15.3%	5.9%	4.9%	13.2%

***p≤.001, ** p≤.01, * p≤.05

Appendix C. Bivariate analyses of return to prison

Table C.1 Bivariate Relationship between Independent Variables and Revocation.

	Variable	Revoked	Not Revoked
Demographics	Gender***		
	Male	23.6%	76.4%
	Female	13.5%	86.5%
	Race/Ethnicity		
	Native American	18.7%	81.3%
	Black	27.5%	72.5%
	Hispanic	23.5%	76.5%
	Other Race	3.4%	96.6%
	White	17.4%	82.6%
	Age	32.90 (9.55)	34.10 (11.33)
Social Capital	Unemployment	23.6%	76.4%
	Negative Associations	22.2%	77.8%
	Gang	36.3%	63.7%
Stability	Two or More Address Changes	22.7%	77.3%
	Prior Absconding	36.9%	63.1%
Current Offense	Current Offense		
	Other/public order	11.3%	86.7%
	Current Violent	25.5%	74.5%
	Current DWI	12.2%	87.8%
	Current Drug	19.6%	80.4%
	Current Property	21.8%	78.2%
Criminal History	Average Number of Prior Arrests (sd)	8.29 (5.17)	4.82 (4.00)
Risk and Supervision Characteristics	Assessed risk level		
	Minimum	6.5%	93.5%
	Medium	13.4%	86.6%
	High	32.1%	67.9%
	Extreme	52.3%	47.7%
	Supervision Type		
	Probation	12.8%	87.2%
Parole	56.8%	43.2%	
	Dual	55.7%	44.3%
Violations	Number reporting violations	.6289 (.9124)	.4259 (.7854)
	Number of arrest-related violations	.2953 (.6061)	.2040 (.5157)
	Number of other violations	.5442 (.8710)	.2613 (.6485)
Substance Use History	History of problems	21.6%	78.4%

***p<.001, ** p<.01, * p<.05