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A Pilot Study of a Brief Motivational Intervention for Incarcerated Drinkers

Mandy D. Owens, M.S.[1,2] and **Barbara S. McCrady, PhD**[1]

[1]Center on Alcoholism, Substance Abuse, and Addictions, University of New Mexico, Albuquerque, New Mexico

[2]University of Washington School of Medicine, Seattle, Washington

Abstract

Almost half of convicted jail inmates have an alcohol use disorder and many are released to environments that put them in contact with network members and cues that make them more likely to relapse on alcohol or drugs. Given the high-risk period immediately following release, the purpose of this study was to examine the efficacy of a brief motivational intervention administered just prior to release to increase substance use treatment entry and attendance, decrease alcohol and drug use, and change social networks for inmates with alcohol use disorders. Forty adult male inmates with AUDs were consented into the study and randomized to a motivational intervention or the control condition (an educational intervention), and then were contacted to do a one-month follow-up interview (62.5% completed this interview). Results indicated that conducting these interventions was feasible and considered extremely helpful by participants. Although there were no significant group differences, medium to large effect sizes suggest possible benefits from the motivational intervention in decreasing days of alcohol and drug use and increasing abstinence, and reducing the proportion of heavy drug users or users of any kind in the social network. Future studies should replicate these findings in larger sample sizes and over longer follow-up time periods. Results may have implications for the use of brief intervention strategies at jails for inmates with AUDs.

Keywords

alcohol; brief interventions; inmates; jail; motivational interviewing; substance use

1. Introduction

Of the seven million adults currently involved in the criminal justice system (CJS), approximately two million individuals are incarcerated in prison or jail (Glaze & Parks, 2012). Almost half of individuals incarcerated in jail meet criteria for an alcohol use

Correspondence concerning this article should be addressed to Mandy D. Owens, 8762 Sand Point Way NE, Seattle, Washington, 98115, USA. mandyo@unm.edu. Phone: 509-393-9055.

disorder (AUD) per the Diagnostic and Statistical Manual of Mental Disorders-TR-IV (American Psychiatric Association, 2000), which is a greater proportion than individuals incarcerated in state or federal prisons (Compton, Dawson, Duffy, & Grant, 2010). One-third of convicted jail inmates reported being under the influence of alcohol at the time of their offense, with a higher percentage among incarcerated offenders of violent crimes reporting have been under the influence of alcohol (37.6%; Bureau of Justice Statistics, 2010). The positive association between alcohol use and involvement with the CJS suggests that therapeutic interventions aimed at helping individuals decrease their alcohol use may be one way to lower the number of people who are rearrested and reincarcerated in the United States. There is strong evidence for the efficacy of substance use treatment in reducing alcohol and drug use and criminal recidivism for individuals with AUDs and other substance use disorders involved with the CJS (Bahr, Masters, & Taylor, 2012; Chandler, Fletcher, & Volkow, 2009; Coviello et al., 2013; DeMatteo et al., 2013; French et al., 1993; Kleiman & Heussler, 2011). The types of treatments in prison or jail settings that have empirical support are limited, but include therapeutic communities, cognitive behavioral treatments, 12-step meetings (Bahr et al., 2012), and mindfulness meditation (Bowen et al., 2006). Although some research has been done on substance use treatments in prisons and jails, most clinical research on offenders with AUDs has been done with individuals living in the community (e.g., drug courts).

1.1. Brief and Motivational Interventions

Motivational interventions include therapies that incorporate motivational interviewing and other motivational enhancement methods (Miller & Wilbourne, 2002). Motivational interventions are efficacious for individuals with AUDs (e.g., Motivational Enhancement Therapy; Project MATCH Research Group, 1997) and often have been incorporated into brief interventions, which may be a good alternative when longer treatments are not available or are too expensive (Hallgren, Greenfield, Ladd, Glynn, & McCrady, 2012; Moyer, Finney, & Swingergen, 2002). Motivation has been purported to be an important factor for individuals in substance use treatment (Hunter-Reel, McCrady, Hildebrandt, & Epstein, 2010), and is an area of concern for individuals involved with the CJS who are being referred or mandated to treatment (Kinlock, Sear, O'Grady, Callaman, & Brown, 2009). Research on motivational interventions for CJS-involved individuals is growing and there already are promising findings of increased treatment retention for adults in outpatient treatment (Lincourt, Kuettell, & Bombardier, 2002) and substance use outcomes among adolescents supervised by the juvenile justice system (Stein et al., 2011). Others also are examining the benefits of in-person and computer delivered motivational interviewing strategies with probationers (Taxman, Walters, Sloas, Lergch, & Rodriguez (2015). Utilizing brief interventions that target motivation could be helpful in improving treatment, substance use, and criminal recidivism outcomes for incarcerated individuals with AUDs being released from jail. However, few studies beyond Lincourt and colleagues (2002) have examined brief motivational interventions for offenders specifically, highlighting an area of research that could help to address the large number of incarcerated individuals with AUDs.

