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Assessing the within-person impact of social/behavioral programs, increased supervision, and jail time on polysubstance use during reentry

Thomas J. Mowen^a, John H. Boman IV^a, John J. Brent^b

^aDepartment of Sociology, Bowling Green State University, Bowling Green, OH, USA;

^bSchool of Justice Studies, College of Justice and Safety, Richmond, KY, USA

Abstract

The process of leaving prison, known as reentry, presents a host of challenges to returning individuals. Research documents that substance use is a pressing issue and widespread among the correctional population. A variety of strategies and programs have been used to promote the desistance from substance use; notably, the use of social/behavioral programs, increased supervision, and jail time. Yet, existing research investigating the respective effects of these strategies in relation to one another is relatively underdeveloped. This issue becomes more salient when considering the extent to which supervision models can impact the outcomes and future prospects associated with reentry. Therefore, this study uses four waves of data from the Serious and Violent Offender Reentry Initiative (SVORI) to examine the impact of social/behavioral programming, increased supervision, and jail sanctions on polysubstance use during reentry. Further, we use a series of interaction terms to explore any conditioning effects between approaches on substance use across time. Results from longitudinal crossed-lagged dynamic panel models reveal that social/behavioral programs contribute to within-person decreases in polysubstance use across time while enhanced monitoring and jail-time contribute to within-person increases in polysubstance use. Interactions indicate these programs exert independent, and not interactive, effects on polysubstance use post-release.

Keywords

Reentry; offender programming; substance use

Introduction

The United States incarcerates more individuals than any other country in the world (Carson & Anderson, 2016). This reality becomes more pressing when considering that 95% of those incarcerated will eventually be released (Travis, 2005). In 2015, alone, approximately 640,000 individuals who were released from prison left on supervised parole (Carson & Anderson, 2016). The process of leaving a term of incarceration, referred to as reentry, is often accompanied by a variety of challenges as individuals work to become reunited with

family members and friends, secure housing, and find employment (Bahr, Masters, & Taylor, 2012; Grogger, 1995; Mowen & Visser, 2015; Visser & Travis, 2003; Western, Braga, Davis, & Sirois, 2015). Partially attributable to these difficulties and other challenges associated with reentry (e.g., see Western et al., 2015), a significant portion of individuals who begin the reentry process will face re-incarceration (Kirk, 2016; Spohn & Holleran, 2002). Focal to the current effort is one of the leading causes of reentry failure – substance use after release from prison (Prendergast, 2009; Phillips, 2010; Severson, Veeh, Bruns, & Lee, 2012).

In addition to a large portion of the correctional population having a history of substance use disorders and dependence, a sizable number of individuals incarcerated in the United States – and consequently those on parole – were convicted of a drug offense (Kelly & Stemen, 2005). Estimates suggest that more than half of all individuals under the Federal supervision were incarcerated for a drug offense (West & Sabol, 2008). Similarly, one-third of individuals on parole served time for drug-related offenses (Kaeble & Bonczar, 2017). Moreover, the majority of those incarcerated report having some level of drug dependence or substance use disorder (see Karberg & James, 2005; National Center on Addiction and Substance Abuse, 2010). Taken together, a considerable number of individuals are currently serving, or have served, time incarcerated due to possession and use of a controlled substance.

Because substance use represents a key factor driving high recidivism rates during reentry (see Mallik-Kane & Visser, 2008; Martin, Butzin, Saum, & Inciardi, 1999; Prendergast, 2009), a number of researchers and policy-makers have sought to explore the factors that may promote successful reentry and reintegration via reducing substance use (see Seiter & Kadela, 2003). With roots in both general and specific deterrence, many of these approaches incorporate elements of both prevention and intervention. Building on this generalization, extant scholarship suggests that social and behavioral programs, increased supervision during parole, and sanctions involving jail time are approaches that might reduce the prevalence of substance use among returning persons (Downey, Roman, & Liberman, 2012; Lattimore, Krebs, Koetse, Lindquist, & Cowell, 2005; LaVigne et al., 2014; Petersilia, 1998; Taxman, 2001). Unfortunately, findings on the efficacy of these strategies – detailed in greater length in subsequent sections – are mixed, leaving researchers with an inconsistent portrait of findings that hinders the ability for scholars to cohesively form recommendations for criminal justice policy.

Despite the inconsistent findings, extant research does suggest that social/behavioral programs, enhanced supervision, and jail time may hold promise in promoting successful reentry and curbing substance use alike (see Bahr et al., 2012; Drake, Aos, & Miller, 2009; Lowenkamp, Flores, Holsinger, Makarios, & Latessa, 2010). Considering that research rarely examines all three approaches in a longitudinal framework, this issue becomes even more important when considering that these three strategies do not exist independently of one another. Instead, many people experience combinations of social and behavioral programs, increases in supervision, and jail sanctions during the reentry process (see Lowenkamp & Latessa, 2005). Accordingly, this alludes to the possibility that these three

approaches may be important for post-release substance use because they exert interdependent – or interactive – effects on substance use after release from prison.

Examining the various effects that social and behavioral programs, increased supervision, and jail sanctions play on post-release substance use would help research better inform policy recommendations and applications. In an attempt to accomplish, this study uses four waves of data from the Serious and Violent Offender Reentry Initiative (SVORI) to examine the impact of social and behavioral programs, increased supervision, and jail sanctions on substance use during the reentry timeframe among a sample of male offenders. Prior to discussing the methodological specifics of the study; however, we review research documenting the importance of substance use during reentry and discuss findings that are relevant to the three parole-based strategies central to this study.

The importance of substance use for persons undergoing the reentry process

Recent estimates demonstrate that drug offenders comprise a significant proportion of those under state and federal supervision (Stemen & Kelly, 2005; West & Sabol, 2008). More specifically, the proportion of released prisoners convicted of drug-related offenses is much higher than those convicted of violent and property crimes (Lynch & Sabol, 2001), and substance abuse among incarcerated individuals—and consequently those returning home—is widespread (Karberg & James, 2005). In examining the prevalence of substance abuse issues among local/state incarcerated populations, Karberg and James (2005) found that over two-thirds of all incarcerated individuals had some level of substance use-related issues. Specifically, about 40% of all individuals reported a dependence on alcohol or drugs, and an additional 25% reported having abused alcohol or drugs prior to incarceration (Karberg & James, 2005). At the national level, the National Center on Addiction and Substance Abuse (2010) estimates that about 85% of people in the U.S. prison population show a prior history of substance use disorders, have committed crime to obtain money for substances, were incarcerated for a drug violation, or were under the influence of substances when initially arrested. These figures demonstrate that substance use-related issues are ubiquitous among the incarcerated population and, therefore, the population of individuals facing and/or undergoing reentry.

