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Drug use in the year after prison

Abstract

With poor health and widespread drug problems in the U.S. prison population, post-prison drug use provides an important measure of both public health and social integration following incarceration. We study the correlates of drug use with data from the Boston Reentry Study (BRS), a survey of men and women interviewed four times over the year after prison release. The BRS data allow an analysis of legal and illegal drug use, and the correlation between them. We find that illegal drug use is associated with histories of drug problems and childhood trauma. Use of medications is associated with poor physical health and a history of mental illness. Legal and illegal drug use are not strongly correlated. Results suggest that in a Medicaid expansion state where health coverage is widely provided to people leaving prison, formerly-incarcerated men and women use medications, not illegal drugs, to address their health needs.

Keywords: Massachusetts; incarceration; drug use; Medicaid; childhood trauma

Over 600,000 people, largely from poor minority communities, are released from prison each year (Carson, 2016; Simes, 2016). With histories of poor health and substance use disorders, those making the transition from incarceration to community face significant obstacles to successful reentry (Schnittker et al., 2011). Drug use after prison release is a key indicator of social integration. Illegal drug use is a negative indicator, related to criminal involvement, relapse to addiction, and an elevated risk of mortality (Binswanger et al., 2007; Mowen and Visher, 2015a). Less studied, but equally important, legal drug use is a positive indicator, linked to continuity of medical care, adherence to treatment, and access to community-based providers. In different ways then, illegal and legal drug use are informative about risky behaviors, social support, and overall health and well-being after incarceration.

Social integration depends on pre-prison risk factors and the post-prison reentry process. Among pre-prison risk factors, mental illness, a history of drug problems, and childhood trauma are highly prevalent in prison populations, and are markers of frailty that make drug use more likely (Dube et al., 2003; Min et al., 2007). After prison release, drug use is also likely to depend on health status and the social environment of reentry. For example, parole supervision and transitional housing programs impose drug testing that may deter illegal drug use. Returning to a supportive family has also been found to reduce illegal drug use after incarceration (Mowen and Visher, 2015a). Besides these aspects of the reentry environment, poor health after prison may necessitate the use of medications where health care is accessible.

Correlations between different kinds of drug use are also informative about social integration after incarceration. For a population in poor health with a history of criminal involvement, illegal drugs may be used to alleviate symptoms of mental illness or chronic pain that might otherwise be managed by medications (Khantzian, 1985; Pickard, 2012). This hypothesis of self-medication suggests that legal and illegal drug use should be studied together, and the two may be correlated. Self-medication with illegal drugs stymies social integration. Health needs are addressed through illicit drug markets and without the consistent support of a health care provider. Still, in the small literature on drug use after incarceration, no study that we know examines legal and illegal drug use together (e.g. Binswanger et al., 2012; Seal et al., 2007; Mowen and Visher, 2015a). In short, studying the correlates of legal and illegal drug use, and the association between them, are central to understanding social integration after incarceration.

The current study of drug use after incarceration analyzes data from the Boston Reentry Study (BRS), a unique longitudinal survey that follows a sample of men and women over the first year after release from Massachusetts prisons. Based on four post-release interviews over the first year after incarceration, the data offer granular detail on patterns of illegal and legal drug use in a state that pioneered the expansion of Medicaid for the formerly-incarcerated and other low-income people.

Drug Use After Prison

Drug use after prison is a key focus for reentry programming efforts, community corrections supervision, and an important measure of public health. Despite the obvious policy and health significance, most research has focused on drug use by arrestees or prisoners, and not the formerly-incarcerated (e.g. Cooper et al., 2012; Fazel et al., 2006). The review by Larney and her colleagues identified eight studies published between 2004 and 2014 that analyzed illegal drug use, hazardous drinking, and tobacco use over a one week to 12 month follow-up period following release from incarceration (Larney et al., 2018). Incidence estimates are generally not comparable across studies, but some results suggest that drug use after incarceration is at least twice as common as in the general population. While research suggests the high rate of drug use, studies often rely on convenience samples and suffer from high rates of attrition, typically between 25 and 50 percent over 3 to 12 months of follow-up. If drug use itself contributes to study dropout, the incidence of drug use will be underestimated and the association between drug use and socio-economic disadvantage is also likely to be attenuated (see Western et al., 2016).

