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Changes in Inmates' Substance Use and Dependence From Pre-Incarceration to One Year Post-Release

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Abstract

Purpose—To assess changes in inmates' misuse of substances from pre- to post-incarceration.

Methods—In Study 1, professionals ($n = 162$) and laypersons ($n = 50$) predicted how jail inmates' substance misuse would change from pre-incarceration to post-release. In Study 2, a longitudinal study of 305 jail inmates, we examined actual changes in substance use and dependence from pre-incarceration to the first year post-incarceration, as well as whether changes varied as a function of demographic, criminal justice, treatment, and personality factors.

Results—Professionals and laypersons predicted little change in substance misuse whereas, in fact, inmates' frequency of substance use and dependence decreased substantially from pre-incarceration to post-release. Sharper decreases were observed for inmates who were female, younger, more educated, serving longer sentences, enrolled in substance abuse treatment, high in shame-proneness, and low in criminogenic thinking. Race, first time incarceration, transfer to other correctional facilities, mandated community supervision (probation), and guilt-proneness did not predict changes in substance use or dependence.

Conclusions—Although substance misuse decreased, this remains a population high in need of substance abuse treatment both upon arrest and at one year post-incarceration; 60% of former inmates met at least one DSM-IV criterion for substance dependence at one year post-release.

Keywords

substance use; substance dependence; jail; incarceration; criminogenic cognitions

Substance dependence is highly prevalent amongst jail inmates. Specifically, Karberg and James (2005) found that 46% of jail inmates meet DSM-IV criteria for substance dependence at the start of incarceration—a rate nearly 17 times higher than that of the

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general population. Incarceration represents a period of enforced sobriety for many, if not most, inmates. Does this hiatus in substance use result in changes in substance use post-release—relative to pre-incarceration? We first asked professionals and non-specialists to predict whether inmates' substance misuse would increase, decrease, or stay the same. We then drew on a large longitudinal study of jail inmates, comparing their pre-incarceration substance use and dependence to that reported one year post-release. In addition, we examined twelve theoretically derived predictors of individual differences in change.

Does Substance Misuse Increase or Decrease Following Incarceration? Competing Theoretical Predictions

There are compelling reasons to expect jail inmates to decrease their substance use and dependence post-incarceration, relative to pre-incarceration. First, incarceration typically involves a period of forced sobriety, which may provide the opportunity to develop adaptive coping skills. If inmates utilize these coping skills when rejoining the community, they may be more apt to remain substance-free. In addition, a substantial number of former inmates may be placed on probation, with desistance from substance use (i.e., drug testing) as a condition of probation, which could further motivate such inmates to limit their substance use and misuse.

On the other hand, several factors may exacerbate post-release substance use. One potential aggravating mechanism may be reactance (Brehm, 1966), defined as a “motivational state directed toward the reestablishment of the free behaviors that have been eliminated or threatened with elimination” (pg. 384). Many models of substance abuse treatment such as motivational interviewing emphasize the importance of intrinsic motivation to change as a determinant of reductions in substance use (DiClemente, Bellino & Neavins, 1999). However, it is unclear how an externally imposed sobriety (i.e., coerced sobriety during incarceration) affects inmates' motivation for change. Because reactance is a response aimed at restoring one's own agency, an incarceration defined by a removal of freedom to use substances may intensify reactance, resulting in an unwillingness to maintain sobriety.

A second potentially aggravating mechanism is “ironic” thought processes (Wegner, Schneider, Carter & White, 1987). Enforced sobriety may lead inmates to consciously suppress thoughts of substance use which, due to increased unconscious monitoring for the thoughts one is trying to suppress, can “ironically” lead to obsession and preoccupation with that thought, resulting in increased cravings and eventual relapse upon release. A sobriety marred by such thought suppression may offset the potential benefits of incarceration by magnifying the appeal of substance use, or at least the cognitive accessibility of cravings.

In addition to the psychological mechanisms that could predict post-release relapse, situational factors could also be conducive to increases in post-release substance use. For example, Knight, Hiller, and Simpson (2002) found that relapse is common among prison inmates in the first 90 days post-release, which may be due to the fact that incarceration is typically experienced as highly stressful (Haney, 2003), with uncertainties regarding housing and employment especially salient just prior to release. The pressures of post-release integration may foster maladaptive means of coping, such as substance use, which would

align with stress management and coping theories that explain substance use as the result of high levels of stress.

In sum, some theories predict incarceration would exacerbate post-release substance misuse via increased stress, reactance, and ironic thought processes. Other theories suggest the opposite. An inmate's broach with sobriety may aid in the development of new adaptive stress management skills, and lead to reductions in use following release.

Does Substance Misuse Increase or Decrease Following Incarceration?

Scant Empirical Evidence

Research examining changes in substance use from pre- to post-incarceration is surprisingly rare. Comparisons have been made primarily in the context of treatment studies (for a systematic review see Kouyoumdjian et al., 2015) or with highly specific populations such as HIV infected individuals with substance use disorders (Krishnan et al., 2012) .

Of most direct relevance, in Visser and Courtney's (2006) Urban Institute study of 424 male prison inmates (median length of incarceration about 2 years), participants reported dramatic drops in substance use from pre- to post-incarceration. Just prior to release, participants reported retrospectively on substance use during the 6 months prior to incarceration; 72% said they used drugs and 60% reported alcohol intoxication prior to incarceration. In interviews conducted 1–3 months post-release with 358 (84%) participants, these percentages dropped to 13% and 17%, respectively. Confidence in these precipitous drops in substance use is somewhat tempered by the extraordinarily low self-reports of undetected crime (6%) also gathered at 1–3 months post-release. Little information is provided regarding assurances of confidentiality in this brief report.

Using a similar design, Shinkfield and Graffam (2009) asked 79 Australian prisoners nearing re-entry to report on pre-incarceration substance use. Unfortunately, the retention rates at one month and 3–4 months post-release were 46% and 24%, respectively. Nonetheless, substantial drops in drug use and alcohol misuse were reported from pre- to post-incarceration in the 36 and 19 participants interviewed at one month and 3–4 months post-release.

Somewhat less relevant, two studies focused solely on prison inmates with histories of substance misuse, estimating the likelihood of using substances following incarceration. In a large study of prison inmates with a history of substance misuse (<1% female), those in the control group ($n = 809$) who did not participate in a specialized residential substance abuse treatment had a .37 probability of using drugs or alcohol within the first 6 months of release from prison, reported by the probation officer (Pelessier et al., 2001). There are, however, obvious limitations in relying on probation officers' reports of post-release substance use, as not all substance use is detected or reported to the probation officer. Another study of 49 former prison inmates (93.9% of whom self-reported illicit drug or alcohol abuse during the year prior to incarceration) found only 7 relapsed within the first 30 days of release, although relapse is not clearly defined in the study (Nelson, Dees, & Allen, 2011). Both of these studies looked at prison inmates' substance use outcomes post-release, focusing solely

on inmates with pre-existing substance use problems, thus providing no information on the degree to which non-substance abusing inmates engage in problematic substance use after a stressful period of incarceration surrounded by a high percentage of substance abusing peers; and neither considered inmates incarcerated for relatively brief periods in local jails in addition to inmates housed in long-term prisons.

Study 1

Despite the lack of systematic data and the opposing predictions drawn from theory, criminologists and psychologists may have special insight into this issue based on clinical observation, knowledge of current theory, or both. Thus, we first conducted a survey of professionals with relevant expertise (clinical and social psychologists and criminologists), asking them to predict how substance misuse might change among jail inmates from pre- to post-incarceration. We also included a community sample of non-specialists to assess people's intuitive guesses – in short, “folk theories” – regarding changes in substance misuse from pre- to post-incarceration. Participants were also asked to state their perception of the weight of scientific evidence supporting their opinion.

Method

Participants—Professional participants were 162 individuals recruited from the: (a) Society for Personality and Social Psychology (Division 8) of the American Psychological Association (APA) ($n = 15$)¹; (b) American Psychology and Law Society (Division 41) of the APA ($n = 79$); (c) Society for a Science of Clinical Psychology ($n = 19$); and (d) American Society of Criminology's Division on Sentencing and Corrections ($n = 49$). Members received an email via their organization's listserv with an invitation to complete a brief survey about professionals' opinions regarding the effects of jail incarceration. It was not possible to calculate response rates for professional samples because we did not know the number of members signed-up to receive listserv content in general, or listserv questionnaires in particular. Professional participants were 76% ($n = 123$) White, 60% ($n = 98$) female, and on average 47 years old ($SD = 10.62$, $range = 26$ to 73 years). Most completed a doctoral degree (94%; $n = 152$) and many (44%, $n = 71$) had worked in an adult correctional facility at some point during their lifetime.

Community participants ($N = 50$) were recruited on Amazon Mechanical Turk (MTurk), a crowdsourcing internet marketplace. Participants accepting the assignment received \$0.09 for successful completion of a brief survey about community opinions regarding the effects of jail incarceration. Participation was limited to United States residents. Of the community participants, 64% ($n = 32$) identified as White and 58% ($n = 29$) were female. On average participants were 29 years old ($SD = 5.37$, $range = 24$ to 56 years). The majority completed a bachelor's degree or higher (68%; $n = 34$). The vast majority were never employed in an adult jail or prison facility (96%; $n = 48$) or incarcerated (92%; $n = 46$) in their lifetimes.