Although substance use remains a pressing issue, research often finds reentering individuals do not get the help or treatment they need for a successful reintegration. According to Belenko and Peugh (1998), 75% of incarcerated individuals report a need for substance abuse treatment. However, only 17% of returning persons are given access to and participate in substance abuse treatment programming. A more recent study finds that only 11% of all incarcerated individuals with some form of substance use-related need received any drug treatment during incarceration (The National Center on Addiction and Substance, 2010). Summarizing this issue, Binswanger and colleagues (2012, p. 2) state that

Despite the magnitude of the problem of substance use disorders among criminal justice populations, prisoners have limited access to evidence-based substance abuse treatment during incarceration, during the transition to the community, or

while under community supervision...Therefore, inmates are often released without the tools to avoid returning to drugs after release from prison...

Still further, the lack of effective treatment and/or programming during and after incarceration is associated with higher levels of persistence in substance use and abuse (Prendergast, 2009). The lack of treatment options following release worsens the obstruction that substance use places on returning persons by further complicating and limiting opportunities in regards to finding and/or keeping employment, securing housing, and renewing family relationships—all factors that promote successful reentry (see Mallik-Kane & Visser, 2008).

In short, substance use is a strong contributor to parole revocation, arrest, and/or re-incarceration (Huebner & Cobbina, 2007; Olson & Lurigio, 2000; Phillips, 2010). Succinctly illustrating this issue, Mallik-Kane and Visser (2008) concluded that “Substance abusers were more likely to have engaged in criminal behavior and more likely to have been reincarcerated” (p. 2). With the understanding that persons with substance use-related needs could be greatly aided by appropriate responses during the reentry process (for a review, see Prendergast, 2009), agencies have begun to explore specific programs, interventions, and punishments aimed at reducing substance use and misuse during reentry (Downey et al., 2012; Lattimore et al., 2005; LaVigne et al., 2014; Taxman, 2001). We now turn attention to three of the more common approaches at tackling this issue – social/behavioral programs, enhanced supervision, and jail sanctions.

Substance use prevention and intervention strategies during reentry

Approaches using social/behavioral programs

One particular approach to improving reentry outcomes concerns the use of social and behavioral programming. Although wide in variety (see Johnson & Cullen, 2015), social/behavioral programming tends to encompass specific types of training, classes, and/or therapy aimed at improving an individual’s social connections, behavioral/attitudinal orientations, interpersonal skills, work capabilities, and education. The effectiveness of such programming efforts have been met with mixed support due, in part, because the vast majority of programs have not received considerable evaluation (Mears & Cochran, 2015). Additionally, research has established that there is a significant amount of heterogeneity in what is considered “social/behavioral” programs across jurisdictions and institutions (Johnson & Cullen, 2015). Although these are important issues and limitations to consider, existing research on the efficacy of social/behavioral programming on recidivism has shown that some programs can promote positive reentry. For example, Robinson (1996) found that cognitive behavioral therapy decreased re-incarceration rates among a sample of 2,125 individual assigned to cognitive skills training. Other studies have also shown that the programs aimed at changing attitudes about offending are effective in reducing substance use and abuse among returning men and women (Landenberger & Lipsey, 2005; see also Prendergast, 2009).

In addition to cognitive therapy, other types of social/behavioral programs such as life skills training and programs aimed at strengthening interpersonal skills and relationships

demonstrate promise for promoting positive reentry (Botvin & Griffin, 2004; Cecil, Drapkin, MacKenzie, & Hickman, 2000; Miller & Hobler, 1996). For example, in a meta-analysis conducted on the efficacy of a variety of cognitive and behavioral programs, Pearson and colleagues (2002) found support that behavioral programs produce positive outcomes. Similarly, life-skills programming has been found to promote and encourage successful reentry (Landenberger & Lipsey, 2005). Although it may be difficult to separate life skills training, relationship building, and cognitive behavioral therapy (Clark & Duwe, 2015, p. 386), each represents a component of social/behavioral programming grounded in empirical support. In fact, this supports Andrews and Bonta's (1998, p. 270) suggestion that "behavioral" treatment is more appropriately referred to as "behavioral/social learning/cognitive behavioral" as it encompasses a wide variety of programs outside of "cognitive restructuring."

Despite these findings, another body of evidence questions the effectiveness of social/behavioral programs. For example, Lattimore et al. (2012) found that participation in a variety of social/behavioral programs on both criminal and non-criminal outcomes, was "inconsistent" and that individuals who had participated in reentry programming actually have a higher rate of re-incarceration than those who did not. This finding is echoed in other work demonstrating that some social/behavioral programs produce inconsistent results (see Longshore, Turner, & Fain, 2005). Highlighting this in a review of existing research on various types of reentry programming and recidivism, Johnson and Cullen (2015) conclude, "Perhaps the best that can be said is that a well-intentioned reentry program that seems promising on the surface generally is better than doing nothing, but its impact is likely to be mixed and modest." (p. 543).

Approaches using increased supervision

The use of increased supervision broadly falls under the organizing principles of "intensive supervision programs" (ISPs, see Lowenkamp et al., 2010) which became popular in the 1980s as a result of an exponentially growing correctional population. ISPs have roots within deterrence (Beccaria (1986[1764]) which suggests that high levels of monitoring should encourage compliance through increasing the certainty that an individual will get caught if he/she offends (Lowenkamp et al., 2010; see also Nagin, 2013). ISPs, a form of "intermediate sanctions" comprise a wide variety of supervision strategies including house arrest, electronic monitoring, intensive supervision, increased reporting, and curfews among other mechanisms (see Lowenkamp et al., 2010, p. 368–369). The general organizing principal is that increased forms of supervision – regardless of the specific mechanism–will encourage compliance due to certainty of detection and punishment.