1.2. Social Support

There is strong evidence for the role of social support and social networks in alcohol and other drug use outcomes (Longabaugh, Wirtz, Zywiak, & O'Malley, 2010; Owens & McCrady, 2014). Many types of network members have been shown to influence individuals' relapses to alcohol and other drugs. Having a larger percentage of non-drinking friends in the network has been linked with better treatment outcomes (Zywiak, Longabaugh, & Wirtz, 2002) and, similarly, having more drinking friends has been associated with poorer outcomes (Mohr, Averna, Kenny, & Del Boca, 2001). Researchers also have highlighted the importance of social networks for offenders (Lemieux, 2002; Litt & Mallon, 2003). Owens and McCrady (2014) found that reductions in the proportions of heavy drug users in the social network mediated substance use from pre- to post-incarceration and that the first month was the most critical time for implementing changes in the social network after release from jail. The connection between social networks and relapse has been established for both drinkers in treatment and offenders with substance use disorders, suggesting that targeting post-release social networks may be an effective method for decreasing substance use and recidivism rates for individuals with AUDs being released from jail.

1.3. Current Study

Individuals with AUDs comprise a major proportion of jail inmates and yet most alcohol treatment studies have not sampled this high-risk group. The strong support for alcohol treatments such as brief and motivational interventions suggests that implementing these approaches with inmates with AUDs could improve post-release outcomes. Further, social networks appear to influence the substance use of offenders recently incarcerated, particularly during the first month out of jail. The accrued evidence on brief interventions and the importance of the social network suggests that utilizing a brief motivational intervention with inmates with AUDs could be beneficial. In particular, an intervention focused on substance use and social networks provided just prior to the release from jail could decrease inmates' risk for relapse and criminal recidivism, and help to address the gap in the literature on effective treatments for incarcerated individuals with AUDs.

The first aim of the current study was to test the feasibility of providing a brief motivational intervention that targets substance use treatment attendance, alcohol and drug use, and social networks for adults with alcohol problems being released from jail. Based on previous research on brief interventions, it was hypothesized that a brief motivational intervention would be feasible as evidenced by the intervention being rated as "moderately" or "very helpful" on post-intervention reaction questionnaires completed by participants and therapists (see descriptions of questionnaires below). The second aim tested the efficacy of a brief motivational intervention for increasing entry and attendance at substance use treatment, decreasing alcohol and drug use, and changing social networks after release from jail. It was hypothesized that compared to a control condition, participants in the motivational intervention condition would engage in more help-seeking behaviors (i.e., greater rates of substance use treatment entry and more days attending substance use treatment) after release from jail, would use alcohol and other drugs less (as measured by percent days abstinent from alcohol and drugs), and reduce the proportion of heavy drinkers

and drug users among their social network members. The third aim focused on potential mechanisms of behavior change for this brief motivational intervention; it was hypothesized that motivation and confidence to attend substance use treatment, decrease alcohol and drug use, and change social networks would significantly mediate pre- to post-incarceration attendance at substance use treatment, abstinence, and changes in substance using social network members, respectively.

2. Material and methods

2.1. Participants

With the support of a large detention center in the Southwest, 40 adult males incarcerated at this facility were recruited for the study. Participants were recruited using presentations made within units at the detention center. An additional 10 males were consented into the study and completed the intervention; however, changes in study staff and resources interfered with contacting participants for additional, optional follow-up interviews. Namely, the principal investigator (M.O.) changed institutions and funding was not available for on-site research assistants. Thus, data from these participants were excluded from final analyses.

2.1.1. Inclusion criteria—Initial inclusion criteria included (a) recent legal involvement related to alcohol or drug use (e.g., committing crimes under the influence of alcohol or drugs, driving while intoxicated), (b) being sentenced with a release date in less than 30 days, to find individuals who were relatively close to being released from jail; and (c) being available for follow-up interviews after release from jail. Information provided on the slips received by the study staff were cross-referenced with inmate information to verify that inmates were sentenced and had a release date within 30 days. Inmates who met the three initial screening criteria were contacted at the jail to complete additional in-person screening, which included the following inclusion criteria: (a) moderate or high alcohol use involvement in the 3 months prior to incarceration, as measured by the National Institute on Drug Abuse-Modified Alcohol, Smoking, and Substance Involvement Screening Test; (b) current incarceration or having an arrest within the year prior to incarceration that was related to alcohol or drugs, which may have included but was not limited to driving while intoxicated, drug possession, being under the influence of alcohol or drugs while committing a crime, or probation violations because of alcohol or drug use; and (c) scheduled for release from jail within 14 days.

2.1.2. Exclusion criteria—Exclusion criteria included: (a) not being proficient in English, because many of the measures were not available in other languages; (b) being unwilling or unable to provide any post-release location information (at least two points of contact), which precluded them from being reached for the follow-up assessment; (c) being unable to complete a follow-up interview in Albuquerque, NM; (d) currently participating in the detention center methadone maintenance therapy program, as these inmates had substantially different experiences related to substance use treatment during their incarceration than other inmates (e.g., daily interaction with treatment staff); (e) experiencing active psychotic symptoms, as indicated by the Structured Clinical Interview

for DSM-IV Diagnoses psychotic screening (First, Spitzer, Gibbons, & Williams, 2002), as current psychotic symptoms might have interfered with individuals' abilities to complete self-report measures accurately; and (f) exhibiting gross cognitive impairment as measured by the Mini-Mental Status Exam at the time of screening, which might have interfered with the accuracy of the data collected.