¹The Society for Personality and Social Psychology recently updated their listserv such that members must opt-in to receive research questionnaires. The vast majority of members have not opted to receive these requests, hence the low response rate.

Measures and Procedures—The study was approved by the affiliated university Institutional Review Board. All participants completed surveys via QuestionPro, an online-based survey software system. Participants were asked: “Thinking of a typical jail inmate incarcerated for about six months... How would substance misuse at one month before arrest compare to substance misuse one year after release from jail?” Response options range from -2 to 2 with $-2 = \textit{Substance misuse would get much worse}$, $0 = \textit{Substance misuse would stay the same}$, and $2 = \textit{Substance misuse would decrease}$. Participants were then asked, “What is the available research evidence showing such an effect ($1 = \textit{I'm not sure}$, $2 = \textit{There is virtually no research}$, $3 = \textit{The available research is flawed}$, $4 = \textit{There is evidence and the results are mixed}$, $5 = \textit{The available research is extensive and conclusive}$)?”

Results

Using a 5-point scale ranging from -2 to $+2$ to indicate whether a typical jail inmate incarcerated for 6 months would increase or decrease in misuse of substances, professionals' mean rating was -0.15 , $SE = .05$, $95\% \text{ CI} = -0.26, 0.05$. As shown in Figure 1 (detailed by organization), more than half (64.2%) of the professional participants predicted the typical jail inmate incarcerated for 6 months would not change in their level of substance misuse in the year following their release; 23.4% thought substance misuse would get worse (response -2 or -1). Few professionals, 12.3%, predicted inmates' substance misuse would improve (response 1 or 2).

Using the same scale as professionals, community members' mean rating was -0.10 , $SE = .14$, $95\% \text{ CI} = -0.39, 0.19$. As shown in Figure 1, 30.0% of community participants indicated a typical jail inmate incarcerated for 6 months would decrease in substance misuse; 34.0% thought they would stay the same; and the remaining 36.0% indicated substance misuse would get worse.

As shown in Figure 2 (detailed by organization), more than half of professional (64.8%) and community participants (60.0%) indicated they were not sure of the available empirical evidence to support whether substance misuse would change (Figure 2). The next most frequent answer among both groups was “there is evidence and the results are mixed” (professionals = 20.6%; community = 20.0%). Few participants believed “the available research is extensive and conclusive” (professionals = 10.0%; community = 12.0%).

Discussion

On average, knowledgeable professionals and non-specialist community members expected little change in substance misuse in the year post-incarceration, relative to pre-incarceration. Most were unsure about the current state of the literature. Responses suggest both groups rely more on intuition than on actual empirical evidence – a pattern that is not surprising given the scant research on changes in inmates' substance use while in the community.

Study 2

Drawing on data from a longitudinal study of “general population” jail inmates, Study 2 provides much needed systematic evidence on changes in inmates' substance use and abuse from pre- to post incarceration.

The first aim of this study is to empirically assess how inmates' substance use patterns change *on average* from pre- to post-incarceration. As described in more detail above, theoretically, one could make the case for changes in either direction. On one hand, jail inmates may decrease substance use and dependence post-incarceration, relative to pre-incarceration, owing to a period of sobriety and the consequent development of adaptive coping skills. In addition, conditions of probation may further motivate former inmates to limit their substance use and misuse. On the other hand, post-release substance use may be exacerbated by reactance (Brehm, 1966), "ironic" thought processes (Wegner, 1987), and stress inherent in the transition from institution to community. The limited available empirical evidence suggests drops in substance use and misuse from pre- to post-incarceration.

What Factors Might Predict Individual Differences in Change in Substance Use and Dependence?

Thus far we have discussed mean level changes in substance use and dependence from pre- to post-incarceration, but there are likely substantial individual differences in the direction and magnitude of these changes. Researchers have yet to examine predictors of individual differences in change. A second set of questions addressed in Study 2 concerns who is especially likely to experience increases or decreases in substance use and misuse from pre- to post-incarceration. We investigate 12 key factors that may affect changes in substance use and dependence: gender, age, education level, race, whether inmates were on probation post-release, whether inmates were experiencing their first incarceration, length of incarceration, whether inmates were transferred to a second correctional facility, enrollment in substance abuse treatment, criminogenic cognitions, shame-proneness, and guilt-proneness.

Demographic characteristics—Men and women participate in substance abuse treatment at different rates and endorse different motivations for engaging in substance use. This suggests gender may be a relevant predictor of changes in substance use and dependence from pre- to post-incarceration. On one hand, female inmates seek out substance abuse treatment more than male inmates (Belenko & Houser, 2012; Drapalski, Youman, Stuewig, & Tangney, 2009). This may suggest females have higher levels of motivation to amend their substance habits than male inmates, which could translate to greater decreases in substance misuse from pre- to post-incarceration.

On the other hand, male and female inmates tend to use substances for different reasons, which could influence how amenable their use is from pre- to post-incarceration. For example, Peugh and Belenko (1999) found that female inmates are more likely to use substances to mollify mental health issues and histories of abuse, whereas men are more likely to use for "self-centered reasons" (Langan & Pelissier, 2001), such as endorsing an enhancement motivations to use. Absent treatment, female inmates may continue to experience significant psychological distress, and in turn, have more difficulty amending their substance use and dependence, relative to men.

To our knowledge, no studies have investigated any demographic predictors of changes in substance use from pre- to post-incarceration. We also examine age, race, and education level as potentially relevant predictors.

Criminal justice characteristics—First, we considered probation status during the first-year post-release. Inmates who are placed on probation following their release from jail or prison are often subjected to random drug testing, whereby any detected substance use is grounds for re-arrest (i.e. a probation violation). For that reason, inmates placed on probation may be especially likely to decrease or abstain from substance use.

Second, we examined changes in substance misuse for first-time vs. experienced inmates. Research indicates first-time inmates are more receptive to amending their behavior following incarceration (Vito, 1984). The theory of specific deterrence predicts that a first incarceration can be a turning point regarding inmates' criminality (Stafford & Warr, 1993), simply by making inmates less willing to take risks that could cause re-arrest, sometimes serving to cease their engagement in future illegal behavior altogether (Nagin, 1998). Although no research has assessed how one's incarceration history can affect changes in substance use patterns, it is plausible that substance use would decrease most dramatically following inmates' first incarcerations. If first-time inmates become less prone to engaging in the risks of illegal behavior, they would be more likely to choose to cease their involvement with substances, compared to peers with previous criminal justice contact.

Length of incarceration is another key criminal justice factor. To our knowledge, no research has examined changes in substance use as a result of incarceration length. Although stress models predict longer incarcerations will serve as an antecedent to increases in substance use (e.g., since a longer period of incarceration may induce more stress), more time spent sober may allow for more opportunities to amend one's schema as a "non-user." It is unknown how long of an incarceration is needed to provide inmates ample time to reconsider their substance misuse, or whether or not any effect exists.

Finally, given that all participants were recruited from a single jail facility, to address the issue of generalizability, we assessed whether inmates who transferred to other facilities (typically state prisons) differed from those released directly to the community, in terms of their post-release substance misuse.

Substance abuse treatment—Greater involvement in 12-step programs predicts better outcomes for attendees in community samples (Emrick, 1987) and prison inmates (Hiller, Knight, & Simpson, 1999). Far less research has been conducted in jail settings, where treatment programs must work within the time constraints of inmates' shorter incarceration periods. Peters Kearns, Murrin, Dolente, & May (1993) showed that jail inmates who participated in an intensive six-week substance abuse treatment program were less likely to recidivate compared to those not enrolled in the program, but did not assess substance use itself as a post-release outcome. We have located no studies that assessed changes in substance use from pre- to post-incarceration as a function of treatment in a jail setting, though we hypothesize substance abuse treatment will predict decreases in substance use and dependence—due to self-selection, treatment effects, or both.

Moral cognitions and emotions—Psychologists and criminologists have noted that people who persist in a life of crime hold a distinct set of cognitions that serve to propagate criminal activity (Gottfredson & Hirschi, 1990; Sykes & Matza, 1957; Tangney, Stuewig & Mashek, 2007; Walters, 2002; Walters, 1995). For example, criminals often justify their crimes using “techniques of neutralization” which can be employed to rationalize illegal or problematic substance abuse. Inmates who engage in this mode of thinking may be less likely to process the crime(s) and behaviors that led to their incarceration given the cognitive distortions involved in criminogenic thinking. This type of rationalization may generalize to other domains, and as such, criminogenic thinking may predict no change – or perhaps even an exacerbation – in substance use and dependence post-release. Criminogenic thinking includes a tendency to deny or minimize the negative consequences of one’s crimes. Such tendencies may translate into inclinations to deny or minimize problems with substance use, as well. On the other hand, to the extent that less criminogenic inmates can acknowledge the severity and harm of their crimes, they may be more willing to face head-on the injurious consequences of their substance use, which in turn is apt to be a powerful *intrinsic* motivation for change.