Findings on the efficacy of increased supervision to reduce substance use and recidivism are mixed. For example, Turner, Petersilia, and Deschenes (1992) find that the individuals placed on ISP's are far more likely than individuals on traditional supervision to return to prison. In examining a large number of probationers/parolee's in five different jurisdictions, Turner and colleagues (1992) suggest that the higher rate of re-incarceration among those on intensive supervision is due to technical violations and parole revocation. In a meta-analysis on ISPs, Gendreau, Goggin, Cullen, and Andrews (2000) conclude that ISPs have no effect

on recidivism and may actually increase reoffending (see also Petersilia, 1998). Implicit within these findings is that individuals on increased supervision are more likely to be caught for violations than those with lower levels of supervision. In other words, the significant relationship between enhanced supervision and reentry failure is due to detection, and likely not a result of differences in offending patterns.

On the other hand, other research has found that enhanced supervision can contribute to reentry success. Paparozzi and Gendreau (2005) examined recidivism among 240 parolees on intensive supervision compared to 240 parolees on traditional supervision. Results demonstrated that individuals on intensive supervision reported significantly lower levels of recidivism than those not on intensive supervision. In explaining these findings, Paparozzi and Gendreau (2005) suggest that the ISP's were more oriented towards providing better and more consistent treatment and services than traditional models of supervision. The authors do note; however, that individuals on intensive supervision were more likely to experience a technical violation. Although limited to a sample of youth, Drake et al. (2009) similarly find that intensive supervision tends to be effective only when coupled with proper treatment programs.

Approaches using jail time

While jail is most often conceptualized as a specific deterrent that is administered to a person in regards to unwanted behavior during parole, it is also a general deterrent as all parolees would seemingly know that it is a potential means of sanctioning. Most commonly applied in increments of a few days to a month, jail sanctions can be routinely administered in response to parole violations that do not necessitate total revocation (e.g., APPA, 2013). While research has established that jails are used more frequently as the number of people on parole increases (see Caudill et al., 2014), the vast majority of research on the effectiveness of jail sanctions among parolees use samples that combine those on probation as well as those on parole. The most likely reason for this is because most jurisdictions have implemented correctional supervision structures in which probationers and parolees are supervised by officers who may carry both groups of people on their caseloads (see Abadinsky, 2017). As such, findings relevant to one group of people necessarily applies to the other.

On the whole, research fails to conclude that jail sanctions improve outcomes generally or substance use patterns specifically. Using a sample of probationers and parolees, Wodahl and colleagues (2015) concluded that experiencing a jail sanction in response to a violation did not improve or harm a person's recidivism-based outcomes. Although they discussed that jail sanctions are sometimes necessary, the authors recommended against the widespread use of jail as a means of compliance due to its deleterious effects and high costs (see May, Applegate, Ruddell, & Wood, 2014; Piquero, 2010).

Due to the inconsistent findings regarding jail sanctions, researchers regularly turn to the negative consequences of jail sentences as a means of recommending against their use. Probationers and parolees think of jail as a particularly punitive type of sanction that goes far beyond a more 'standard,' community-based sanction (May et al., 2014; see community-based alternatives emphasized by (Steiner and colleagues [2012])). Imposing a jail sanction

for parolees also carries a particularly negative effect because it could jeopardize their employment (Grogger, 1995) which, in turn, can increase the chance of revocation due to not having a job (see Bushway, Stoll, & Weiman, 2007; Western, Kling, & Weiman, 2001). As mentioned above, the monetary costs associated with jail time are also routinely discussed as a negative associated with jail time (e.g., Piquero, 2010). As such, while deterrence theory would posit that jail sanctions should reduce substance use, research largely finds that jail sanctions appear to have no effect on behavior for parolees (e.g., Pratt, Cullen, Blevins, Daigle, & Madensen, 2008).

Current study

Given the mixed finding on the efficacy of social and behavioral programs, increased supervision, and punitive approaches such as jail time, the current study seeks to examine the independent and interdependent relationships among each on substance use during reentry. Specifically, we explore four research questions. First, do social/behavioral programs, increases in supervision, and jail time relate to substance use? While a deterrence framework would expect that all three approaches would relate to decreased substance use over the reentry time period, the extent research largely fails to support the tenets of general and specific deterrence (e.g., Pratt, Cullen, Blevins, Daigle, & Madensen, 2006). Despite this, the extremely inconsistent findings leads us to approach the issues at hand through a theoretical lens and hypothesize that (H1) *social and behavioral programs, increased supervision, and jail sanctions will lead to less substance use over the reentry time period.*

Second, do social/behavioral programs, increases in supervision, and jail time work in conjunction with one another to influence post-release substance use? Because deterrence theory has little to say on which of the three strategies should interact to produce the best outcomes, we expect that (H2) *social/behavioral programs will further enhance the efficacy of increased supervision* and (H3) *jail time on substance use post-release*. Finally, drawing upon principles of deterrence, we expect that (H4) *the combination of increased supervision and jail time will relate to lower levels of substance use over time after release from prison.*

Methods

Data—Data for this project come from the SVORI multisite evaluation study (Lattimore & Steffey, 2010). The overall goal of the SVORI project was to examine the impact of a variety of enhanced reentry programs on the reentry process. Outcomes such as post-release employment, mental health, substance use and offending, re-arrest, and incarceration were all evaluated. Enhanced reentry programming encompassed a variety of different programs such mental health care, job and skills training, education, and other social/behavioral programs for returning individuals. The SVORI data were collected between 2005 and 2007, and encompass a total of 1,697 men across 14 different states.

SVORI data were collected in four waves. The first wave was collected about 30 days prior to the scheduled release of the respondent. During this wave, individuals were asked a variety of questions concerning their experience prior to and during their current term of incarceration. Respondents were asked about their family and peer relationships, experiences with substances, employment history, education level, and various programs they may have

participated in during incarceration. Basic demographic questions such as age, marital status, and race and ethnicity were also collected at wave one. Wave two data were collected about 30 days post-release. Like the prior wave, respondents were asked about family and peer dynamics, substance use, participating in reentry programming, parole conditions, and a number of other dimensions of reentry and factors that could impact successful transition back into the community. Wave three and four data, which capture the same measures, were collected at about 9 months and 15 months post-release, respectively. The overall response rate by wave four was 68.5% (see Lattimore & Steffey, 2010).