Researchers have focused on the use of illegal drugs and not prescribed medications. Incarcerated men and women, however, carry heavy burdens of infectious disease, chronic conditions, and mental illness (Travis et al., 2014). Prison authorities are constitutionally obliged to provide health care. Perhaps as a result, treatment and health have been found to be better in prison than immediately after release (Mallik-Kane and Visher, 2008; Wildeman and Wang, 2017).

In light of their poor health, the use of medications by formerly-incarcerated people is an important positive health behavior that should form part of an assessment of post-prison drug use.

The Boston Reentry Study collected data on legal and illegal drug use in a representative sample of Massachusetts state prisoners released to the Boston area. Unusually for reentry research, the BRS sustained a response rate of 94 percent percent over the yearlong follow-up period, with a retention rate of 91 percent by the final exit interview. The survey asked respondents to report on whether they ever used a variety of drugs since the last survey interview. Unlike most earlier research, the BRS data distinguished hard drugs (including cocaine and heroin) from cannabis. A separate module asked about prescription drug use, recording medications for pain, mental health disorders, and other medical conditions.

Figure 1 shows the level of illegal and legal drug use in the BRS sample at four follow-up interviews at one week, two months, six months, and 12 months after prison release. These four measures provide the dependent variables for this study. The proportion of the sample reporting any drug use is shown separately for respondents who have no history of drug or alcohol problems, and those that do. A history of drug problems is indicated by a positive response to the survey question: Has drug or alcohol addiction ever been an issue for you? A history of drug problems was reported by about half of all respondents. The use of hard drugs is almost entirely confined to those with a history of drug or alcohol problems. The rate of cannabis use is higher than the rate of hard drug use, and

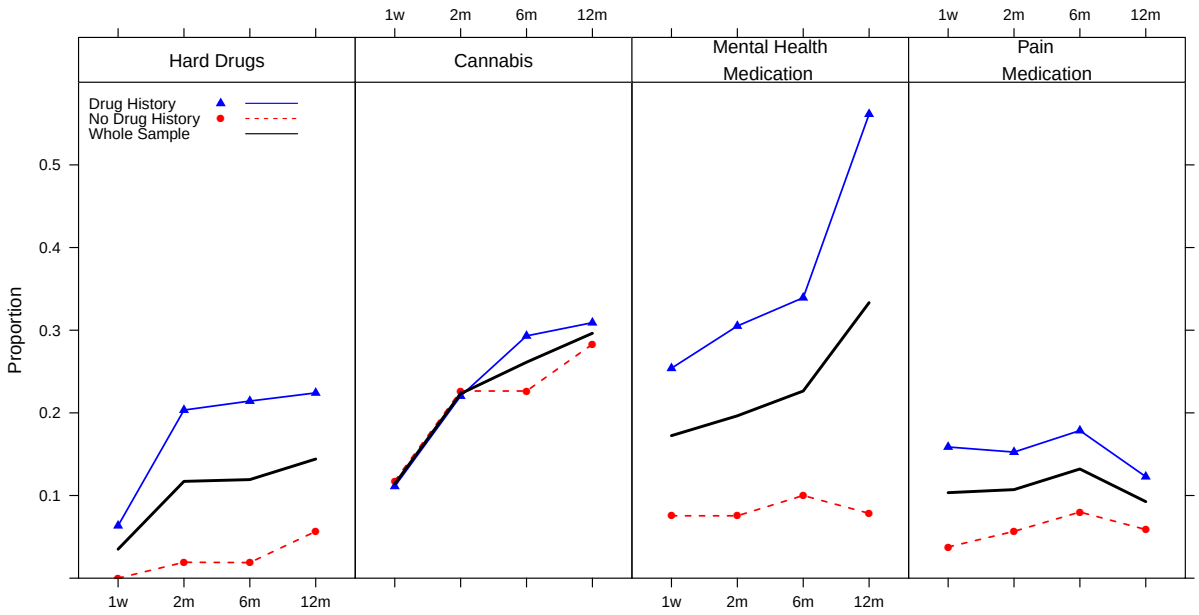

Figure 1. Proportion of respondents in the year after prison release reporting use of: (1) hard drugs, (2) cannabis, (3) medications for mental health, (4) medications for pain, Boston Reentry Study.