2.2. Measures

2.2.1. National Institute on Drug Abuse-Modified Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST)—The ASSIST was administered to determine if individuals had significant alcohol involvement in the three months prior to incarceration. Overall the ASSIST shows good reliability (Cronbach's alpha reliability ranged from 0.75-0.88; Hides et al., 2009). For the current study, alphas were 0.81 for questions about alcohol, 0.85 for cannabis, 0.97 for opiates, and 0.98 for methamphetamine.

2.2.2. Mini-Mental Status Examination (MMSE)—The MMSE was used to identify cognitive impairment (cutoff score of 20; Folstein, Folstein, & McHugh, 1975). The MMSE has been used previously to measure cognitive function of substance abusers (Smith, Horton, Saitz, & Samet, 2006). In the present sample, the Cronbach's alpha for the MMSE was 0.71, suggesting acceptable internal reliability.

2.2.3. Measures of motivation and confidence—Measures of motivation and confidence to attend substance use treatment services, decrease or stop using alcohol and other drugs, and change social networks after release from jail were assessed at the start of the baseline interview and at the end of both interventions. The format of these questionnaires was based on the Readiness Ruler (LaBrie, Quinan, Schiffman, & Earleywine, 2005). Cronbach's alphas ranged from acceptable for assessing baseline motivation and confidence to decrease substance use (0.76) to good for assessing motivation and confidence to attend substance use treatment and change social networks (0.90, 0.83, respectively).

2.2.4. Demographic information—The CASAA Demographic Interview form (CASAA Research Division, 1997) is a self-report measure used to collect participants' demographic information, including age, education levels, race/ethnicity, income, and other information. Demographic information was used to help determine the generalizability of the study results.

2.2.5. Important People Drug and Alcohol Interview (IPDA)—The IPDA is a revised version of the Important People and Activities interview (Beattie & Longabaugh, 1999) that asks participants to list members in their social network, as well as the importance, supportiveness, drinking and drug use status, and support for substance use treatment of each network member (Owens & Zywiak, in press; Zywiak et al., 2009). Longabaugh et al. (1998) found that the earlier version, the Important People Interview, had high 2-3 day test-retest reliability ($r = 0.95$). During the baseline interview the IPDA captured participants' social networks in the 4 months prior to incarceration and at the follow-up interview it assessed social networks since release.

2.2.6. Addiction Severity Index (ASI)—The Addiction Severity Index 5th edition (McLellan et al., 1992) measures the impact of individuals' substance use on seven domains of their lives. The ASI has been administered to criminal justice populations (Hiller et al., 2009) and homeless individuals (Zanis, McLellan, Cnaan, & Randall, 1994), and has been used in substance use treatment settings (French et al., 2002). Leonhard, Mulvey, Gastfriend, and Shwartz (2000) found modest internal consistency for the alcohol and drug sections of the ASI (Cronbach's alphas of 0.84 and 0.69, respectively) and for the criminal history section (0.65). The alcohol and drug use sections of the ASI were used to assess previous treatment and twelve-step group attendance; and the criminal history section was used to assess participants' criminal history and included their current charges and time incarcerated.

2.2.7. Alcohol and Substance Use Form-90 (Form-90)—Alcohol and drug use before and after jail were assessed using the Form-90. The Form-90 has shown consistent results for retests with the same interviewer, with correlation coefficients of 0.93-0.99 for the recent alcohol and drug use sections (Tonigan, Miller, & Brown, 1997). The Form-90 included a calendar portion to measure substance use and asks participants to provide "anchor dates", such as birthdays and major events, to help reduce recall bias. Data from the Form-90 were used to calculate percent days abstinent from both alcohol and drugs (PDA). Information on the Form-90 also was used to assess pre- and post-incarceration substance use treatment and 12-step group attendance. The Form-90 QF was administered at the baseline interview to measure substance use treatment and 12-step attendance and alcohol and drug use in the past 30 days of incarceration (or less if the participant had been incarcerated for <30 days).

2.2.8. Post-intervention reaction questionnaires (for participants and therapists)—After participants finished the post-intervention questionnaire of motivation and confidence they completed a brief questionnaire (7 items) assessing their perception of the intervention, which included a rating of helpfulness (Likert-type, 0-10, 0 being "not at all helpful" and 10 being "extremely helpful"). Therapists also completed a post-intervention reaction questionnaire after finishing either intervention. The post-intervention reaction questionnaire for therapists was used to gather information about the feasibility and administration of the treatment intervention.

2.2.9. Test of blood alcohol content (BAC)—Prior to reviewing the consent form and beginning the follow-up interview, participants' BACs were tested using either a digital breathalyzer or BAC strips to verify that they were not under the influence of alcohol. No individuals had a positive BAC prior to reviewing the consent form. If participants' BACs were between 0.02 and under 0.08 prior to the follow-up interview, study staff asked them to reschedule the appointment or they were asked to wait until their BACs were below 0.02.

2.2.10. Urine analysis—Although previous studies have shown consistent results between participants' self-reported substance use and urine analyses for drug use (e.g., Owens & McCrady, 2014), a urine analysis (Six Drug [THC/Coc/Opi/Amph/Mamph/Benzo] Dip Test) was performed on-site at the follow-up interview. Urine analyses were not

completed for interviews at the detention or a public location to help protect confidentiality of the participant.