The longitudinal nature of the SVORI data make this an ideal dataset in which to examine reentry outcomes as the first wave of data was collected while the respondent was still incarcerated while the second, third, and fourth waves were collected post-release. As a result, we use data from all four waves, but focus primarily on the post-release waves as the substance use outcome measure – described in detail below – could only occur after incarceration.

Dependent variable—The dependent variable in this analysis is a variety index of *polysubstance use*. At each wave, respondents were asked whether or not they used any of the following substances, since the previous wave, including: marijuana, hallucinogens, cocaine, heroin, inhalants, sedatives, methadone, amphetamines, alcohol, narcotics, or stimulants.¹ As some of these drugs can be prescribed by a physician, respondents were asked if they had used these substances in a manner not as prescribed by a physician to capture illicit use. Respondents could answer “yes” or “no” for each substance, and “yes” responses were coded as “1” while “no” responses were coded as “0.” Responses were summed together such that higher values indicate more substances used. As these substances represent a wide variety of substances which have very different user effects that carry various levels of risk and dependence potential, we apply the severity weights developed by Pandina, White, and Yorke (1981). The weights range from .358 (alcohol use) to .976 (heroin) and ensure that more minor substances like alcohol and marijuana are weighted much lower than more severe substances like heroin or methadone.² This weighted variety index has an overall mean of 1.411, a standard deviation of 1.857, and ranges from 0 to 9.335. To account for skewness in this measure, we use the natural logarithm of this measure (see Table 1). This logged measure has a mean of .532, an overall standard deviation of .631, and ranges from 0 to 2.300. There is more variation within-individuals across time (standard deviation = .508) than between individuals (standard deviation = .388).

Time variant independent measures—The primary time variant predictor measures in this study encompass social/behavioral programs, enhanced monitoring, and increased jail time. To capture *social/behavioral programs*, we draw data from questions asking the respondent whether they participated in a variety of programs including life skill classes, personal relationship classes, and/or programs designed to cognitively transform persons’

¹As alcohol is not illegal, we estimated models with alcohol and without alcohol included in the substance use variety index. Results of these models were substantively identical and, because individuals on parole are often required not to use alcohol, we included this measure in the variety index.

²Substantive results were identical using either the weighted or unweighted variety index. However, the weighted variety index fit the statistical models more precisely. Thus, the weighted index is used in the analysis.

attitudes towards criminal behavior. Overall, about 6.5% participated in life skills, 6.6% in personal relationship classes, and 12.4 in cognitive attitude training. To capture social/behavioral programs, we created a binary measure that coded persons who reported participating in any of these three programs as “1.” They are contrasted to those who did not participate in any program. This measure has a mean of .117 and an overall standard deviation of .382. As individuals could report participating in social/behavioral programs in one wave and not another, we allow this measure to vary across time. Thus, the within-individual standard deviation is .251 and the between-individual standard deviation is slightly larger at .303.

To measure *increased supervision*, we draw data from three measures asking the respondent if he had been subjected to increased drug testing from their supervising officer (6.3% of the sample responded yes), house arrest (6.9%), or some form of electronic monitoring (6.7%) during the reentry process. Like the measure of social/behavioral programs, we code respondents who answered “yes” to any of the three questions with a value of “1” and contrast them to those who responded “no” (a value of “0”). Enhanced monitoring has an overall mean of .132 (standard deviation = .338). As this measure varies across time, the within-individual standard deviation is .224 and the between-individual standard deviation is .273.

Finally, to measure *jail time*, we draw data from a question asking the respondent if their supervising officer had required them to serve any additional jail time since the previous interview wave. Respondents who reported serving jail time were coded as “1” and are contrasted to those who experienced no jail time (coded “0”). This measure has an overall mean of .158 and a standard deviation of .365. The within-individual standard deviation is .243, indicating that individuals often reported having served jail time at one wave and not another (between-individual standard deviation is .289).

Time variant control measures—In addition to the time variant variables above, we also control for a number of time variant control measures. Prior research has highlighted the important role which families play in the reentry process (Shapiro & Schwartz, 2001; Visser & Travis, 2003). Individuals often live with their families following release from prison, and family support is often highlighted as key for positive reentry outcomes (Visser & Travis, 2003). To account for *family support*, we draw from three measures asking the respondent if they 1) feel close to their family, 2) want their family involved in their life, and 3) consider themselves a source of support for their family. Respondents could answer along a four point scale (3 = strongly agree, 2 = agree, 1 = disagree, 0 = strongly disagree), and responses were summed to create a scale with higher values indicating more family support. Family support has a mean of 7.097, an overall standard deviation of 1.660, and ranges from 0 (no support) to 9 (very high support). The time variant standard deviation is .911, indicating change across time within-individuals (between-individual standard deviation = 1.444).

Prior research has also demonstrated the important role that peers play in offending (Akers & Lee, 1999). To account for the influence of *criminal peers*, we draw from three measures asking the respondent how many of their close friends were incarcerated, had assaulted

someone, or sold drugs since the prior interview. Response categories include none (“0”), some (“1”), most (“2”), or all (“3”). To create an index of criminal peers, responses were summed. This measure has an overall mean of 3.241, a standard deviation of 2.427, and ranges from 0 (no criminal peers) to 9 (all criminal peers). As a time variant measure, the within-individual standard deviation is 1.252 and the between-individual standard deviation is 2.139.

In addition to family and peer influences, other studies show that employment is particularly important during the reentry process (Bahr et al., 2010). To account the influence of *employment*, we draw data from a question asking the respondent if they were legally employed (1 = yes, 0 = no) at each wave. This measure has an overall mean of .663 (standard deviation = .472). The within-individual standard deviation is .292, demonstrating that individuals move in and out of being employed across time (between-individual standard deviation = .390).

Research has also demonstrated that relationship status relates to reentry outcomes (Travis, 2005). Respondents were asked if they were *married or in a steady relationship* (non-married/non-steady relationship contrast). Overall, 60.4% reporting being either married or in a steady relationship (39.6% reported not being married/not in a steady relationship). The within-individual standard deviation is .391 demonstrating more variation across time than between-individuals (.308).