does not vary with drug and alcohol history. These rates of illegal drug use are significantly higher than those reported in general population surveys. Finally, the use of mental health medication increases significantly over the year after incarcation, but the use of pain medication changes little.

Pre-Prison Risks and Post-Prison Health and Social Environment

The correlates of drug use after incarceration include pre-existing risk factors and post-release measures of health and social environment. We explore the relationship of post-prison drug use to three pre-prison risk factors: a history of drug and alcohol problems, exposure to trauma in childhood, and poor mental health. Incarcerated men and women report drug use problems at sig-

nificantly higher rates than the general population. A review of estimates finds that 25 percent of U.S. prisoners report histories of drug dependence compared to estimates of around 3 percent for the general population (Fazel et al., 2006; Peugh, 2005; Merikangas and McClair, 2012). Drug dependence and substance use disorder are chronic conditions often marked by cycles of relapse and recovery (McLellan et al., 2000). We thus expect to observe high rates of illegal drug use among those with a history of drug and alcohol problems at baseline.

A history of drug and alcohol problems is closely related to exposure to trauma in childhood (Peters et al., 2015; Cuomo et al., 2008). People who have been incarcerated have often lived in chaotic and dangerous home environments as children (Messina et al., 2007; Western, 2015). Qualitative studies indicate extensive histories of family violence, witnessing violence, and family disruption in the lives of formerly-incarcerated men and women (Black, 2010; Sered and Norton-Hawk, 2014; Western, 2018). Childhood trauma has been linked to adult drug use as a means to address the adult psychological effects of trauma, or other maladaptive coping behaviors (Widom et al., 1999). We thus expect that childhood histories of trauma will be closely associated with drug use after prison release.

Poor mental health has also been widely associated with drug use in adolescence and adulthood. Childhood emotional distress, adult depression, and social alienation have frequently been reported for heavy drug users (Swendsen and Merikangas, 2000). The Urban Institute's *Returning Home* study found 1 in 10 men and 1 in 4 women reported a dual diagnosis of mental health and

substance abuse conditions (Mallik-Kane and Visher, 2008). Poor health and mental health diagnoses may be risk factors for drug use because of underlying common causes, prescribed medical treatment, or in the case of illegal drugs, self-medication (Crutchfield and Gove, 1984; Khantzian, 1985; Pickard, 2012).

After prison release, poor health is a likely proximate cause of legal and illegal drug use. A large research literature has documented the poor and declining health of people released from incarceration. High rates of infectious disease and stress-related illness have been reported in survey data in the years after incarceration (Massoglia, 2008). Other survey estimates indicate relatively few health impairments during incarceration, but health deteriorates after release (Schnittker and John, 2007). Poor health may be related to legal drug use where patients are prescribed medications for diagnosed conditions, or illegal drug use where they are self-medicating conditions such as chronic pain or ongoing mental illness.

Health status itself likely depends on a broader social context that also influences the likelihood of drug use. Through social connection, parental monitoring, and material or emotional support, families may be a protective factor against substance use and relapse during the reentry process. Family support has been linked to lower rates of recidivism and reduced drug use in the first months after incarceration (Western et al., 2015; Mowen and Visher, 2015b; Visher and Courtney, 2006). Besides the informal monitoring by family members, illegal drug use among those released from prison is often directly scrutinized by probation and parole officers who conduct regular drug tests as a con-

dition of community supervision. Residential drug treatment programs, called sober houses in Massachusetts, also conduct regular drug tests of residents, thereby reducing the use of illegal drugs (O'Connell et al., 2016).