Regarding moral emotions, whereas shame emerges when individuals feel bad about the global self following a transgression or failure, guilt results from feeling bad about a specific behavior, somewhat apart from one’s self as a whole. The propensity to experience shame has been linked to substance abuse in community and offender samples, and in samples varying in sexual orientation (Dearing, Stuewig, & Tangney, 2005; Hequembourg & Dearing, 2013; but see Dearing, Witkiewitz, Connors & Walitzer, 2013). Shame is also associated with higher risk for relapse and impairment to social adjustment during recovery according to a study of recovering female alcoholics in Alcoholics Anonymous, a 12-step recovery program (Wiechelt & Sales, 2001). This may be attributable to the denial and externalization of blame often motivated by shame (Stuewig, Tangney, Heigel, Harty, & McCloskey, 2010), which could make individuals less likely to acknowledge and address substance problems. Moreover, painful experiences of shame may incite self-medication (Khantzian, 1986). In fact, in college students, shame-proneness is associated with problematic alcohol use and drinking to cope with anxiety and depression (Treeby & Bruno, 2012). In contrast, guilt-proneness was inversely related to problematic alcohol use and to drinking to cope with depression. More generally, guilt is associated with accepting responsibility (Tangney, 1990), and often prompts reparative efforts (Lindsay-Hartz, 1984; Tangney, Stuewig & Mashek, 2007), that may facilitate recovery from addiction. We hypothesize guilt-proneness will predict decreases in substance use, whereas shame-proneness will predict increases in substance use and dependence.

Method

Participants—Participants were 305 inmates recruited from June 2002 to May 2007 as part of a larger longitudinal study at an urban adult detention center (Tangney, Mashek, & Stuewig, 2007). Data were collected after intake into the jail (Time 1) and one year post-release (Time 2). Inmates were eligible to participate if they were likely to serve a 4-month minimum sentence, were not in solitary confinement, and were fluent in English or Spanish. Inmates were informed that participation was voluntary and that data were confidential,

protected by a Certificate of Confidentiality from the Department of Health and Human Services. Procedures were approved by the GMU IRB.

Of the inmates who met criteria and who were invited to participate in this multi-wave, longitudinal study, 74% agreed ($N = 628$). Agreement to participate in the study included giving permission for study personnel to access criminal, jail, medical, and forensic mental health records. Of these inmates, 508 completed a baseline assessment; 16 provided invalid self-report data, as determined by elevated ($>70T$) infrequency and inconsistency scales on the Personality Assessment Inventory (Morey, 1991), and 8 had invalid or missing substance use data leaving 484 participants with valid baseline assessments. Twenty-one individuals were not eligible for a one-year follow-up at this time leaving us with a sample of 462 eligible inmates. A total of 323 participants (70%) completed a one-year post-release assessment, but 12 were excluded from the current study because they reported being in the community fewer than 90 days during the first year post-release and six individuals were missing on the substance use questions at follow-up.

The current sample includes 305 participants who completed both a valid intake assessment (Time 1) and one-year post-release assessment (Time 2). Participants were predominately male (71%, $n = 218$) and Black (48%, $n = 145$), though the sample was diverse in race/ethnicity 36% White, 6% Hispanic/Latino, 3% Asian/Pacific Islander, 7% Other) and age (Range: 18–69, $M = 33.5$, $SD = 10.2$). Participants were released into the community from the host jail ($n = 120$) or were transferred to another jail or prison before they were eventually released ($n = 185$). Retention analyses compared individuals who completed Time 2 assessments ($n = 321$) to those who did not ($n = 171$). Individuals who completed Time 2 assessments were somewhat older ($t(490) = -2.36$, $p < .05$), reported fewer symptoms of marijuana dependence ($t(263.95) = 2.33$, $p < .05$), were incarcerated for shorter periods of time ($t(211.71) = 2.93$, $p < .01$) and were less likely to have been transferred prior to release into the community ($\chi^2(1) = 25.71$, $p < .001$). There were no differences with regard to gender, race, years of education, frequency of alcohol, marijuana, or illicit drug use, symptoms of alcohol or illicit drug dependence, guilt, shame, criminogenic cognitions, engagement in substance use treatment, or status as a first time inmate. Following a correction for family-wise error (Benjamini & Hochberg, 1995), time incarcerated and transfer prior to release were the only differences that remained significant between those who were followed up at Time 2 and those who were not. It was more difficult to follow up on participants released from other jurisdictions or areas of the country than from the local jail. Those released from the local jail were apt to have shorter sentences (< 1 year) relative to those transferred to prison (by definition, sentences of 1+ years).

Measures and Procedures—Shortly after assignment to the jail's general population (i.e., housing for inmates without serious medical or mental health concerns) medium and maximum security units, eligible inmates were presented with a description of the study. Inmates who consented to participate completed 4 to 6 interview sessions consisting of face-to-face interviews and computer-based questionnaires. In addition to presenting questionnaire items visually on the computer screen, the computer read each item aloud to participants via headphones. Use of the touch screen program required minimal familiarity with computers (e.g. no keyboard, no mouse). Research assistants were present to address

questions or concerns that arose during the sessions. Sessions generally lasted between 45 minutes and 1 ½ hours and inmates received a \$15–18 honorarium. The Time 2 assessment occurred one year post-release, including many of the same measures delivered at Time 1 and typically lasted 1 to 2 hours. Time 2 assessments were conducted over the phone for participants in the community and in person for those who had been reincarcerated. Inmates received a \$50 for completing the Time 2 assessment.

Substance Use and Dependence: At Times 1 and 2, frequency of substance use and symptoms of dependence were assessed using the Texas Christian University Correctional: Residential Treatment Form, Initial Substance Use Assessment (TCU-CRTF) (Simpson & Knight, 1998). For frequency of use, participants indicated how often they used alcohol, marijuana, cocaine, and opiates during the 12 months prior to their incarceration (Time 1) or during the 12 months after their release (Time 2). Possible answers were: 0 = *never*, 1 = *less than once a month*, 2 = *once per month*, 3 = *1–3 times per month*, 4 = *1–2 times per week*, 5 = *3–4 times a week*, 6 = *5–6 times a week*, 7 = *daily*, and 8 = *more than once a day*. For each substance participants used, they answered additional questions regarding symptoms of dependence as specified by the DSM-IV (American Psychiatric Association, 2000). Item responses ranged from 0 = *never*, 1 = *1 time only*, 2 = *2–3 times*, 3 = *4–6 times*, to 4 = *7 or more times*, regarding the number of dependence symptoms experienced in the 12 months prior to incarceration/over the 12 months after their release. Responses were averaged for each substance type, though cocaine and opiates were combined into a single “hard drug” category.

Predictors of Change: We chose several variables that may predict improvement or deterioration in substance use, in addition to key demographic factors.

Demographic predictors: At Time 1, participants self-reported their gender, race, age, and completed years of education. Racial groups included White ($n = 109$) and Black ($n = 145$); there were too few other races to create another group. There were 218 males and 87 females. Years of education ranged from 5 to 18 years ($M = 11.84$ years, $SD = 2.09$).

Criminal justice predictors: At booking, deputies completed a structured initial custody assessment classifying whether or not the inmate had a *prior jail experience* (0 = *prior jail experience*, 1 = *first jail experience*). Of the participants, 82.1% ($n = 238$) had one or more prior jail experience(s). *Time incarcerated* was calculated as number of days incarcerated between the Time 1 assessment and the day released into the community ($M = 352.97$, $SD = 436.88$, Median = 175.00, *range* = 8 – 2479 days, skew = 2.35, S.E. of skew = .14). To correct for the positive skew resulting from the large number of short incarcerations, we transformed this variable by taking the square root of each value ($M = 16.15$, $SD = 9.62$, Median = 13.23, *range* = 2.83 – 49.79, skew 1.18, S.E. of skew = .14). Through administrative records we also identified individuals who had been released directly to the community from the host jail ($n = 120$) vs. those who had been transferred to other facilities (typically state prisons) and then released ($n = 185$).

Probation status was determined through collection and review of official district and circuit court records of participants’ sentencing and revocation hearings. Records were available for

a random subset of participants at the time of analysis ($n = 139$). A dichotomous variable was used to indicate whether participants were on probation at any point during the first year post release ($n = 79$) or not ($n = 60$). We chose not to analyze amount of time spent on probation during the first year post-release because the vast majority of participants who were assigned probation were on probation for the entire year, creating a bimodal distribution (0 days, 365 days).

Substance abuse treatment: Data regarding substance treatment were gathered from the jail's official records of requests for treatment and services enrollment. Participants were categorized as having enrolled in at least one substance abuse treatment group (typically 12-step programs) or not having enrolled in any substance abuse treatment group (0 = *did not enroll*, 1 = *enrolled*). Additional information, such as attendance and completion was not available.

Moral emotions and cognitions: Guilt- and shame-proneness were measured with the Test of Self Conscious Affect-Socially Deviant Version (TOSCA-SD; Hanson & Tangney, 1996) at Time 1. The TOSCA-SD employs a scenario-based methodology where respondents are told to envision themselves undergoing 13 predicaments. Each situation is followed by possible responses that describe experiences of shame or guilt with respect to that specific context. Respondents answer on a 5-point scale (1 = *not at all likely* to 5 = *very likely*) regarding their likelihood of reacting to the hypothetical dilemma in each of the described ways. Tangney Stuewig, Mashek, and Hastings (2011) provide evidence for the reliability (Cronbach's alpha: guilt = .80, shame = .71) and validity of the TOSCA-SD assessed at Time 1 of the current study. Consistent with the literature on using the TOSCA (Paulhus, Robins, Trzesniewski, & Tracy, 2004; Tangney & Dearing 2002; Tangney et al., 2011), in order to examine the unique effects of shame and the unique effects of guilt, each was residualized on the other thereby giving us a measure of guilt-free shame (shame-proneness) and shame-free guilt (guilt-proneness).