As mental health is often related to substance use and reentry outcomes (Mallik-Kane & Visser, 2008), we control for whether or not the individual was receiving *mental health treatment* post release. Overall, 7.8% of respondents reported receiving mental health treatment (in contrast to 92.2% who reported not receiving mental health care treatment). This measure varies within-individuals across time (standard deviation of .216). Finally, as our outcome measure is substance use, we include a variable capturing whether or not the individual reported being in a *substance treatment program* post-release (1 = yes, 0 = no). This measure has an overall mean of .222 and standard deviation of .415. The within-individual standard deviation (.256) indicates a noticeable amount of change in programming enrollment over time.

Time invariant control variables—In addition to the time variant measures we also control for a number theoretically important time invariant controls. First, we control for pre-incarceration levels of substance use as a measure *lagged substance use* (we discuss the analytic strategy that allows us to control for this measure below). This measure is comprised of identical measures as our dependent variable. These items come from wave one measures which asked respondents how many of the same substances they had used prior to incarceration. This measure (logged due to skewness and to maintain consistency in measurement with the outcome variable) has a mean of .669, a standard deviation of .607, and ranges from 0 to 2.336.

Prior literature has also demonstrated the importance of race and age on reentry outcomes (Severson et al., 2012; Travis, 2005; Uggen, 2000). To account for race, we created binary measures indicating that the respondent was identified as *Black* (34.5% of the sample) or

Other race (12.4% of the sample) in contrast to *White* (53.1% of the sample). To account for *age* of the individual we include a variable capturing the respondent's age at wave one. This measure has a mean of 29.469 (standard deviation = 7.291; range = 18 to 69 years).

A variety of additional characteristics may relate to reentry experiences (see Visser, Lattimore, Barrick, & Tueller, 2017). To account for the presence of children, we include a variable representing the total *number of children* the respondent reported having at wave one. The mean of this measure is 1.452, standard deviation of .162, and ranges from 0 (no children) to 10. Due to the data being skewed in this measure, we use the natural logarithm. To account for the influence of *education*, we include a dummy variable representing that the individual did not complete high school/a GED. Overall, 37.8% of respondents reporting not completing high school (in contrast to 62.2% who reported completing high school or receiving their GED).

To account for mental health treatment during incarceration, we include a variable capturing whether or not the individual received *mental health treatment while incarcerated* in contrast to individuals who did not receive treatment. Overall, 17.9% of respondents reporting receiving mental health treatment in contrast to 82.1% who did not receive mental health treatment. In addition to mental health treatment, we also include two separate measures of substance abuse treatment. The first asked respondents if they had ever received *substance abuse treatment pre-incarceration*. Overall, 43.8% of respondents reported that they had (in contrast to 56.2% who reported not having received substance abuse treatment pre-incarceration). The second asked respondents if they had received *substance abuse treatment while incarcerated*. Overall, 46.4% reported that they had in contrast to the 53.6% who reported never having participated in substance abuse treatment while incarcerated.

Prior work has also demonstrated that experiences within the criminal justice system can affect the reentry process as well as substance use (Durose, Cooper, & Snyder, 2015). First, we control for whether or not the individual was *reincarcerated* by wave four. Overall, 27.9% of all respondents were reincarcerated by wave four in contrast to 72.1% who were not reincarcerated by wave four. To account for the *length of incarceration*, we include a measure capturing the total number of days the individual was incarcerated. This measure has a mean of about 944 days, standard deviation of 943 days, and ranges from 44 to 9,846 days. Due to the skew in this measure, we use the natural logarithm. This logged measure has a mean of 6.479, a standard deviation of .887, and ranges from 3.807 to 9.158. We also include a measure capturing the total *number of prior convictions* the respondent reporting having prior to their term of incarceration. This measure has a mean of 5.887, standard deviation of 7.896, and ranges from 1 to 90. Again, due to the skew in this measure, we use the natural logarithm. This measure has a mean of 1.598, a standard deviation of .735, and a range from .693 to 4.511. Finally, as reentry experiences can vary due to the individuals' criminal record, we include a dummy variable representing that the individual was incarcerated due to a *property* (11.4%), *drug* (21.0%), or *violent* offense (16.8%) in contrast to *some other* offense (50.4%).

Missing data—As with most longitudinal data sets (and particularly reentry data), there are missing data in the SVORI data set. Of the original sample of 1,697 men, we use data

from 962 persons. This represents an attrition rate of approximately 43%. Although this represents a large amount of missing data, sample attrition has been well documented and investigated by a variety of sources in the SVORI project. For example, the federal-funded evaluation lead by the Urban institute (Lattimore & Steffey, 2010) has shown that respondents present at wave one are not significantly different from respondents at wave four across a host of measures. Additionally, prior work using SVORI has shown that the data satisfy the condition of being missing at random (see Stansfield, Mowen, O'Connor, & Boman IV, 2017; Wallace et al., 2016). However, to ensure missing data was not significantly altering our findings, we performed a sensitivity analysis (Brame & Paternoster, 2003) and estimated a series of t-tests comparing missing and not missing cases across each measure in the study. Without exception, these tests failed to reach significance, thereby demonstrating no significant differences across respondents who had existing and missing data. To perform an additional test, we imputed all missing data using full-information maximum likelihood imputation (see Moral-Benito, Allison, & Williams, 2016). Substantive results were identical using the full sample of 1,697. Given the results of these tests as well as prior work (Lattimore & Steffey, 2010; Stansfield et al., 2017; Wallace et al., 2016), we confirm that although missing data are a noted issue in the SVORI sample, our results are robust to sample attrition.

Analytic strategy—To examine the effect of social/behavioral programs, increased supervision, and jail time on polysubstance use across time, we use a cross-lagged dynamic panel model. This model, which is further outlined below, overcomes two specific limitations of existing research. First, prior work on reentry programming tends to compare the effects of programming on reentry outcomes between-individuals. For example, studies tend to compare reentry outcomes for an individual who received programming compared to someone who did not receive programming. While this research is important, it does little to inform us of the effect of programming on reentry outcomes across time within the same individual. Cross-lagged dynamic models overcome this issue by estimating both within-person changes alongside between-person differences. In this way, it is similar to a traditional mixed-effects model.