2.3. Procedures

2.3.1. Recruitment and screening—Presentations about the study were conducted within units of approximately 60 inmates and interested inmates could complete an information slip. Information slips were crosschecked with jail information to verify that interested inmates currently were sentenced and with a release date in 30 or less days. If inmates reported being sentenced with their release scheduled in less than 30 days, any alcohol or drug related arrest in the 12 months prior to incarceration, and were willing to provide post-release location information, they were screened and completed the MMSE interview. If inmates were found to be ineligible, they were thanked and their names were detached from their information slips and destroyed appropriately.

2.3.2. Baseline procedures—All baseline interviews were held in a private room at the detention center that had windows to ensure the safety of the inmate and study staff, but offered auditory confidentiality. Participants were consented an average of 6.7 days prior to their release (*SD* = 3.9; range of 1 to 13).

2.3.2.1. Informed consent—A Federal Certificate of Confidentiality was obtained for this study, which provided additional privacy protection from legal requests. Prior to the informed consent process, research staff informed individuals of the procedures around testing their blood alcohol contents and asked individuals to provide their verbal consent indicating that they understood these procedures. Individuals then proceeded to the informed consent process where research staff explained study procedures and highlighted the voluntary nature of the study and that it would not impact their legal status. If individuals wanted to participate, they completed an informed consent quiz that highlighted major aspects of the study, reviewed any incorrect answers, and signed the consent form.

2.3.2.2. Assessment battery—Participants completed the following questionnaires: (a) post-release location information (e.g., phone numbers, mailing and email addresses for participants, friends/family, shelters); (b) pre-intervention motivation and confidence ratings; (c) demographic information; (d) IPDA structured to assess their social networks in the four months prior to incarceration; (e) ASI criminal and treatment history sections; and (f) Form-90 structured for the 90 days prior to incarceration and the Form-90 QF for the 30 days prior to the baseline interview to capture their substance use and treatment attendance while incarcerated. Participant location information and the pre-intervention motivation and confidence questionnaire always were completed first. The other measures were counterbalanced across participants. After completing these measures, participants were randomized to one of the two conditions using computer-generated assignment that randomly assigned each ID number to a group, but did not calculate group assignment for the full sample (thus, by chance, groups were not balanced).

Once randomized, participants proceeded to the intervention with a therapist for either the motivational interviewing or education. At the end of the intervention therapists

administered the post-intervention questionnaires that assessed motivation and confidence, as well as reactions to the interventions, which were sealed in an envelope, and thanked the participants. Therapists also completed a post-intervention reaction questionnaire. After the baseline intervention, study staff had $15 gift card stored with the inmate's property.

2.3.3. Treatment conditions—Both interventions were approximately 50-60 minutes (M = 57:03, SD = 5:43) and were delivered by advanced clinical psychology graduate students who were trained in motivational interviewing and had experience in delivering brief motivational interventions. Study therapists conducted both interventions to reduce therapist bias and interventions were recorded for supervision with a certified motivational interviewing trainer and to assess treatment fidelity. Study therapists and research assistants were crossed when possible for baseline interviews and always were crossed for follow-up interviews, such that follow-up interviews always were conducted by a different study staff member than was the participant's therapist. Due to scheduling and availability of study staff, 17 participants (42.5%) had the same individual collect the baseline data and conduct the intervention.

2.3.3.1. Motivational interviewing intervention (MI)—The basic format of this intervention built upon existing brief motivational interventions and used a motivational interviewing style (Miller & Rollnick, 2013). MI sessions followed a manual that targeted alcohol and other drug use, and if relevant, participants' social networks and engagement in treatment. Therapists used opened-ended questions and reflections to elicit participants' reasons to change after release from jail, and included planning when indicated. It was decided not to provide normative feedback (as would be common in Motivational Enhancement Therapy) in order to increase ecological validity, should this intervention be used in jail settings in the future without extensive assessments of participants' substance use and behaviors.

2.3.3.2. Educational intervention (EI)—For this intervention, participants watched two videos about substance use and were instructed to complete a quiz during each video to focus the participant on the material and not their own experiences. Therapists then reviewed the quizzes with the participants and corrected any incorrect answers. Therapists in this condition utilized closed-ended questions, reduced the use of reflections, and discouraged self-disclosure of participants beyond their opinions of the video or its content. For example, if participants began to talk about their own experiences with alcohol or drugs the therapist quickly redirected the conversation to the next question.

2.3.4. Follow-up interviews

Participants were contacted to schedule the follow-up interview for days 28 to 49 days after release. Interviews took place at a research center (n = 22, 88.0%), the jail if the participant was reincarcerated (n = 2, 8.0%), or a public location to reduce barriers related to transportation (n = 1, 4.0%). Of the full sample, 18 (45.0%) completed the one-month interview. An additional seven participants who missed their one-month interviews completed a three-month interview; data from the three-month interviews determined outcomes within the first month and these were used in lieu of missing one-month data for

these individuals only. In total, follow-up data were available for 25 participants (62.5%) and participants completed this interview an average of 33.5 days (SD = 7.3) after being released. For the purposes of this study, data collected at the three-month follow-up were used only to fill in data for participants who missed their one month follow-up interview.