Criminogenic cognitions were assessed at Time 1 using the 25-item Criminogenic Cognitions Scale (CCS; Tangney et al., 2012) which assesses five domains: (a) Notions of Entitlement; (b) Failure to Accept Responsibility; (c) Short-Term Orientation; (d) Insensitivity to Impact of Crime; (e) Devaluing Authority. Items were rated on a 4-point Likert-type scale whereby following a statement participants selected either: 1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, or 4 = *strongly agree*. Tangney et al., (2012) present evidence for the reliability (Cronbach's alpha = .72) and validity of the CCS assessed at Time 1 of the current study.

Results

On Average, How Do Substance Use and Dependence Change from Pre- to Post-Incarceration?—A large majority of inmates decreased their substance use from pre-incarceration to one year post-release. With regard to frequency of alcohol use, more participants decreased (46.2%) than increased (25.9%). Of those who did not change (27.9%), 38.8% reported no use at either timepoint. For symptoms of alcohol dependence, more participants decreased (46.9%) than increased (27.1%). Of those who remained the

same (26.1%), 96.2% reported no symptoms at either timepoint. Regarding frequency of marijuana use, about three times as many participants decreased (40.1%) than increased (13.2%). Of those who did not change (46.7%), 90.1% reported no use at either timepoint. For marijuana dependence symptoms, almost twice as many participants decreased (25.7%) than increased (13.3%). Of those who did not change (61.0%), 97.8% reported no symptoms at either timepoint. Regarding frequency of hard drug use, over three times as many participants decreased (39.9%) than increased (10.9%). Of those who remained the same (49.2%), 93.3% reported no use at either timepoint. For symptoms of hard drug dependence, over two times as many participants decreased (38.0%) than increased (13.9%). Of those who remained the same (48.2%), 98.6% reported no symptoms at either timepoint.

Table 1 shows the difference in mean TCU substance use and dependence scores between the two time periods. In the first year post-release, former inmates reported significantly less use of and dependence upon both legal and illegal substances, relative to the year prior to incarceration, with effect sizes ranging from $d = .19$ for alcohol dependence to $d = .45$ for frequency of hard drug use. These decreases are both statistically and practically significant. For example, inmates' average frequency of hard drug use and symptoms of dependence upon hard drugs during the first year post-incarceration, although still high, were about half what they were prior to incarceration.

Individual Differences in Changes in Substance Use and Dependence—Thus far, we have focused on mean changes in substance use and dependence – how much inmates change in general. But to what degree are there individual differences in changes in substance use and abuse from pre- to post-incarceration? Is substance misuse exacerbated for some subgroup(s) of inmates? The degree to which there were individual differences in change was examined by assessing stability correlations between the substance use and dependence variables.

The second column from the right in Table 1 shows the correlations between pre-incarceration substance use and dependence and post-incarceration use and dependence. The moderate magnitude of the correlations (r 's ranging from .43 to .56) suggests considerable individual variation in change between the two time periods.

Predictors of Individual Differences in Change in Substance Use and Dependence

Plan of analysis: We next assessed demographic variables, criminal justice factors, substance abuse treatment, and moral emotions and cognitions as potential predictors of individual differences in change. To do so, a difference score was calculated by subtracting pre-incarceration substance scores from post-release scores. We then conducted hierarchical regressions that used these difference scores as the dependent variable. In Step 1, we entered the relevant pre-incarceration substance variable to control for initial level of use/dependence² (the right-most column in Table 1 presents the coefficient of pre-incarceration

²This method of analysis addresses the practical problem of regression to the mean, whereby during repeated measurements, relatively high or low observations on the first measurement are likely to be followed by less extreme scores upon subsequent measurement (Fitzmaurice, 2001).

use/dependence scores on the difference scores). In Step 2, we entered the predictor of interest. Results of these regression analyses are shown in Table 2. In order to better understand the patterns of effects, we followed up significant results by creating subgroups to examine mean difference scores. This allowed us to investigate the direction and size of the changes for relevant subgroups. For example, although age may be related to a decrease in substance use, it is useful to know whether older individuals decrease while younger individuals increase or if both groups decrease, but one group decreases more than the other. For dichotomous predictors that yielded a significant finding in Table 2, we examined mean difference scores for each grouping variable (e.g., males vs. females). For continuous variables such as years of education, tertiary splits were conducted based on the distribution of the data. Mean difference scores were determined for the upper third (66th percentile and above) and the lower third of the sample (33rd percentile and below).

Demographic predictors: We found that females showed greater decreases in substance use and dependence than males in all areas except hard drug dependence (which was marginally significant). Nonetheless, men showed decreases in all six substance categories as well, although the changes were not as large as they were for female inmates. Specifically, females ($M = -1.26$, $SE = 0.23$) showed a sharper decrease in frequency of alcohol use, but males ($M = -0.29$, $SE = 0.14$) also decreased in frequency of alcohol use from pre- to post-incarceration. Similarly, concerning symptoms of alcohol dependence, females ($M = -0.37$, $SE = 0.09$) decreased more than males ($M = -0.11$, $SE = 0.06$). Regarding frequency of marijuana use, females ($M = -1.32$, $SE = 0.21$) decreased more than males ($M = -0.73$, $SE = 0.13$), and concerning symptoms of marijuana dependence, females ($M = -0.33$, $SE = 0.06$) decreased more than males ($M = -0.19$, $SE = 0.03$). In regard to hard drugs, females decreased in frequency of use ($M = -1.12$, $SE = 0.14$) more than males ($M = -0.78$, $SE = 0.09$), and in symptoms of dependence, females ($M = -0.52$, $SE = .07$) decreased more than males ($M = -0.37$, $SE = .05$).

Years of education predicted greater decreases in frequency of use and symptoms of dependence on alcohol (but not other substances). Using a tertiary split, we found that those with more years of education (i.e., completed 13 or more years of education) decreased in frequency of use ($M = -1.02$, $SE = 0.23$) more than those with fewer years of education (i.e., completed less than 12 years of school) ($M = -0.21$, $SE = 0.19$). Similarly, those with more education ($M = -0.36$, $SE = 0.09$) tended to decrease in symptoms of alcohol dependence more than those with less education ($M = -0.05$, $SE = 0.07$).

Age was also a significant predictor of changes in frequency of alcohol use and marijuana use and dependence. Specifically, older inmates (39 years and older) decreased their frequency of alcohol use ($M = -0.93$, $SE = 0.21$), whereas younger inmates (26.5 years and younger) tended to increase their frequency of alcohol use ($M = 0.09$, $SE = 0.21$). Regarding frequency of marijuana use, both younger and older inmates tended to decrease their use from pre-to post-incarceration, though older inmates decreased their frequency of marijuana use ($M = -1.26$, $SE = 0.20$) more than younger inmates ($M = -0.36$, $SE = 0.19$). Pertaining to symptoms of marijuana dependence, older inmates ($M = -0.33$, $SE = 0.05$) tended to decrease more than younger inmates ($M = -0.11$, $SE = 0.05$), though both groups tended to decrease in their symptoms of dependence. Race was unrelated to changes in substance use

and dependence, indicating the normative declines generalized across White and Black participants.

Criminal justice predictors: Length of incarceration was a significant predictor of changes in frequency of marijuana use. Participants who were incarcerated for longer periods of time (310 days or more) decreased more in frequency of marijuana use ($M = -1.13$, $SE = 0.19$) than those incarcerated for shorter periods of time (115 days or less; $M = -0.59$, $SE = 0.19$), though all participants decreased. No other criminal justice factors predicted changes in substance use or dependence. Being a first time inmate (vs. recidivating inmate), spending time at only at the local jail (vs. being transferred to and released from another facility), and probation status had no bearing on changes in substance use and dependence from pre- to post-incarceration.

Substance abuse treatment: Substance abuse treatment during incarceration was a modest predictor of changes in substance use and dependence; significant effects were observed only for frequency of alcohol use and symptoms of marijuana dependence. Those who enrolled in substance abuse treatment ($M = -1.26$, $SE = 0.22$) decreased in frequency of alcohol use more than those who did not enroll in treatment ($M = -0.30$, $SE = 0.15$). For symptoms of marijuana dependence, those who enrolled in treatment ($M = -0.36$, $SE = 0.05$) decreased more than those not enrolled in treatment ($M = -0.17$, $SE = 0.03$).

Moral emotions and cognitions: In general, moral emotional style (prone to shame and prone to guilt) did not predict changes in substance use and dependence. The sole significant finding was that, contrary to our hypothesis, a greater propensity for shame was related to sharper decreases in frequency of marijuana use. Specifically, inmates high in shame-proneness (residualized shame score of 0.22 or above; $M = -1.26$, $SE = 0.19$) tended to decrease in frequency of marijuana more than those low in shame-proneness (residualized shame score of -0.36 or below; $M = -0.52$, $SE = 0.19$).