The second advantage concerns overcoming a limitation to fixed- and mixed-effects models, which are the most popular forms of longitudinal modeling in the social sciences (see Allison, 2015, p. 1). As Allison (2015) explains, often the best predictor of future behavior is past behavior. However, lagged measures of the dependent variable (e.g., $t-1$) cannot be used in either fixed- or mixed-effects models due to severe bias in estimation (Allison, 2015). A cross-lagged dynamic panel model overcomes this limitation through the use of progressive chained equations, thus satisfying the assumption of independence (Williams, Allison, & Moral-Benito, 2016). In the case of our study, it allows us to include a lagged measure of polysubstance use (polysubstance use prior to incarceration, assessed at wave one) to examine how reentry experiences impact future polysubstance use. The lagged pathways have two primary path specifications. First, paths from the lagged outcome at wave one are specified to every time invariant variable as well as every wave two, time variant predictor and outcome. Second, the prior wave's outcome ($t-1$) is also regressed onto progressive (t) outcomes and time variant predictors. Thus, the model progressively accounts for the impact

of the most recent substance use of the respondent as well as his pre-incarceration patterns of substance use.

In addition to overcoming the two limitations noted above, cross-lagged dynamic panel data models are also advantageous as they are able to combine the unique advantages of both mixed- and fixed-effects models. Specifically, a cross-lagged model extends the fixed-effect model by including time invariant predictors (which fixed-effects models do not traditionally allow – see Rabe-Hesketh & Skrondal, 2012). At the same time, a cross-lagged model extends the capabilities of a mixed-effects model by treating the time variant component as within-individual change only, thus not confounding between-individual differences and within-individual changes in a single variable.

We proceed using a model-building procedure. Given the mixed findings on the effects of monitoring, increased jail time, and enhanced programming on reentry programs, we present the results of the full model in Table 2. In Table 3, we explore whether there are interdependent relationships among the three key independent variables on polysubstance use. The interaction terms interact enhanced monitoring, increased jail time, and social/behavioral programs. To create these interaction terms, they were first group mean centered and the multiplied together (see Hoffman & Gavin, 1998).

Results

The results of the first cross-lagged dynamic panel models is shown in Table 2. Prior to examining the results, models were separately estimated to examine the standalone effects of social and behavioral programming, increased supervision, and jail time (controls were included). The substantive results for each of these models were identical to a model which simultaneously included all three measures together. This full model is presented in Table 2. By examining the fit indices, it is evident that the model fits the data adequately. Although the chi-square statistic is significant (which demonstrates a lack of fit; see Williams et al., 2016), both the root mean squared error of approximation (RMSEA; .029) and the comparative fit index (CFI; .970) are well within modern bounds for close fit on a structural equation model (see Acock, 2013). Results of this model demonstrate that social/behavioral programs are associated with a .068 unit decrease in the measure of polysubstance use across time. Substantively, this means that participation in social and behavioral programs corresponds to a significant decrease in substance use over time. On the other hand, enhanced monitoring is associated with a .084 unit increase in polysubstance use across time and, similarly, increased jail time is associated with a .206 unit increase in substance use across time. In other words, enhanced monitoring and increased jail actually contribute to significant increases in substance use over time.

Results of the time variant control measures in Table 2 show that lower levels of family support, and not being employed are related to over-time increases in substance use. A returning person's relationship status and his participation in post-release substance abuse and/or mental health treatment are not significantly related to polysubstance use after release. Turning to the time variant controls, Black respondents report significantly lower levels of logged polysubstance use than White respondents by .056 units. On the other hand,

attending mental health treatment and drug treatment while incarcerated are related to significant increases in polysubstance use following release (.088 and .090 unit increases, respectively). Persons who have higher numbers of prior convictions, those who were reincarcerated, and those who committed property offenses are also more likely to use substances after release from prison. The lagged measure of substance use, age, number of children, education level, participation in institutional substance abuse treatment, and incarceration length are all non-significantly associated with polysubstance use during the reentry timeframe.

We now turn to examining the interactive effects of the three focal predictors on polysubstance use during reentry (refer to Table 3). Model 1 presents results of an interaction term capturing the joint contributions of social and behavioral programs interacting with increased supervision on post-release polysubstance use. Like in prior models, the RMSEA and CFI show evidence of close fit to the data, the main effects of the three key predictors, and the controls show similar patterns of statistical significance to the model presented in Table 2. The interaction term, which is the focal point of interest, fails to reach significance; however. This suggests that social/behavioral programs and enhanced monitoring exert independent, but not interdependent, effects on substance use.

Model 2 in Table 3 replaces the former interaction term with one capturing the interactive effects of social and behavioral programs and jail time. With fit indices, main effects, and control variables showing similar trends to the prior models, this interaction term fails to reach significance, suggesting that social/behavioral programs and jail time exert independent, but not interrelated, effects on post-release polysubstance use. Model 3 replaces this interaction term with one capturing the product of increased supervision and jail time. This interaction also fails to approach statistical significance, suggesting that the effects of increased supervision and jail time on substance use after release from prison are distinct from one another. We now turn to a discussion of how results apply to our hypotheses, prior research, deterrence theory, and policy.

Discussion and conclusions

The goal of this research was to examine the impact of social and behavioral programs, increased supervision, and jail time on polysubstance use during the process of reentry. A series of cross-lagged dynamic panel models demonstrated that participation in social and behavioral programs contributed to significantly lower levels of polysubstance use across the reentry period. On the other hand, enhanced supervision and increased jail time contributed to increase polysubstance use over the same time. Interaction terms indicated that these programs are largely independent in their effects on polysubstance use post-release. To examine these results, we now return to the study's hypothesis.

Our first hypothesis that social/behavioral programs, increased supervision, and jail sanctions would lead to decreased substance use within-individuals during reentry finds mixed support. In support of this hypothesis, findings demonstrated that social/behavioral programs contributed to significant decreases in polysubstance use across time. Even in the presence of theoretically and pragmatically important control variables, results show that

participation in social/behavioral programs contributed to decreases in substance use. Consistent with research on social-, behavioral-, and cognitive-based treatment (Bonta & Andrews, 2007; Botvin & Griffin, 2004; Cecil et al., 2000; Miller & Hobler, 1996; Pearson & colleagues, 2002; Powers, Vedel, & Emmelkamp, 2008), this study uncovers that social/behavioral programming can reduce substance use and promote successful reentry (Bahr et al., 2012; Seiter & Kadela, 2003).