Ordinarily, the drugs studied here—hard drugs, cannabis, and medications for pain and mental health disorders—would be treated as four independent outcomes. However, the outcomes may be correlated because of self-medication. With self-medication, illegal drugs are used in the absence of medical care to cope with chronic conditions, environmental stressors, and mental illness. If illegal drugs and medications were substitutes, we would expect a negative correlation. If illegal drugs and medications were used alternately we would expect a positive correlation. Self-medication with illegal drugs is of particular concern for disadvantaged and vulnerable groups (Khantzian, 1985). Several observational studies of homeless youth, for example, find substance use was reported as an adaptive response to mental illness, pain, and survival on the streets (Klee and Reid, 1998; Christiani et al., 2008; Holt and Treloar, 2008). In the analysis below we study the possibility of self-medication by estimating correlations among random effects across equations for legal and illegal drug use.

The hypothesis of self-medication has a variety of empirical implications—including correlations between legal and illegal drug use. However, self-medication may also depend on the policy environment governing access to health care. Nationwide, estimates indicate that only 20 percent of those released from prison have health insurance (Mallik-Kane and Visher, 2008). Massachusetts, however, expanded Medicaid eligibility for low income single men under Governor Mitt

Romney in 2005. Several years later, the Department of Correction (DOC) with the University of Massachusetts (UMass) began a program of enrollment in the state Medicaid plan, called MassHealth. As a result, 96 percent were covered by MassHealth at the one-week interview. Of those covered by MassHealth, 85 percent received help from the UMass-DOC program to enroll while incarcerated, and 98 percent thought MassHealth coverage would be helpful upon release. One year after release, health coverage remained consistently above 90 percent among BRS respondents. We might expect that high rates of insurance coverage would attenuate the correlation between legal and illegal drug use, but we leave this an empirical question for the data analysis below.

Data and Methods

The BRS is a panel survey, fielded from 2012 to 2014, that interviewed 122 men and women released from state prison in Massachusetts (Western et al., 2016). All prison releasees who provided a Boston-area address for reentry were eligible to participate, and could could volunteer for the study by responding to an information sheet provided by prison staff. The sample includes 26 percent of all Boston-area prison releases in the recruitment period, and is representative of the population of prison-releasees in demographic characteristics, criminal history, and recidivism. The longitudinal design began with a baseline interview a week before prison release, and four face-to-face follow-up interviews were conducted by a team of staff researchers and graduate students over the following year. After accounting for survey attrition and other missing data, sample size for the current analysis includes 111 respondents who contribute 402 follow-up

interviews to the data set.

The current analysis examines data on legal and illegal drug use. Illegal drug use was measured with a self-administered module that the respondent completed with pen and paper and returned to the interviewer in a sealed envelope. The sealed and self-administered drug module was intended to improve the respondent's sense of confidentiality of the responses. Data on legal drug use was obtained from a health module that asked respondents about their medical conditions, treatment, and medications. Medications were divided into treatments for pain, mostly used to manage chronic pain and arthritis, and mental health medications that were prescribed for depression, anxiety, and bipolar disorder.

The analysis examines four dependent variables: the use of (1) hard drugs (cocaine, crack, methamphetamine, heroin and ecstasy), (2) cannabis, (3) medications for mental health disorders, and (4) medications for pain. We group together hard drugs because they pose serious risks to health and safety in their purchase and use. We also analyze pain and mental health medications separately because each outcome may depend differently on physical and mental health. For each of the four dependent variables, respondents reported whether they had used drugs since the last survey interview. These data are more detailed than in earlier studies of drug use after incarceration because follow-up interviews are conducted at high frequency (four interviews in a year), and the data are more detailed (distinguishing hard drugs and cannabis, and different types of medications).