Table 2 also shows the degree to which criminogenic cognitions predict changes in substance use. Inmates scoring higher on criminogenic thinking reported smaller decreases in substance use and dependence (for all six substance categories) from pre- to post-incarceration, relative to inmates with lower criminogenic thinking, who decreased more. Tertiary splits compared the upper third with the lower third in criminogenic thinking. Those low in criminogenic thinking decreased their frequency of alcohol use ($M = -1.06$, $SE = 0.21$), symptoms of alcohol dependence ($M = -0.34$, $SE = 0.08$), frequency of marijuana use ($M = -1.30$, $SE = 0.19$), symptoms of marijuana dependence, ($M = -0.33$, $SE = 0.05$), frequency of hard drug use ($M = -1.16$, $SE = 0.12$), and symptoms of hard drug dependence ($M = -0.55$, $SE = 0.07$) more than those high in criminogenic thinking did for frequency of alcohol use ($M = -0.34$, $SE = 0.21$) symptoms of alcohol dependence ($M = -0.10$, $SE = 0.08$), frequency of marijuana use ($M = -0.50$, $SE = 0.19$), symptoms of marijuana dependence, ($M = -0.13$, $SE = 0.05$), frequency of hard drug use ($M = -0.73$, $SE = 0.12$), and symptoms of hard drug dependence ($M = -0.35$, $SE = 0.07$).

Benjamini Hochberg Correction: Given the large number of predictors of individual differences in change, a Benjamini Hochberg (B-H) correction (Benjamini & Hochberg,

1995) was applied to control for familywise error. We utilized this procedure rather than the Bonferroni procedure because it has greater power and stability in power as the number of comparisons increases (Williams, Jones, & Tukey, 1999). Separate B-H corrections were conducted for each substance, one for alcohol, one for marijuana, and one for hard drugs.

Following a B-H correction, several significant predictors remained. For alcohol use, being female, completing more years of education, being older, enrolling in substance abuse treatment, and being lower in criminogenic cognitions remained significant predictors of sharper decreases from pre to post incarceration. For alcohol dependence symptoms, being female and lower in criminogenic cognitions remained significant predictors of sharper decreases. For marijuana use, being older, being less shame-prone, and having lower criminogenic cognitions remained significant. For marijuana dependence symptoms, being older, enrolled in substance abuse treatment, and lower in criminogenic cognitions remained significant predictors of decreases. No significant predictors remained for changes in frequency or dependence for hard drugs.

Discussion

Surprisingly few empirical studies have examined how people's substance misuse changes from pre- to post- incarceration. Most Study 1 respondents – laypersons and experts – believed inmates' substance misuse would either stay the same or become worse after incarceration.

On Average, Substance Misuse Decreases Following Incarceration, But Need for Treatment Remains High—Drawing on longitudinal data, Study 2 showed a sharp decrease in jail inmates' substance use and dependence comparing pre-arrest levels to those during the first year post-release. This change was robust across substance type and held for both frequency of substance use and symptoms of dependence. This effect may be due to a number of factors including the effects of incarceration – i.e., coerced sobriety, a fear of future incarceration due to substance misuse, or a fundamental rethinking of one's behavior and lifestyle. Further research is needed to evaluate the possibility that such conceptual mediators account for changes in substance misuse.

In addition, we believe that an entirely different process may be at play, instead or as well. Our guess is that when people are in crisis – for example, when people experiencing an exacerbation of substance misuse problems – they are especially at risk for incarceration. Decreases in substance use and dependence may represent spontaneous remission or a return to an earlier less harmful level of use. By one-year post-release, even without treatment, people may naturally regress back to their personal “mean” – a change that may have occurred in the absence of incarceration of any kind. In fact, other results from this longitudinal study suggest more generally that *people in crisis* are at special risk for incarceration, and part of the “improvement” observed is actually a natural abatement of symptoms or serious life problems that cannot be readily tied to “benefits” of incarceration. For example, in this same sample of inmates, pre-incarceration rates of unemployment were exceptionally high (Moore, et al. under review) as were rates of psychological symptoms upon incarceration (Drapalski et al, 2009), both of which significantly improved over time

(Moore, et al. under review; Stuewig et al., in preparation). It is hard to argue that incarceration improved employment or mental health, as we know that having a criminal record is a barrier to employment and little psychological or psychiatric treatment is available for “general population inmates. Rather, a more likely explanation for changes in employment, mental health, and substance misuse is that incarceration was preceded by a spike in these areas, which naturally abated over time. These results can help us identify within individual change among individuals who are incarcerated and helps us understand “where people are” both before incarceration and during the time when they are reintegrating back into the community.

It’s important to emphasize that although substance misuse decreased, incarceration – or time incarcerated – was no panacea for substance use and dependence. At one year post-release, 60% met at least one DSM-IV criterion for substance dependence, 46% reported meaningful levels of substance dependence by meeting three or more criteria for substance dependence, and 31% reported using illegal drugs. In short, this is a population high in need of substance abuse treatment – both upon arrest and post-incarceration.

Predictors of Individual Differences in Change in Substance Use and Dependence—Although on average jail inmates decreased substance misuse following incarceration, there was considerable individual variation in changes in substance use and dependence, as stability correlations averaged $r = .51$. We examined whether 12 variables predicted individual differences in changes in substance misuse.

Demographic Factors: Regarding gender differences, women reported greater decreases in substance use and dependence than men. This finding aligns with research showing that female inmates are not only more likely to request and be interested in substance abuse treatment during their time in custody (Longshore, Hsieh, & Anglin, 1993), but are more likely to express their substance-related needs to parole officers following their release (Bloom, Owen, & Convington, 2003). In fact, in the current sample, women requested and were enrolled in treatment more often than men during the period of incarceration (Drapalski et al., 2009), in spite of the fact that far more treatment options were available to male inmates, given that men comprised the large majority of the inmate population (about 89%).³

Another possible explanation is psychological symptoms abate somewhat over the period of incarceration, and this seems to be especially true for female inmates (Stuewig, et al., in preparation). Langan and Pelissier (2001) found that male offenders reported they were more likely to use substances prior to incarceration for “hedonistic” reasons, whereas women more often reported use of substances as a way to mollify emotional pain. To the extent that female inmates’ psychological distress decreased more sharply than that of men during incarceration, women rejoining the community may have less reason to “self-medicate,” whereas men’s “enhancement” motivations for use may have changed little from pre- to post-incarceration.

³In the current study we oversampled female participants to allow for meaningful analyses of gender differences.

Regarding age differences, younger inmates appear to not amend their alcohol and marijuana use as much as their older counterparts. This may be part of the normal maturation process in that substance use is more common in younger individuals and tends to decline over time. Substance use and problematic drinking tend to decline as people age, typically reaching their peak during early adulthood (Jochman & Fromme, 2010). Numerous studies, both cross-sectional and longitudinal, have shown a noticeable decline in use after early adulthood (National Survey on Drug Use and Health [NSDUH], 2015; Bachman, O'Malley, Schulenberg, Johnston, Bryant & Merline, 2014; Jackson, Sher, Gotham, & Wood, 2001). Researchers posit it is not necessarily the process of aging itself that reduces substance abuse/dependence, rather it is the increased responsibility that comes with leaving early adulthood – i.e., marriage, having children, changes in attitudes about substance use, etc. (Bachman et al., 2014; Laub & Sampson, 2009). The age effect may also have to do with social connectedness, as in this same sample, younger inmates tended to increase their connectedness to the criminal community from pre-to post-incarceration whereas no such effect was evident for older inmates (Folk et al., under review).

It also appears that education level influences changes in substance use and dependence, primarily with regards to legal substances (i.e., alcohol). The more educated the inmate, the more he or she decreased in alcohol misuse from pre- to post-incarceration. It is possible that arrest and incarceration represents more of a “wake up call” for educated inmates who may come from social contexts in which incarceration is less common. Alternatively, the effect may reflect the fact that the youngest inmates (ages 18–20) are apt to be least educated and are also aging into legal alcohol use, where the education effect is most pronounced.

Normative sharp decreases in substance use and dependence generalized across White and Black participants. That is, in no case did race account for significant individual differences in changes in substance misuse from pre- to post-incarceration.

Criminal Justice Factors: Contrary to our hypothesis, probation status was unrelated to changes in substance misuse. This is especially surprising given that inmates who are mandated to community supervision (i.e., probation, parole) following release from jail or prison are often subjected to random drug testing, whereby any detected substance use is often grounds for re-incarceration (i.e., technical violation). Of course, community supervision is not randomly mandated; it may be that the system is effective in assigning to community supervision those particularly at risk for relapse. Differential selection of risk (favoring non-probationers) may be offset by positive effects of probation (favoring probationers).

Notably, length of incarceration was largely unrelated to changes in substance use and dependence. These findings suggest that protracted sentencing of substance-involved inmates is not an effective way to aid in their rehabilitation. Neither did transfer to a second correctional facility (typically state prison) predict greater decreases in substance misuse. Incarceration in a local jail resulted in equivalent recovery, compared to inmates serving extended sentences at secondary facilities. If the goal is to decrease substance misuse, there is no evidence to support lengthy sentences or incarceration in distant prisons vs. local jails that are closer to family and community services that can be accessed post-release.

Jail-Based Treatment: Enrollment in substance abuse treatment programs was associated with sharper decreases in misuse, particularly regarding frequency of alcohol use and symptoms of marijuana dependence. The observed effects are notable given that this variable simply signified inmates requested enrollment. Actual attendance and number of sessions attended were not available from the Sheriff's database. Thus, one can regard these as lower bound estimates of treatment effects (as well as self-selection effects, as this was not a randomized evaluation).