At the start of all follow-up interviews, participants' blood alcohol contents were tested and they then completed the following questionnaires: (a) current levels of motivation and confidence; (b) IPDA to assess their social networks since being released; (c) ASI criminal and treatment history sections to assess any new arrests, charges, and treatment attendance; (d) Form-90 to assess the time period since being released from jail; and (e) a urine analysis. Participants were given a $25 (one-month interview) or $40 (three-month interview) store gift card.

2.4 Data Analysis

2.4.1. Data management

Distributions of each of the key variables were examined for non-normality and outliers (+/− 2.5 standard deviations from the mean). The substance use variables were non-normal and required arc-sin transformations; all subsequent analyses were done with these transformations. No other variables violated assumptions of normality.

There were no group differences in most baseline variables, including age, ethnicity, education, lifetime convictions or months of incarceration; pre-incarceration number of days of alcohol use, poly-substance use, and abstinence; or pre-intervention ratings of motivation and confidence to change. There were baseline group differences on arcsin transformed pre-incarceration percentage of days of nonalcohol drug use (MI: raw M = 46.0, SD = 38.4; EI: raw M = 16.0, SD = 25.9; t = 2.936, p < 0.01); however, this was unrelated to primary post-release outcomes and, therefore, was not included as a covariate in subsequent analyses.

There were no baseline differences between participants who completed at least one follow-up interview (n = 25, 62.5%) and those that did not (37.5%) for age; ethnicity; years of education; pre-incarceration substance use; lifetime number of convictions and time incarcerated; or pre-intervention levels of motivation and confidence to change substance use, go to treatment, or change their social networks. There were no group differences in follow-up rates for participants in the MI versus EI group (MI: n = 14, 60.8% of MI group; EI: n = 11, 64.7% of EI group; χ^2 (1, n = 40) = 0.061, p = 0.804).

2.4.1. Hypothesis testing

Using the effect size estimated provided by Moyer et al. (2002) of d = 0.669 and assuming 15% attrition, a priori power analyses suggested that recruiting 80 participants total (retaining 68 after attrition) would be needed to achieve power of 0.80 to find significant group differences. However, due to limited resources for the study discussed previously, only 40 participants were included in the current study.

To test the first hypothesis, that the intervention would be seen as feasible, post-intervention reaction questionnaires of participants and therapists were compared. Paired-sample t tests

were used to determine if the MI group had higher participant ratings of helpfulness than the EI condition.

To test the second aim of the study regression models tested study condition as a predictor of entry into treatment (i.e., a binary variable about any help-seeking behaviors related to their alcohol or drug use after release from jail) and the number of days in substance use treatment (formal and informal treatment, measured by the Form-90). The number of days of pre-incarceration substance use treatment was divided by three to make the baseline time period (90 days) comparable to the one-month follow-up period (mean 33 days). If there was a significant group difference in substance use treatment attendance, this variable would have been entered as a covariate in subsequent analyses for this aim. Next, regression models were used to test condition as a predictor of substance use during the time after release from jail. In these analyses, pre-incarceration treatment attendance and pre-incarceration substance use were used as covariates in their respective analyses. Alcohol and drug use while incarcerated also was examined as a significant covariate if relevant. To test group differences in social networks and to mirror analyses performed by Owens and McCrady (2014), regression models were used to test condition as a predictor of changes in the following social network variables: (a) percentage of heavy drinkers in the social network, (b) percentage of heavy drug users in the social network, and (c) percentage of users of alcohol or drugs in the social network. Similar to previous analyses in this aim, baseline values for social network variables were included as covariates.

For the third aim, fully lagged mediation models were used to test post-intervention motivation and confidence ratings separately as mediators of pre- and post-incarceration outcomes, which include substance use treatment attendance, substance use, and social network variables; and controlled for pre-intervention motivation and confidence ratings,. The mediation analyses tested the significance of each of the mediation effects using a Monte Carlo approach (Selig & Preacher, 2008), which randomly samples the data multiple times and produces a confidence interval that can be used to determine statistical significance. A priori power analyses indicated that there would be low power to detect mediation effects, but were included in this pilot study as an aim that could be incorporated into future studies.

4. Results

4.1. Participants

Figure 1 shows the flow of screening. Most individuals were ineligible for the study because they were not sentenced and did not have a scheduled release date, and after in-person screening, most individuals were ineligible because they denied drinking within the year prior to booking. As shown in Table 1, participants were, on average, in their early to mid-thirties and the majority identified as being a racial minority (total $n = 32$, 80%). Overall, this was a poly-substance using sample. Everyone reported using substances in the 90 days prior to jail despite most being on probation, with approximately equal percentages of days of alcohol use only, days drug use only, days using both alcohol and drugs on the same day, and days of complete abstinence (see Table 1). Substantial percentages of participants' social networks also were substance users ($M = 71.2$, $SD = 20.5$), and social networks

tended to have larger percentages of heavy drug users (M = 25.2, SD = 24.2) than heavy drinkers (M = 18.7, SD = 20.2).