Predictors include pre-prison risk factors, post-prison measures of health and social environment, and control variables. Descriptive statistics are reported in Table 1. Pre-prison risk factors are measured by self-reported histories of drug and alcohol problems, childhood trauma, and mental illness reported at baseline. Around half the sample reported drug and alcohol problems and mental illness. Childhood trauma is measured by summing six binary indicators of traumatic experiences, and then standardizing the scale to have a mean of 0 and standard deviation of 1.0. Indicators comprising the scale show the extensive prevalence of trauma. For example, 56 percent of respondents grew up with someone with drug or alcohol problems, nearly half were victims of parental violence, and 42 percent witnessed a violent death in childhood. Post-prison health and social environment are measured by self-rated health scales after prison release, probation or parole status, residence in a sober house, and a measure of family support. Control variables include indicators for age, race, and sex, participation in prison drug programs, the length of stay in prison, and pre-incarceration medical care and drug treatment. The control variables aim to account for the experiences of respondents during and prior to incarceration.

We model the associations between drug use and covariates with logistic regressions that also include random effects for each respondent. Random effects adjust standard errors for clustering due to the panel structure of the data. For respondent i in interview wave t, we write the four binary outcomes as H_{it} for hard drug use, C_{it} for cannabis use, P_{it} for pain medications, and M_{it} for mental health medications. Collecting time-invariant covariates that measure

Table 1. Description and means of independent variables used in regression analysis of drug use after incarceration. ($N = 111$ respondents.)

Variable Name	Description	Mean (95% CI)
Pre-Prison Risk Factors		
Drug and alcohol history	Dummy variable measured at baseline for history of drug or alcohol problems.	.52 (.45, .63)
Childhood trauma	Standardized scale (mean=0, s.d.=1) measuring childhood history of domestic violence, family drug use, respondent hit by parent, living with family member who is depressed/suicidal, sexually abused, or witnessed death.	.00 (-.19, .19)
Mental illness	Dummy variable for history of mental illness reported at baseline.	.44 (.35, .54)
Post-Prison Health and Social Environment		
Self-rated health	Time-varying 4-point scale recording whether health is poor, fair, good, or excellent.	2.02 (1.95, 2.09)
Probation/parole	Dummy variable recording probation or parole supervision.	.62 (.52, 70)
Sober house	Time-varying dummy variable for residence in sober house or other transitional housing program.	.26 (.22, .31)
Family support	Time-varying dummy variable for staying with or receiving money from a family member.	.60 (.55, .65)
Control Variables		
Saw doctor pre-prison	Dummy variable indicating saw doctor at least monthly before incarceration.	.59 (.50, .68)
Drug treatment pre-prison	Dummy variable indicating attended drug treatment before incarceration.	.24 (.16, 31)
Prison drug program	Dummy variable for participation in prison drug program.	.16 (.10, 24)
Time served	Length of stay in months for most recent incarceration.	33.44 (27.20, 37.64)
Age	Age of respondent in years at the baseline survey.	36.48 (34.61, 38.34)
Female	Dummy variable for female respondents.	.14 (.07, .19)
White	Dummy variable for non-Hispanic white respondents.	.30 (.22, 39)

pre-prison risk factors in the vector $\boldsymbol{x}_{1i}$ and time-varying covariates that measure well-being and the reentry environment, $\boldsymbol{x}_{2it}$, logistic regressions for the probability of drug type $d = H, C, P$, and M, are written:

$$\text{logit}(p_{dit}) = \boldsymbol{x}'_{1i}\boldsymbol{\beta}_{d1} + \boldsymbol{x}'_{2it}\boldsymbol{\beta}_{d2} + \theta_{dt} + \alpha_{di},$$

where θ_{dt} are time fixed effects for each interview wave, and α_{di} are random effects for each respondent. The random effects are assumed to follow a normal distribution with covariance matrix,

$$\boldsymbol{\Sigma} = \begin{bmatrix} \sigma_H^2 & & \\ \vdots & \ddots & \\ \sigma_{HM} & \cdots & \sigma_M^2 \end{bmatrix}$$

Positive correlations among the random effects for legal and illegal drugs provide evidence of self-medication. The correlations can be calculated from the elements of the covariance matrix, $r_{xy} = \sigma_{xy}/(\sigma_x\sigma_y)$. If illegal drugs are being used to manage mental illness or chronic health conditions, which might also be intermittently treated with mental health or pain medications, we would expect hard drug and cannabis usage to be correlated with medication use.