Moral Cognitions and Emotions: The finding that criminogenic cognitions predict less pronounced decreases in substance use suggests inmates' crime-related cognitions may have an effect that extends beyond criminal activity. In the domain of substance misuse, criminogenic thinking may inhibit potentially constructive use of the period of incarceration. But for substance dependent inmates, criminogenic thinking does not predict recidivism as it does for non-substance dependent inmates (Caudy, Folk, Stuewig, Wooditch, Martinez, Maass, Tangney, & Taxman, 2015). Therefore, programs may need to address both criminogenic thinking (e.g., Folk et al., 2015; Malouf, Youman, Harty, Schaefer, & Tangney, 2013) and substance misuse in order to most effectively serve this subgroup of inmates (Taxman, 2014).

Shame- and guilt-proneness were largely unrelated to changes in substance use and dependence, with the exception of frequency of marijuana use. Shame-prone inmates showed sharper decreases in marijuana use, relative to their less shame-prone peers. This finding is surprising and difficult to interpret, given that shame-proneness is generally positively related to a history of substance misuse (Dearing, Stuewig, & Tangney, 2005), and thus this finding would benefit from replication.

Limitations and Future Directions—There are several notable limitations to the current study. First, participants were inmates recruited from a single jail. Whereas 63% of the sample was eventually transferred to another correctional facility, the jail from which participants were recruited may be different from others. This facility is especially well run, as inmates report little to no substance use during their incarceration, and in fact frequently complain about the difficulty of obtaining substances relative to other facilities. Nonetheless, the fact that inmates who were transferred to other facilities did not differ in changes in substance use or dependence compared to inmates who were not transferred, lends some support to the generalizability of this study's findings.

Second, all measures of substance use and dependence were self-reported, which could limit their accuracy. Several studies have suggested that underreporting is common when individuals are asked to report their substance use (Del Boca & Darkes, 2003; Del Boca & Noll, 2000). Ideally, in future studies, self-report would be augmented with drug-testing. Nonetheless, bias towards under-reporting cannot explain the dramatic drops in post-incarceration substance misuse, relative to pre-incarceration levels. Both were assessed via self-reports and thus presumably subject to the same bias.

Third, official records of probation status were only available for the county in which the jail resides. Since all participants in the study were sentenced in this county, they were all

eligible to be assigned probation there. We were frequently able to determine when probation was transferred from the county in which the jail resides to other jurisdictions, but not if an individual was assigned probation elsewhere. It is possible that some individuals who were not assigned probation in this county were on probation elsewhere – in other words, some of our “no” responses should be “yes.” Future research should aim to gather probation records from all relevant jurisdictions to provide a more stringent test of these hypotheses.

Finally, the study was non-experimental in nature in that there was no comparison group of individuals who engaged in criminal activity and who were not incarcerated. Ethical considerations clearly preclude random assignment to incarceration, making longitudinal analyses of change a far more feasible approach. This study presents some of the first data of its kind, but it is important to recognize these limitations in inferring causal effects of incarceration (Campbell & Stanley, 1966.).

Clinical Implications—Despite reductions in substance misuse evident in the current sample, 46% of participants still reported meaningful levels of substance dependence (i.e., meeting at least three DSM-IV criteria for substance dependence) during the first year post-release. There is much room for improvement in meeting the widespread need for substance abuse treatment among jail inmates (Taxman & Kitsantas, 2009). Substance abuse treatment programs in correctional facilities often do not accommodate the treatment needs of inmate populations (Bartlett et al., 2005), as many of these programs were developed in the community for non-offenders who often face different impediments to sobriety. The results from the current study help in identifying and understanding predictors of this naturalistic change, which can inform the design of programs that encourage this change, as well as be a starting point for future research to further examine these processes.

Our results indicate that young male inmates may warrant special attention. Young inmates were the only demographic subgroup that actually showed an increase in substance use post-incarceration, relative to pre-arrest. Moreover, on average, men showed a less pronounced decline in substance misuse than women. Young men may benefit from more concerted outreach efforts during the period of incarceration. In addition, clinicians may find it useful to develop and evaluate substance abuse interventions tailored to the specific needs and concerns of young male substance-involved offenders.

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References

American psychiatric association. Diagnostic and statistical manual of mental disorders: DSM-IV-TR. Washington, DC: Author; 2000.

- Bachman, JG.; O'Malley, PM.; Schulenberg, JE.; Johnston, LD.; Bryant, AL.; Merline, AC. The decline of substance use in young adulthood: Changes in social activities, roles, and beliefs. Psychology Press; 2014.
- Belenko S, Houser KA. Gender differences in prison-based drug treatment participation. *International Journal of Offender Therapy and Comparative Criminology*. 2012; 56:790–810. [PubMed: 21764764]
- Benjamini Y, Hochberg Y. Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society B*. 1995; 57:289–300.
- Bloom B, Owen B, Covington S. Gender responsive strategies: Research, practice and guiding principles for women offenders. National Institute of Corrections. 2003
- Brehm, JW. A theory of psychological reactance. Oxford, England: Academic Press; 1966.
- Campbell, DT.; Stanley, JC. Experimental and quasi-experimental designs. for research. Boston: Houghton Mifflin Company; 1966.
- Caudy MS, Folk JB, Stuewig JB, Wooditch A, Martinez A, Maass S, Tangney JP, Taxman FS. Does substance misuse moderate the relationship between criminal thinking and recidivism? *Journal of Criminal Justice*. 2015; 43:12–19. [PubMed: 25598559]
- Dearing RL, Witkiewitz K, Connors GJ, Walitzer KS. Prospective changes in alcohol use among hazardous drinkers in the absence of treatment. *Psychology of addictive behaviors*. 2013; 27(1):52–61. [PubMed: 22612252]
- Dearing RL, Stuewig J, Tangney JP. On the importance of distinguishing shame from guilt: Relations to problematic alcohol and drug use. *Addictive Behaviors*. 2005; 30:1392–1404. [PubMed: 16022935]
- Del Boca FK, Noll JA. Truth or consequences: the validity of self-report data in health services research on addictions. *Addiction*. 2000; 95:347–360. [PubMed: 10795351]
- Del Boca FK, Darkes J. The validity of self-reports of alcohol consumption: state of the science and challenges for research. *Addiction*. 2003; 98:1–12. [PubMed: 14984237]
- DiClemente CC, Bellino LE, Neavins TM. Motivation for change and alcoholism treatment. *Alcohol Research & Health*. 1999; 23(2):86–92. [PubMed: 10890801]
- Drapalski A, Youman K, Stuewig J, Tangney JP. Gender differences in jail inmates' symptoms of mental illness, treatment history and treatment seeking. *Criminal Behaviour and Mental Health*. 2009; 19:193–206. [PubMed: 19533597]
- Dunlap WP, Cortina JM, Vaslow JB, Burke MJ. Meta-analysis of experiments with matched groups or repeated measures designs. *Psychological Methods*. 1996; 1:170–177.
- Emrick C. Alcoholics Anonymous: Affiliation processes and effectiveness as treatment. *Alcoholism: Clinical and Experimental Research*. 1987; 11:416–423.
- Fitzmaurice G. A conundrum in the analysis of change. *Nutrition*. 2001; 17:360–361. [PubMed: 11369183]
- Folk JB, Blasko BL, Warden R, Schaefer K, Ferssizidis P, Stuewig J, Tangney JP. Feasibility and Acceptability of an Impact of Crime Group Intervention with Jail Inmates. *Victims & Offenders*, (ahead-of-print). 2015:1–19.
- Folk JB, Mashek DJ, Stuewig JB, Tangney JP, Moore KE, Blasko BL. Changes in jail inmates' community connectedness across the period of incarceration. Manuscript submitted for publication. under review.
- Gottfredson, MR.; Hirschi, T. A general theory of crime. Stanford, CA: Stanford University Press; 1990.
- Haney C. The psychological impact of incarceration: Implications for post-prison adjustment. Prisoners once removed: The impact of incarceration and reentry on children, families, and communities. 2003:33–66.
- Hanson RK, Tangney JP. The test of self-conscious affect—social deviance (TOSCA-SD) version. Unpublished manuscript. 1996
- Hequembourg AL, Dearing RL. Exploring shame, guilt, and risky substance use among sexual minority men and women. *Journal of Homosexuality*. 2013; 60:615–638. [PubMed: 23469820]