At baseline, the full sample of participants reported feeling motivated and confident to decrease their alcohol use (M = 7.2, SD = 3.0; M = 7.6, SD = 2.5, respectively) and to decrease their drug use (M = 8.0, SD = 2.6; M = 7.3, SD = 3.1, respectively). Many endorsed the maximum ratings motivation and confidence to decrease their alcohol use (ratings of "10" or "extremely motivated/confident;" n = 13, 32.5%; n = 12, 30.0%, respectively) and to decrease their drug use (n = 19, 47.5%, n = 15, 37.5%, respectively). Only two individuals in the full sample denied having any motivation to decrease his drinking (5.0%) and no one reported a rating of "0" for motivation to decrease drug use. Relatedly, participants expressed motivation and confidence to attend substance use treatment (which also included 12-step groups; M = 6.8, SD = 3.2; M = 7.1, SD = 2.7, respectively) with many reporting maximum ratings of motivation (n = 13, 32.5%) and confidence (n = 12, 30.0%) to attend some kind of substance use treatment. Almost all participants wanted to change their social networks at least "some" (n = 11, 27.5%) or "a lot" (n = 28, 70.0%), and they were very motivated (M = 8.4, SD = 1.8) and confident (M = 7.9, SD = 2.0) about making these changes. Table 2 shows mean ratings of motivation and confidence across all three time points (baseline, post-intervention at one-month interview) for participants who completed the one-month interview only (n = 18).

4.2. Aim 1- Feasibility

The first aim of this study examined the feasibility of conducting a study on brief motivational interventions with inmates with AUDs and other substance use disorders (SUD) just prior to their release. Overall, this study was shown to be feasible in a number of domains, including recruitment; completing in-person screens, assessments, and confidential therapeutic interventions; and following-up with many participants after release.

It was hypothesized that participants in MI would rate the intervention as more helpful than those who completed the EI session. There were no significant differences in length of sessions (see Table 1; t = 1.196, p > 0.05) or participants' ratings of helpfulness (see Table 3). Participants rated both interventions as "extremely helpful." Ratings of helpfulness were unrelated to most baseline measures of substance use, with the exception of pre-incarceration percentage of days of alcohol and drug use, which was negatively related to ratings of helpfulness for participants in the EI group (r = −0.519, p < 0.05). In other words, individuals in the EI group who had more days of both alcohol and drug use rated the EI intervention as being less helpful. Therapists rated the MI condition as being more helpful for participants (M = 9.0, SD = 1.8; "extremely helpful") than the EI condition (M = 6.5, SD = 2.3; "somewhat helpful;" t = 3.925, p < 0.001).

4.3. Aim 2 - Outcomes

4.3.1. Substance use treatment—It was hypothesized that individuals in the MI group would be more likely to seek substance use treatment (formal and informal) after release, would be abstinent on more days, and would make more changes in their social networks. There were no significant differences in treatment engagement (binary assessment

of any treatment contact) or days of attendance from pre- to post-incarceration for either group. Because there also were no within- or between-group differences in treatment seeking from pre- to post-incarceration days in alcohol treatment or days in drug treatment, substance use treatment was not used as a covariate in subsequent analyses. Results showed a medium effect size in post-release treatment engagement between groups that favored the MI group ($g = 0.506$; effect sizes were estimated using Comprehensive Meta-Analysis software Version 2; Borenstein, Hedges, Higgins, & Rothstein, 2005). The effect size of study condition as a predictor of days in substance use treatment, controlling for baseline number of days was small ($g = 0.397$) where those in the MI group had more days in treatment than those in the EI group.

4.3.2. Substance use—Compared to pre-incarceration, only the MI group had significant increases in abstinence (see Table 4; MI: Pre PDA = 22.6%, Post = 67.3%, $t = -4.113$, $p < 0.01$, $g = 1.303$; EI: Pre PDA = 32.7%, Post = 65.0%, $t = -2.189$, $p = 0.053$, $g = 0.824$). Percentage of days only using drug also significantly decreased for the MI group (Pre = 49.1%, Post = 17.2%, $t = 3.025$, $p < 0.05$, $g = 0.854$), but there were no other significant within-group changes in substance use for either group.

Substance use while incarcerated was unrelated to post-release substance use and therefore was not examined as a covariate. Study condition was not a significant predictor of percentages of days of alcohol use only, drug use only, alcohol and drug use in one day, or abstinence, or rates of post-incarceration relapse after controlling for pre-incarceration substance use. Estimates of effect sizes of study condition as a predictor of substance use outcomes (controlling for baseline values) were small for percentage of days of alcohol use only ($g = 0.302$), which favored the EI group, and days of both alcohol and drug use ($g = 0.126$) and days of complete abstinence ($g = 0.294$; Table 4); both favored the MI group. There was a large effect size for the MI group in differences of percentage of days of drug use only ($g = 0.816$).

4.3.3. Social networks—Compared to social networks before coming to jail, participants in the EI group reduced the proportion of heavy drinkers in their social networks (see Table 4; $t = 2.296$, $p < 0.05$, $g = 0.779$), but participants in the MI group did not. Those in the EI group did not reduce the proportion of heavy drug users or users of any kind in their social networks after they were released. The MI group reduced both the proportion of heavy drug users ($t = 2.947$, $p < 0.05$, $g = 1.032$) and users of any kind ($t = 3.486$, $p < 0.01$, $g = 1.333$) from pre- to post-incarceration.