For each of the dependent variables we fit two models. The first includes just the predictors of key interest, time fixed effects, and demographic characteristics including controls for age, race, and sex of the respondent. The second model adds controls for experiences with treatment and medical care prior to and during incarceration.

Results

The regression results, reported in Table 2, indicate that the use of heroin, cocaine, and other hard drugs are closely related to the risks associated with histories of drug problems and childhood trauma. The odds of hard drug use were over six times higher (exp[1.883] = 6.6) for respondents with a history of drug and alcohol problems compared to those with no such history. A standard deviation increase on the childhood trauma scale is associated with a doubling of the odds of hard drug use after incarceration (exp[.832] = 2.3). While risk factors are positively related to high levels of hard drug use, family support may be protective. The odds of hard drug use for respondents who received housing or financial help from family were less than 20 percent of the odds for those with no family support. Although probation and parole and sober house treatment programs tested regularly for drug use, these conditions of reentry were unrelated to the use of hard drugs.

Results for cannabis show a different pattern. While a history of drug and alcohol problems is unrelated to cannabis use, respondents who have suffered childhood trauma frequently report using cannabis. A standard deviation increase in the childhood trauma scale is associated with more than a fourfold increase in the odds of cannabis use (exp[1.542] = 4.7). Unlike the result for hard drugs, family support is not significantly associated with cannabis. Results for post-prison factors also differ for cannabis use. Respondents under parole and probation supervision use cannabis at relatively low rates. If regular drug testing is the mechanism by which parole and probation are influencing drug

Table 2. Logistic regression results (log odds) for analysis of illegal drug and medication use in the first year after prison release. (Absolute z statistics in parentheses.)

	Hard Drugs		Cannabis		Pain Medication		Mental Health Medication	
Pre-Prison Risk Factors								
Drug and alcohol history	2.560**	1.883*	-.308	-.860	.729	1.288	2.058**	1.664*
	(2.65)	(2.01)	(.30)	(.78)	(.80)	(1.37)	(2.74)	(2.06)
Childhood trauma	.710	.832*	1.392**	1.542**	-.517	-.653	-.169	-.245
	(1.85)	(2.02)	(2.69)	(2.85)	(1.30)	(1.62)	(.58)	(.80)
Mental illness	-.903	-1.112	-1.064	-1.188	.858	.736	3.112**	3.042**
	(1.16)	(1.38)	(1.04)	(1.18)	(1.06)	(.98)	(4.54)	(4.48)
Post-Prison Health and Social Environment								
Self-rated health	-.541	-.388	.473	.607	-.977*	-1.074**	-.483	-.486
	(1.53)	(1.09)	(1.22)	(1.56)	(2.49)	(2.78)	(1.57)	(1.56)
Family support	-1.749*	-1.768*	1.029	1.329	1.799*	1.611	.763	.692
	(2.50)	(2.41)	(1.48)	(1.87)	(2.10)	(1.93)	(1.58)	(1.42)
Probation/parole	-.491	-.649	-3.349**	-3.425**	.184	.152	-.236	-.302
	(.71)	(.98)	(3.17)	(3.26)	(.24)	(.21)	(.43)	(.54)
Sober house/shelter	-.171	.163	-1.374	-1.103	.670	.434	.903	.898
	(.27)	(.25)	(1.45)	(1.18)	(.93)	(.61)	(1.71)	(1.66)
Constant	-4.031*	-3.703*	-2.927	-1.967	-5.579**	-6.054**	-5.649**	-5.531**
	(2.43)	(2.30)	(1.68)	(1.02)	(2.70)	(2.76)	(4.14)	(3.90)
Controls:	No	Yes	No	Yes	No	Yes	No	Yes

$^{*}p < .05$ $^{**}p < .01$

Note: All models control for age, sex, race, and fixed effects for interview waves. Control variables include participation in a prison drug program, pre-incarceration drug treatment, pre-incarceration medical care, and duration of incarceration. Correlated random effects are fit for each respondent. Respondents $N = 111$; respondent-waves $N = 402$.