- Hiller ML, Knight K, Simpson DD. Prison-based substance abuse treatment, residential aftercare, and recidivism. *Addiction*. 1999; 6:833–842. [PubMed: 10665073]
- Jackson KM, Sher KJ, Gotham HJ, Wood PK. Transitioning into and out of large-effect drinking in young adulthood. *Journal of Abnormal Psychology*. 2001; 110:378–391. [PubMed: 11502081]
- Jochman, KA.; Fromme, K. Maturing out of substance use: the other side of etiology. In: Scheier, LM., editor. *Handbook of Drug Use Etiology: Theory, Methods and Empirical Findings*. Washington, DC: American Psychological Association; 2010. p. 127-147.
- Karberg, JC.; James, DJ. Substance dependence, abuse, and treatment of jail inmates, 2002. (NCJ 209588). Washington, DC: Government Printing Office; 2005.
- Khantzian EJ. A contemporary psychodynamic approach to drug abuse treatment. *The American Journal of Drug and Alcohol Abuse*. 1986; 12:213–222. [PubMed: 3332557]
- Knight, K.; Simpson, DD.; Hiller, ML. Outcome assessment of correctional treatment (RSAT Final Report). Fort Worth: Texas Christian University, Institute of Behavioral Research; 2002.
- Kouyoumdjian FG, McIsaac KE, Liauw J, Green S, Karachiwalla F, Siu W, Korchinski M. A systematic review of randomized controlled trials of interventions to improve the health of persons during imprisonment and in the year after release. *American Journal of Public Health*. 2015; 105(4):e13–e33. [PubMed: 25713970]
- Krishnan A, Wickersham JA, Chitsaz E, Springer SA, Jordan AO, Zaller N, Altice FL. Post-release substance abuse outcomes among HIV-infected jail detainees: Results from a multisite study. *AIDS and Behavior*. 2012; 17(2):171–180.
- Langan NP, Pelissier BM. Gender differences among prisoners in drug treatment. *Journal of Substance Abuse*. 2001; 13:291–301. [PubMed: 11693453]
- Laub, JH.; Sampson, RJ. *Shared beginnings, divergent lives: Delinquent boys to age 70*. Cambridge, MA: Harvard University Press; 2009.
- Lindsay-Hartz J. Contrasting experiences of shame and guilt. *American Behavioral Scientist*. 1984; 27:689–704.
- Longshore D, Hsieh SC, Anglin MD. Ethnic and gender differences in drug users' perceived need for treatment. *Substance Use & Misuse*. 1993; 28:539–558.
- Malouf, ET.; Youman, K.; Harty, L.; Schaefer, K.; Tangney, JP. Accepting guilt and abandoning shame: A positive approach to addressing moral emotions among high-risk, multi-need individuals. In: Kashdan, TB.; Ciarrochi, J., editors. *Mindfulness acceptance, and positive psychology: The seven foundations of well-being*. Oakland, CA: New Harbinger Publications; 2013. p. 215-239.
- Moore KE, Gregorian MJ, Tangney JP, Folk JB, Stuewig JB, Salatino AC. Changes in jail inmates' employment and other areas of community integration from pre- to post-incarceration. Manuscript submitted for publication. under review.
- Morey, LC. *The personality assessment inventory professional manual*. Odessa, FL: Psychological Assessment Resources; 1991.
- Nagin DS. Criminal deterrence research at the outset of the twenty-first century. *Crime and Justice*. 1998; 23:1–42.
- National Survey on Drug Use and Health. (n.d.). ICPSR Data Holdings. 2015.
- Nelson, Dees, & Allen. The first month out: Post incarceration experiences in New York City. *Federal Sentencing Reporter*. 2011; 24(1):72–75.
- Paulhus DL, Robins RW, Trzesniewski KH, Tracy JL. Two replicable suppressor situations in personality research. *Multivariate Behavioral Research*. 2004; 39:303–328. [PubMed: 26804578]
- Pelissier B, Wallace S, O'Neil JA, Gaes GG, Camp S, Rhodes W, Saylor W. Federal prison residential drug treatment reduces substance use and arrests after release. *The American Journal of Drug and Alcohol Abuse*. 2001; 27:315–337. [PubMed: 11417942]
- Peters RH, Kearns WD, Murrin MR, Dolente AS, May RL. Examining the effectiveness of in-jail substance abuse treatment. *Journal of Offender Rehabilitation*. 1993; 19:1–39.
- Peugh J, Belenko S. Substance-involved women inmates: Challenges to providing effective treatment. *Prison Journal*. 1999; 79:23–44.

- Shinkfield AJ, Graffam J. Community reintegration of ex-prisoners: Type and degree of change in variables influencing successful reintegration. *International Journal of Offender Therapy and Comparative Criminology*. 2009; 53(1):29–42. [PubMed: 18063748]
- Simpson, DD.; Knight, K. TCU data collection forms for correctional residential treatment. Fort Worth: Texas Christian University, Institute of Behavioral Research; 1998.
- Stafford MC, Warr M. A reconceptualization of general and specific deterrence. *Journal of Research in Crime and Delinquency*. 1993; 30:123–135.
- Stuewig J, Tangney JP, Heigel C, Harty L, McCloskey L. Shaming, blaming, and maiming: Functional links among the moral emotions, externalization of blame, and aggression. *Journal of Research in Personality*. 2010; 44:91–102. [PubMed: 20369025]
- Stuewig J, Drapalski A, Youman K, Durbin K, Zaveri P, Tangney J. Cruel and unusual punishment revisited: Changes in symptoms of mental illness among jail inmates across the period of incarceration. in preparation.
- Bartlett, C.; Dinsmore, J.; Gilbert, JM.; Kornblum, A.; Latham, J.; Oliff, H.; Sutton, D. Treatment Improvement Protocol (TIP) Series 44. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2005. Substance Abuse Treatment for Adults in the Criminal Justice System.
- Sykes GM, Matza D. Techniques of neutralization: A theory of delinquency. *American Sociological Review*. 1957; 22:664–670.
- Tangney JP. Assessing individual differences in proneness to shame and guilt: development of the Self-Conscious Affect and Attribution Inventory. *Journal of Personality and Social Psychology*. 1990; 59:102. [PubMed: 2213483]
- Tangney, JP.; Dearing, R. Shame and guilt. New York: Guilford Press; 2002.
- Tangney JP, Mashek D, Stuewig J. Working at the social-clinical-community-criminology interface: The George Mason University Inmate Study. *Journal of Social and Clinical Psychology*. 2007; 26:1–21. [PubMed: 21572973]
- Tangney JP, Stuewig J, Mashek DJ. Moral emotions and moral behavior. *The Annual Review of Psychology*. 2007; 58:345–372.
- Tangney JP, Stuewig J, Mashek D, Hastings M. Assessing jail inmates' proneness to shame and guilt: Feeling bad about the behavior or the self? *Criminal Justice and Behavior*. 2011; 38:710–734. [PubMed: 21743757]
- Tangney JP, Stuewig J, Furukawa E, Kopelovich S, Meyer PJ, Cosby B. Reliability, validity, and predictive utility of the 25-item Criminogenic Cognitions Scale (CCS). *Criminal Justice and Behavior*. 2012; 39:1340–1360. [PubMed: 24072946]
- Taxman FS. Second Generation of RNR: The importance of systemic responsivity in expanding core principles of responsivity. *Fed. Probation*. 2014; 78:32.
- Taxman FS, Kitsantas P. Availability and capacity of substance abuse programs in correctional settings: A classification and regression tree analysis. *Drug and Alcohol Dependence*. 2009; 103(Suppl 1):S43–S53. [PubMed: 19395204]
- Treeby M, Bruno R. Shame and guilt-proneness: Divergent implications for problematic alcohol use and drinking to cope with anxiety and depression symptomatology. *Personal and Individual Differences*. 2012; 5:613–617.
- Visher, CA.; Courtney, SM. Cleveland prisoners' experiences returning home. Washington, DC: Urban Institute; 2006.
- Vito GF. Developments in shock probation: A review of research findings and policy implications. *Emerging Issues in Probation and Parole*. 1984; 48(2):22–31.
- Walters GD. The psychological inventory of criminal thinking styles: I. Reliability and preliminary validity. *Criminal Justice and Behavior*. 1995; 22:307–325.
- Walters GD. The psychological inventory of criminal thinking styles (PICTS) A review and meta-analysis. *Assessment*. 2002; 9:278–291. [PubMed: 12216785]
- Wegner DM, Schneider DJ, Carter SR, White TL. Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology*. 1987; 53:5–13. [PubMed: 3612492]
- Wiechelt SA, Sales E. The role of shame in women's recovery from alcoholism. *Journal of Social Work Practice in the Addictions*. 2001; 1:101–116.

Williams VSL, Jones LV, Tukey JW. Controlling error in multiple comparisons, with examples from state-to-state differences in educational achievement. *Journal of Educational and Behavioral Statistics*. 1999; 24:42–69.

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Highlights

- In Study 1, professionals from Psychology and Criminology ($n = 162$) and laypersons ($n = 50$) predicted that jail inmates' substance misuse would change little from pre-incarceration to postrelease.
- In Study 2, a longitudinal study of 305 jail inmates, frequency of substance use and dependence decreased substantially from pre-incarceration to one-year post-release. Sharper decreases were observed for inmates who were female, younger, more educated, serving longer sentences, enrolled in substance abuse treatment, high in shame-proneness, and low in criminogenic thinking. Race, first time incarceration, transfer to other correctional facilities, mandated community supervision (probation), and guilt-proneness did not predict changes in substance use or dependence.
- Although substance misuse decreased, this remains a population high in need of substance abuse treatment both upon arrest and at one year post-incarceration; 60% of former inmates met at least one DSM-IV criterion for substance dependence at one year post-release.