Study condition did not significantly predict post-release percentages of social networks that were heavy drinkers ($g = 0.148$; Table 4) but slightly favored the EI group. Although study condition did not reach statistical significance as a predictor of post-release percentage of social networks that were heavy drug users after controlling for baseline values, there was a large effect size ($g = 1.198$) in favor of the MI group. Group assignment was not a predictor of post-release percentage of social networks that were users of any kind (i.e., drinkers or drug users of any level of severity); the effect size was $g = 0.843$, where the MI group was favored.

4.4. Aim 3 - Mediation

The third aim of this study was to examine ratings of motivation and confidence to change behaviors as mediators of pre- and post-incarceration substance use treatment engagement, substance use, and changes in social networks. Motivation and confidence ratings were not significant mediators of treatment attendance, substance use, or social network variables for individuals in the MI group.

5. Discussion

The purpose of this study was to examine the feasibility and efficacy of a brief motivational intervention for individuals with alcohol and other drug use disorders administered just prior to their release from jail. This pilot study provided encouraging evidence of the feasibility of conducting brief interventions with individuals with AUDs and other SUDs just prior to their release, suggesting the viability of providing treatment to this high-risk group in the future. Overall, participants rated the MI as being “extremely helpful;” however, they also rated the control condition as “extremely helpful” and the ratings of the two interventions did not differ. Although group differences in treatment, substance use, and changes in social networks did not reach statistical significance, individuals in the MI group reported increases in abstinence and reductions in the proportions of heavy drug users and users of any kind in their social networks after release from jail, whereas the EI group did not show these changes. Further, effect sizes favored the MI over the EI condition in post-release substance use treatment attendance, days of nonalcohol drug use only and abstinence, and changes in social networks. Contrary to hypotheses, ratings of motivation and confidence for individuals in the MI group were not significantly different from those in the EI condition, and they were not mediators of substance use treatment engagement, substance use, or changes in social networks.

Conducting clinical research with incarcerated individuals with SUDs was feasible. Evidence of feasibility included having a sufficient population from which to recruit, being able to conduct confidential assessments and interventions within the jail, and finding that a brief motivational or educational intervention was well-received by participants. This study provides encouraging evidence that it is possible to do much-needed research to establish adequate interventions for this high-risk population. As anticipated, participants considered the motivational intervention to be “extremely helpful;” however, their ratings were not significantly different from the educational intervention as had been hypothesized. It is possible that there were ceiling effects for ratings of helpfulness. It also may be that the EI session was well received because the videos used in this session were non-judgmental and evidenced-based and inmates were receiving individual attention from a concerned clinician.

Although there were no significant group differences in post-release outcomes, there were promising effect sizes that ranged from small (e.g., changes in days of both alcohol and drug use, days abstinent) to large (e.g., changes in days of drug use only, changes in proportions heavy drug users in the social networks) that favored the MI condition. However, others have not found an effect of a brief MI session even with large samples of drug users (e.g., Bogenschutz et al., 2014, Roy-Byrne et al., 2014; Saitz et al., 2014). There may be methodological differences that could explain this discrepancy in findings. For example,

individuals with SUDs may be more responsive to a brief MI session in jail than in other settings (e.g., primary care, emergency rooms), because they have had more time to think about changing their substance use prior to the session. Individuals in jail also may have experienced more severe negative consequences related to their alcohol and drug use than those presenting at primary care or emergency rooms (Bogenschutz et al., 2014; Saitz et al., 2014), which may make them more similar to those presenting for substance use treatment and more able to benefit from motivational interviewing. It will be necessary to examine the efficacy of a brief MI session in a larger, more representative sample of inmates with SUDs, to see if the effect sizes from this study replicate.

Consistent with other findings with similar populations (Owens & McCrady, 2014), participants decreased their substance use and changed their social networks after release from jail. However, substance use and social network outcomes did not differ significantly between the MI and EI conditions; these results are contrary to other findings in the motivational interviewing literature (Burke, Arkowitz, & Mechnola, 2003; Lundahl, Kunz, Brownell, Tollefson, Burke, 2010). It could be difficult to detect an effect of the MI session because participants in the EI group also changed after release from jail, because of benefits from the intervention and as a result of being incarcerated. Thus, detecting an effect of MI over EI would require a more robust impact of MI than was observed; this is a phenomenon and concern shared by other researchers who did not find an effect of a brief MI session over a control condition for individuals appearing at emergency rooms because of alcohol and/or drugs (Bogenschutz et al., 2014). The null findings also could be because of the low power to detect an effect related to the small sample size and high attrition rates.

There may be other reasons why there were no significant between-group differences observed in post-release outcomes. Most individuals at this jail do not have access to substance use treatment (only 1 male “pod” out of 20 pods provides substance use treatment). Even inmates that do go to the “treatment pod” receive only group therapy and 12-step meetings; there is no individual therapy. For the current study, the control condition was an hour of individual attention and education, which was not comparable to “treatment as usual” at the jail and may have been better than what the general inmate population typically received. There also may have been no group differences because the same therapists provided both interventions. Despite training, it may be that therapists used motivational interviewing skills during the EI session, resulting in cross-contamination. Further, completing a two to three hour battery on alcohol and drug use, legal histories, and social networks may have led to assessment reactivity (Clifford, Maisto, & Davis, 2007; Epstein et al., 2005; Roy-Byrne et al., 2014) in both groups, which could have washed out significant group differences. It would have been helpful to have a control group that was not individual treatment and to compare those receiving MI to those receiving no substance use treatment (what most jail inmates get) to provide a clearer picture of the effect of the MI session.