Table 3. Correlation matrix of random effects from logistic models of hard drug use, cannabis use, and medication use for models with and without control variables.

	Hard Drugs	Cannabis	Pain Medication
No Controls			
Cannabis	.668		
Pain Medication	−.508	.045	
Mental Health Medication	.261	.363	.180
Including Controls			
Cannabis	.659		
Pain Medication	−.461	.275	
Mental Health Medication	.219	.385	.230

use, we only find evidence for an effect on cannabis and not hard drugs.

Finally, the results for the use of medications are strikingly different from the results for illegal drugs. The use of pain medications after release from prison is closely related to markers of poor physical health. Every additional point on the four-point self-rated health scale is associated with a reduction in the odds of medication use by one-third. Beyond health indicators, family support was positively associated with the use of pain medications, in contrast to the results for hard drug use. A history of drug and alcohol problems and childhood trauma were unassociated with the use of pain medications.

The odds of medications use for mental health disorders among respondents reporting a history of mental illness are more than 20 times higher than for those with no mental illness ($\exp[3.042] = 20.9$). Drug and alcohol history is also associated with the use of mental health medications, and in this case, may be reflecting the poor mental health of heavy drug users. Unsurprisingly, parole and probation supervision and sober house living were unassociated with either pain or mental health medication use.

The logistic regression models for hard drugs, cannabis, and pain and mental health medications include random components that are correlated across equations. If respondents were alternating or substituting between legal and illegal drugs, the random effects for medications would be strongly correlated with, say, the random effects for hard drugs. Instead, Table 3 shows that, across models, cannabis and hard drug use are highly correlated, but medication use is not strongly correlated with illegal drug use, except for a moderate ($r \approx -.5$), negative relationship between hard drug use and pain medications. This offers some evidence of the substitution of medications with hard drugs. Still, the correlation is small compared to that for hard drugs and cannabis, and other correlations between illegal drugs and medications have the opposite sign.

The weak correlation between legal and illegal drug use provides evidence against self-medication where illegal drugs are used alternately with legal. Consistent with the expectation that MassHealth coverage attenuates the correlation between legal and illegal drug use, the results suggest that respondents in poor health were able to get the medications they needed and did not substitute with illegal drugs.

Discussion

Using fine-grained longitudinal data with a high rate of study retention, we found evidence of a high and increasing rate of drug use through the first year after prison release. One in five reentry study respondents used cocaine, heroin, or other hard drugs in the year after incarceration release. About half the sample used cannabis and a similar proportion used medications for health

conditions.

The findings point to three main conclusions. First, illegal drug use is related to childhood trauma. While the links between drug use and childhood trauma have been reported in other research, the consequences of trauma for formerly-incarcerated people are less often studied. Reentry policy is often focused on behavioral change or meeting the immediate needs of housing and employment after incarceration. The reentry study respondents report high rates of childhood trauma, and this is closely associated with post-prison health outcomes. Trauma emerges in this analysis as an important target for policy intervention.

Second, the results suggest that regular drug testing that forms part of the conditions of parole and probation supervision may deter only cannabis use, but not hard drug use. Respondents on community supervision used cannabis at low rates, but hard drug use was unrelated to supervision status. We interpret the lower incidence of cannabis use for parolees and probationers to stem largely from the longer detection window of cannabis in urine testing than for other drugs (Goodwin et al., 2008). Although researchers have evaluated how the conditions of parole such as unscheduled drug testing affect recidivism (Petersilia and Turner, 1993), fewer studies have examined the effects of community supervision (versus no supervision) on drug use. The current results suggest that drug testing during probation and parole may only affect less serious illicit drug use and does little to curb the use of cocaine and heroin.