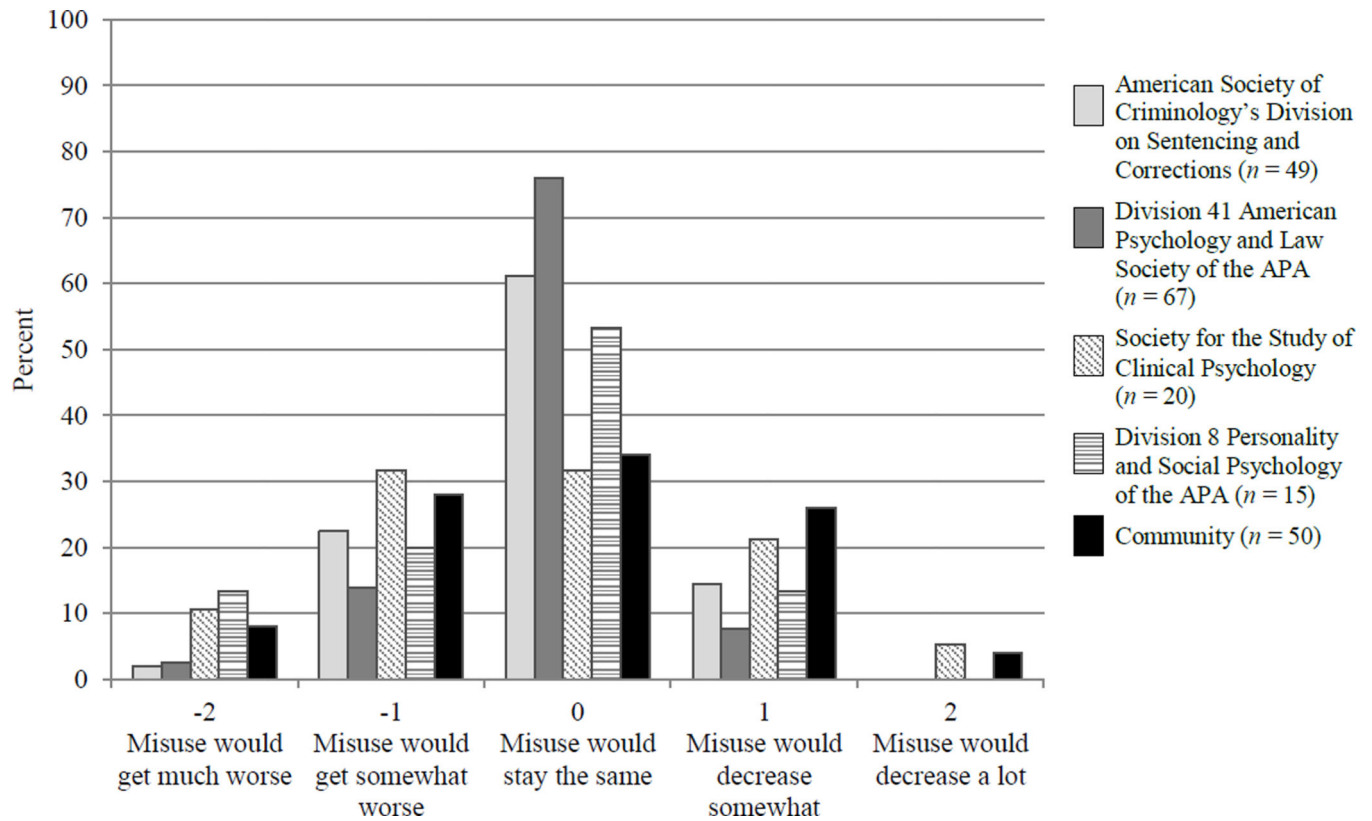


Figure 1.
Survey of Professionals and Community: Substance Misuse

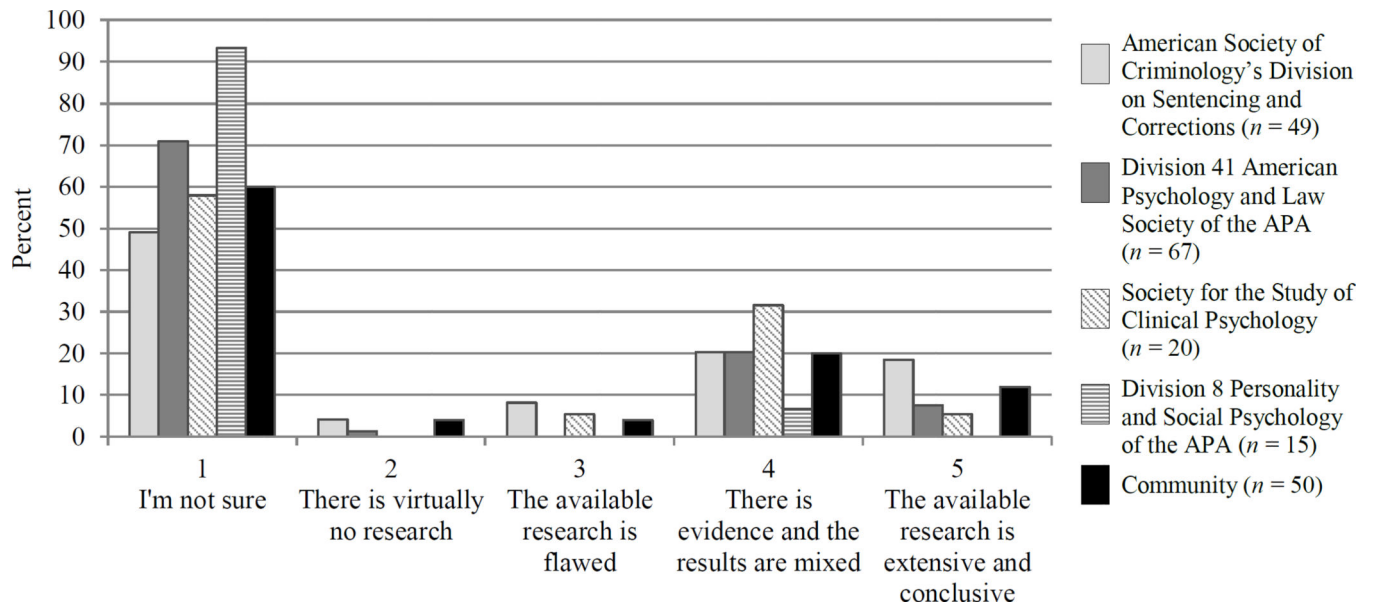


Figure 2.
Survey of Professionals and Community: Empirical Evidence

Table 1

Changes in TCU Substance Use and Dependence from Pre- to Post-Incarceration

	Time 1 M (SD)	Time 2 M (SD)	Difference M (SD)	t-value	Cohen's d	Correlation between Time 1 & 2	T1 predicting difference score β
Alcohol							
Frequency	3.39 (2.40)	2.82 (2.46)	-0.57 (2.45)	4.04***	.23	.49***	-.49***
Dependence	0.75 (1.03)	0.56 (0.94)	-0.19 (0.97)	3.34***	.19	.51***	-.56***
Marijuana							
Frequency	2.04 (2.68)	1.14 (2.26)	-0.90 (2.45)	6.39***	.36	.52***	-.62***
Dependence	0.44 (0.85)	0.22 (0.56)	-0.23 (0.79)	4.97***	.31	.43***	-.77***
Hard Drugs							
Frequency	1.63 (2.18)	0.75 (1.49)	-0.88 (1.88)	8.12***	.45	.53***	-.74***
Dependence	0.81 (1.12)	0.40 (0.80)	-0.41 (0.95)	7.59***	.41	.56***	-.71***

Note.

 $p < .001$;

$n = 300-305$. Time 1 = Year prior to incarceration; Time 2 = One year post-release; d was calculated using the formula t_c described in Dunlap, Cortina, Vaslow, & Burke (1996) because simulations show it has the least distortion in estimating d; *TCU Frequency of Use Values*: 0- "never", 1- "Less than once a month", 2- "1 time per month", 3- "1 to 3 times per month", 4- "1 to 2 times per week", 5- "3 to 4 times a week", 6- "5 to 6 times a week", 7- "Daily", to 8= "more than once a day". Symptoms of Dependence are scored on a different scale regarding occurrence of symptoms: 0 - "never", 1- "1 time only", 2- "2 to 3 times", 3- "4 to 6 times", to 4- "7 or more times".

Table 2

Predictors of Individual Differences in Change in Substance Use and Dependence

	Alcohol		Marijuana		Hard Drugs	
	Frequency β	Dependence β	Frequency β	Dependence β	Frequency β	Dependence β
Demographic						
Gender (Male)	.18***	.12*	.11*	.08*	.08*	.07 ^t
Race (Black)	.07	.06	.05	.00	.05	.01
Education	-.13**	-.10*	-.04	-.06	-.05	-.04
Age	-.20***	-.07	-.15**	-.13***	-.01	-.03
Criminal Justice						
On Probation	-.07	-.08	.08	.10	-.01	.06
First Jail Experience	-.03	.03	.02	.03	-.02	-.03
Length of Incarceration	-.06	-.04	-.10*	-.06	-.04	-.03
Release vs. Transfer/Release	.03	-.02	.03	-.02	-.02	-.04
Jail Based Treatment						
Substance Tx Enrollment	-.18***	-.06	-.07	-.11**	-.04	-.06
Moral Emotion and Cognition						
Guilt-Proneness	-.03	.00	-.01	-.01	-.02	.00
Shame-Proneness	-.04	.00	-.14**	-.04	.05	.03
Criminogenic Cognitions	.13*	.13**	.12*	.12**	.09*	.09*

Note.

^t $p < .10$,* $p < .05$,** $p < .01$,*** $p < .001$. $n = 287-305$ except for Race where $n = 250-254$ and Probation Status where $n = 137-139$. Standardized beta coefficients are given. Gender: 0 = Female, 1 = Male; Race: 0 = White, 1 = Black.