However, contrary to our hypothesis, findings also demonstrated that increased supervision and jail lead to increases—not decreases—in polysubstance use. Although these findings run contrary to the general expectations of deterrence theory, some prior work provides insight into these results. In regards to enhanced monitoring, research efforts have found that when implemented as a standalone strategy, enhanced monitoring is largely ineffective in reducing drug use and facilitating reentry success (Drake et al., 2009; Lowenkamp et al., 2010; Wodahl et al., 2015). Similarly, prior work has shown that jail sanctions do little to reduce substance use (Wodahl et al., 2015), while other work indicates that overreliance on punishment will likely increase levels of drug (Spohn & Holleran, 2002). Although future research would need to independently examine such a statement, it very well could be that going to jail may increase stresses and strains that are met with coping strategies, such as substance use.³ From this perspective, it is important for practitioners to try to reduce strains for those reentering society whenever possible. Overall, research generally finds that punitive responses to substance use counter the principles of deterrence and do little to increase the negative consequences associated with drug use. In a similar vein, our results challenge the efficacy of punitive sanctions to reduce offending (e.g., Braman, 2002; Lynch & Sabol, 2001; Manza & Uggen, 2008; Western, 2002). Therefore, this effort suggests that reentry programs should pursue an evidence-based approach to implementing enhanced monitoring practices to prioritize a greater range of non-law enforcement responses to reduce drug use (e.g., Miller & Miller, 2017, 2011).

Our remaining hypotheses – that social/behavioral programs would increase the effectiveness of increased supervision (H2), and jail time (H3) on substance use, and that increased supervision coupled with jail time would lead to significantly lower levels of polysubstance use (H4) are not supported. Instead, results of our analyses demonstrated that these programs are independent in their effects on polysubstance use. Again, although prior research yields mixed results (Drake et al., 2009), existing studies demonstrate that programs can often “feed” off one another. Alongside research finding that rehabilitative and risk/needs-based interventions are more effective than jail stays rooted in incapacitation and deterrence (Tonry, 2017), this study suggests that reentry-based programs should privilege remedial alternatives over carceral sanctions to improve reentry prospects and decrease drug use.

Given the lack of support for deterrence-based approaches found in this study, our results carry important policy implications. First and foremost, findings question the use of increased supervision and jail as forms of sanctioning for persons on parole. While prior studies (e.g., Wodahl et al., 2015) find that jail does not significantly affect outcomes, our

³We thank an anonymous reviewer for raising attention to this possibility.

study goes one step further by suggesting that it directly harms people's long-term substance use-related outcomes. As such, we echo the work of Wodahl and colleagues (pp. 248–249) by encouraging practitioners to avoid jail sanctions for returning persons whenever possible. Additionally, we stress the need for practitioners to emphasize to returning persons the importance of 1) staying away from criminally inclined friends, 2) maintaining high levels of family support, and 3) holding a job on substance use patterns. Finally, it also appears that social/behavioral programs also help reduce substance use, meaning the expansion of these programs could be warranted for people undergoing reentry. As such, this study suggests that social/behavioral programs which are designed to help people are more effective at reducing substance use than using punishment as a means of compliance

Despite the contributions of this project, there are important limitations. First, although the SVORI data are - overall - similar in general composition to the incarcerated/correctional population in the United States, the sample does represent serious and violent offenders. As a result, it may not be generalizable to the broader population from which the data were drawn. Future work should examine the types of programs/strategies we examined in this researcher in other samples for replication. Further, given the increasing number of women who are incarcerated and experience reentry, future research should examine whether or not our findings hold for females, we were limited to explore outcome for males only.

There are also important limitations concerning some of the measures used. While our measure of polysubstance use captures a variety of substances, it does not capture the overall frequency of use. This is an important limitation as an individual who smokes marijuana on occasion is likely fundamentally different than an individual who uses heroin consistently. While the application of severity weights helps to make this distinction, we are still limited in capturing use and not frequency of use. In addition, our measure of social/behavioral programs also does not capture frequency of program participation as that measure was not available in the SVORI data. Further, due to relatively low levels of participation in one specific program, our measure of social/behavioral programs treats individuals who participated in a single course the same as an individual who participated in all three types of courses (personal relationships, life skills, and anger management). This is an important limitation as it seems reasonable to expect that greater levels of participation within and across programs should contribute to even more favorable outcomes. Future research should more closely examine this issue.

Overall, this study adds to the existing research on reentry as well as the impact of programs on drug use during the reentry period. Although this study is limited to a sample of serious male offenders, it is likely reentry programs will impact substance use among other recently released populations. By demonstrating that enhanced supervision and jail time increase substance use while social/behavioral programs lower drug use, this study suggests that the use of remedial responses can promote successful offender reentry. Building on these findings, criminal justice agencies should strongly consider the impact of various forms of reentry programs and their impact on future offending, prospects, and outcomes.

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Table 1.Descriptive statistics of the SVORI data ($n = 962$).

Variable	Mean	Std. dev.	Range	Std. dev. (within)	Std. dev. (between)
Dependent Variable					
Substance Use	0.669	0.607	0–2.336	0.486	0.375
Time Variant Variables					
Independent Variables					
Social/Behavioral Programs	0.177	0.382	0, 1	0.251	0.303
Increased Supervision	0.132	0.338	0, 1	0.224	0.273
Jail Time	0.158	0.365	0, 1	0.243	0.289
Control Variables					
Family Support	7.097	1.660	0–9	0.911	1.444
Criminal Peers	3.241	2.427	0–9	1.252	2.139
Employment	0.663	0.473	0, 1	0.292	0.390
Married/Steady Relationship	0.604	0.489	0, 1	0.391	0.308
Substance Treatment	0.222	0.415	0, 1	0.256	0.339
Mental Health Treatment	0.078	0.268	0, 1	0.216	0.157
Time Invariant Variables					
Lagged Substance Use	1.274	0.559	0–2.336	-	-
Race					
<i>White</i>	0.531	0.499	0, 1	-	-
<i>Black</i>	0.345	0.475	0, 1	-	-
<i>Other</i>	0.124	0.329	0, 1	-	-
Age	29.469	7.291	18–69	-	-
Number of Children	1.452	0.162	0–10	-	-
Did not Complete High School	0.378	0.485	0, 1	-	-
Mental Health Treatment (Incarcerated)	0.179	0.383	0, 1	-	-
Substance Treatment (Incarcerated)	0.464	0.499	0, 1	-	-
Substance Treatment (Pre-incarceration)	0.438	0.396	0, 1	-	-
Reincarceration	0.279	0.449	0, 1	-	-
# prior Convictions	5.887	7.896	1–90	-	-
Length of Incarceration	944.25	943.507	44–9846	-	-
Primary Conviction Type					
<i>Property</i>	0.114	0.318	0, 1	-	-
<i>Drug</i>	0.210	0.407	0, 1	-	-
<i>Violent</i>	0.168	0.374	0, 1	-	-
<i>Other</i>	0.504	0.500	0, 1	-	-