Third, the weak correlation between illegal and legal drug use, and between health indicators and illegal drugs, tend to disconfirm the claim that illegal drug

use is often a type of self-medication for health problems. This contrasts with other research where illegal drug use has been found to substitute for therapeutic remedies and legal drugs, particularly in low-income or reentry populations (Khantzian, 1985; Klee and Reid, 1998; Christiani et al., 2008; Holt and Treloar, 2008). We interpret this result in the health policy environment of our Massachusetts field site, where health insurance is extended to low-income residents through an expanded Medicaid program. Health insurance coverage immediately after prison is very high in our sample (96% at the first week after prison release). In this policy context, the benefits of health care coverage may be twofold: improving access to medications, and severing the link between legal and illegal drug use (see also Rich et al., 2014).

While drug use is closely associated with pre-prison risk factors and post-prison health and social environments, we emphasize the analysis is only descriptive. Associations of drug use with family support, housing, and health, in particular are likely subject to endogeneity bias. Causal inference must go beyond the observational data presented here to isolate variation in predictors that does not depend on drug use. Drug use too is measured by self-reports, and respondents influenced by social desirability bias may under-report drug use in interviews.

Drug use is an important marker of social integration. Illegal drug use may indicate ongoing criminal involvement and presents the possibility of relapse to substance use disorder. Legal drug use indicates access to medical services and compliance with treatment. The evidence presented here suggests that histories

of drug problems and trauma are hurdles for successful social integration after prison. For people leaving prison, who are often poor and in poor health, expanding access to health care may reduce self-medication with illegal drugs and effectively promote social integration.

Appendix

A.1. Logistic regression coefficients for covariates in models illegal drug and medication use in the first year after prison release. (Absolute z statistics in parentheses.)

	Hard Drugs		Cannabis		Pain Medications		Mental Health Medications	
Age 30-44	-.542	-.986	-2.170*	-2.199*	1.129	1.434	-.665	-.613
	(.61)	(1.11)	(1.99)	(2.02)	(1.02)	(1.32)	(.91)	(.84)
Age over 45	-.677	-.486	-4.188**	-3.573*	3.295*	3.022*	-1.006	-.859
	(.68)	(.50)	(2.64)	(2.34)	(2.45)	(2.37)	(1.18)	(.99)
Female	-.822	-.680	.529	.173	-.025	-.323	-.176	-.460
	(.74)	(.61)	(.41)	(.13)	(.02)	(.28)	(.23)	(.57)
White	1.597*	1.613*	1.467	1.595	-.009	-.236	1.974**	1.905**
	(2.22)	(2.34)	(1.44)	(1.57)	(.01)	(.30)	(3.30)	(3.23)
2-month interview	1.813*	1.866*	2.243**	2.276**	.015	.038	.642	.650
	(2.36)	(2.41)	(2.87)	(2.92)	(.03)	(.06)	(1.24)	(1.26)
6-month interview	1.543*	1.652	3.261**	3.343**	.253	.197	1.058	1.043
	(2.00)	(2.13)	(3.88)	(3.96)	(.42)	(.33)	(1.96)	(1.92)
12-month interview	1.721*	1.815*	3.403**	3.528**	-.703	-.752	1.876**	1.872**
	(2.22)	(2.33)	(3.91)	(4.01)	(1.03)	(1.12)	(3.39)	(3.37)
Saw doctor pre-incarceration		1.120		.160		.097		.353
		(1.55)		(.18)		(.13)		(.63)
Drug treatment pre-incarceration		.727		.648		-.661		.689
		(1.02)		(.58)		(.69)		(1.07)
Prison drug program		-1.433		-1.553		1.863*		.427
		(1.44)		(1.26)		(2.06)		(.61)
Length of stay (months)		-.022		-.040 *		.017		-.007
		(1.62)		(2.18)		(1.61)		(.76)

$^{*}p < .05$ $^{**}p < .01$

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