NOTES: SVORI = Serious and violent offender reentry initiative, n = Sample size, Std. Dev. = Standard deviation

Table 2.Cross-lagged dynamic panel model examining substance use post-release ($n = 962$).

Variable	Coef	S.E.
Time Variant Measures		
<i>Independent Variables</i>		
Social/Behavioral Programs	−0.068	0.034 *
Increased Supervision	0.084	0.037 *
Jail Time	0.206	0.036 ***
<i>Control Variables</i>		
Family Support	−0.021	0.010 *
Criminal Peers	0.039	0.008 ***
Employment	−0.110	0.031 ***
Married/Steady Relationship	0.054	0.030
Substance Treatment	0.017	0.034
Mental Health Treatment	−0.012	0.057
Time Invariant Control Variables		
Lagged Substance Use	0.019	0.025
Race		
<i>Black</i>	−0.056	0.026 *
<i>Other</i>	−0.032	0.034
Age	−0.001	0.002
Number of Children	−0.018	0.019
Did not Complete High School	0.017	0.022
Mental Health Treatment (Incarcerated)	0.088	0.031 **
Drug Treatment (Incarcerated)	−0.023	0.022
Drug Treatment (Pre-incarceration)	0.090	0.022 ***
Reincarceration	0.070	0.027 *
# prior Convictions	0.057	0.015 ***
Length of Incarceration	−0.020	0.013
Primary Conviction Type		
<i>Property</i>	0.076	0.033 *
<i>Drug</i>	0.037	0.027
<i>Violent</i>	0.005	0.029
X ² (Model vs. Saturated)	58.204 **	
RMSEA	0.029	
Comparative Fit Index	0.970	

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

NOTES: SVORI = Serious and violent offender reentry initiative, n = Sample size, Coef = regression coefficient, S. E. = Standard error, RMSEA = Root mean squared error of approximation.

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Table 3.Cross-lagged dynamic panel model examining substance use post-release with interaction terms ($n = 962$).

Variable	Model 1		Model 2		Model 3	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Time Variant Measures						
<i>Independent Variables</i>						
Social/Behavioral Programs	-0.075	0.036 *	-0.064	0.031 *	-0.068	0.033 *
Increased Supervision	0.074	0.038 *	0.085	0.037 *	0.079	0.038 *
Jail Time	0.202	0.036 ***	0.225	0.041 ***	0.178	0.042 ***
<i>Control Variables</i>						
Family Support	-0.022	0.010 *	-0.020	0.010 *	-0.022	0.010 *
Criminal Peers	0.038	0.008 ***	0.038	0.008 ***	0.039	0.008 ***
Employment	-0.110	0.031 ***	-0.112	0.031 ***	-0.111	0.031 ***
Married/Steady Relationship	0.053	0.030	0.055	0.030	0.056	0.030
Substance Treatment	0.019	0.034	0.017	0.034	0.021	0.034
Mental Health Treatment	-0.016	0.057	-0.025	0.058	-0.006	0.058
<i>Interaction Terms</i>						
<i>Social/Behavioral Programs × Supervision</i>	0.031	0.078	-	-	-	-
<i>Social/Behavioral Programs × Jail Time</i>	-	-	-0.109	0.114	-	-
<i>Supervision × Jail Time</i>	-	-	-	-	0.107	0.099
Time Invariant Control Variables						
Lagged Substance Use	0.019	0.025	0.019	0.025	0.016	0.025
Race						
<i>Black</i>	-0.056	0.025 *	-0.058	0.025 *	-0.056	0.025 *
<i>Other</i>	-0.033	0.033	-0.035	0.034	-0.032	0.034
Age	-0.001	0.002	-0.001	0.002	-0.001	0.002
Number of Children	-0.017	0.019	-0.017	0.019	-0.017	0.019
Did not Complete High School	0.016	0.022	0.017	0.022	0.017	0.022
Mental Health Treatment (Incarcerated)	0.089	0.031 **	0.089	0.031 **	0.086	0.031 **
Drug Treatment (Incarcerated)	-0.022	0.022	-0.022	0.022	-0.023	0.022
Drug Treatment (Pre-incarceration)	0.090	0.022 ***	0.090	0.022 ***	0.091	0.023 ***
Reincarceration	0.071	0.027	0.071	0.027 *	0.070	0.027 *
# prior Convictions	0.057	0.016 ***	0.056	0.016 ***	0.056	0.016 ***
Length of Incarceration	-0.020	0.012	-0.018	0.013	-0.020	0.013
Primary Conviction Type						
<i>Property</i>	0.076	0.033 *	0.075	0.033 *	0.078	0.033 *
<i>Drug</i>	0.037	0.027	0.037	0.027	0.039	0.027
<i>Violent</i>	0.006	0.029	0.004	0.029	0.005	0.029
X ² (Model vs. Saturated)	87.483 **		86.705 **		87.001 **	
RMSEA	0.026		0.026		0.026	

Variable	Model 1		Model 2		Model 3	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Comparative Fit Index	0.970		0.970		0.97	

*
 p .05,

**
 p .01,

 p .001

NOTES: SVORI = Serious and violent offender reentry initiative, n = Sample size, S.E. = Standard error, Coef = regression coefficient, RMSEA = Root mean squared error of approximation.