Pre- and post-intervention ratings of motivation and confidence to change behaviors did not significantly mediate pre- to post-incarceration treatment engagement or attendance, substance use, or social networks as was predicted. It is possible that this lack of findings may be explained by the reasons discussed previously, such as low power due to small

sample size and high attrition rates. The ceiling effects of the ratings of motivation and confidence also may have limited the ability to detect mediation outcomes, because individuals already reported being extremely motivated and confident to change most behaviors, suggesting there may be other processes explaining the encouraging effects of the MI session.

5.1. Study Limitations and Strengths

There are limitations of the current study. First, the limited resources available to track participants during this difficult transition period made it difficult to follow participants after release from jail, which is consistent with other studies with forensic samples (e.g., Krishnan et al., 2013; Wallace et al., 2016) . There are concerns with high attrition rates, such as reduced power or that participants reached for follow-up would be different from other participants, which could bias results such as effect size estimates. Although individuals who provided follow-up data did not differ from those without follow-up data on baseline characteristics and substance use, the two groups may have differed on other variables that were not assessed for this study (e.g., stability of housing options after release).

A second limitation was the short follow-up assessment period, where additional and longer follow-up periods could have detected possible long-term effects of the MI session on treatment attendance, alcohol and drug use, or criminal recidivism. The one-month follow-up was chosen to increase feasibility and because previous research found that most changes of relevance to the present study occurred during the first month after release from jail (Owens & McCrady, 2014). Third, this study only sampled men, which limits generalization to female inmates. Women were recruited, but because they are less represented at the jail, recruitment was more difficult and there were not enough female participants to examine sex as a moderator.

A major contribution of the current study is in providing a description of inmates with SUDs as well as examining potential therapeutic interventions. This study also offers encouraging evidence of the feasibility of conducting research with individuals with SUDs in jails versus prisons, where most other studies with inmates have been conducted. Many components of the research design add to the strengths of this study, including the experimental design, use of empirically validated and reliable measures, and use of therapists who received extensive training and experience in conducting motivational interviewing.

5.2. Future Directions

Future studies should recruit and follow larger samples over a longer period of time to test whether or not this type of intervention leads to positive outcomes and if changes persist over longer time periods (e.g., one year post-incarceration). Following participants past one month post-release also would provide a better representation of the impact of this intervention on criminal recidivism, such as rearrest and return to jail. Future research studies should incorporate procedures to track and follow participants more consistently, which likely would be more feasible with a better-funded and staffed study.

Although there were few significant group differences between the MI and EI, effect sizes suggested that participating in a one-hour motivational intervention could help individuals to

further decrease their substance use and change their social networks when they are first released more than simple education. Further, this brief intervention would be less expensive to administer than full treatments and still lead to improved outcomes, such as reduced criminal recidivism and increases in employment; this could translate into savings that outweigh treatment costs making it appealing to administrators in justice settings. It also may be the case that providing more treatment beyond a single, brief intervention could bolster the effects of the MI session and lead to improved outcomes for individuals with SUDs being released from jail. For example, other research could build upon the current study by testing the efficacy of the four session Motivational Enhancement Therapy protocol (MET; Project MATCH Research Group, 1997), which could be adapted to also encourage changes in social networks, rather than a single MI session. The findings from such a study of MET versus a single MI session could help determine if increasing doses of treatment could provide incremental improvements in outcomes for individuals with SUDs and also could identify moderators of efficacy for each treatment condition, such as substance use severity.

It would be informative to see who benefits most or least from a single MI session, and then examine how a motivational intervention might fit into more comprehensive treatment programs offered through jails for higher-risk individuals. For example, Prendergast and Cartier (2013) are examining the effectiveness of a brief motivational intervention for low- or moderate-risk inmates while in jail, and referring those at high-risk to intensive substance use treatment in the community. Other options could include conducting brief interventions with inmates to motivate further engagement in jail programming, which could help them to enroll in health insurance, connect them outside services, teach them vocational skills (e.g., employable skills), or refer them to substance use treatment for when they are released.

5.3. Conclusions

Results highlight the clinical needs of individuals with SUDs being released from jail and provide evidence of the feasibility and efficacy of a brief motivational intervention with this population. Although there were no significant group differences in post-release outcomes, participants in the MI group used substances less often in their first month out of jail than prior to incarceration, whereas the EI group had no changes in rates of abstinences. Effect sizes also suggest that participating in the MI session may lead to decreases in percentage of days of drug use only or days with both alcohol and drugs, as well as reductions in proportions of heavy drug users or users of any kind in participants' social networks. Ratings of motivation and confidence to change behaviors did not mediate pre- to post-release improvements. Future research should replicate findings from this study and be used to inform procedures that affect this population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Individuals are at high risk for alcohol and drug relapse when released from jail.
- It is feasible to conduct brief interventions in jail settings.
- A brief motivational intervention may be helpful for inmates being released.

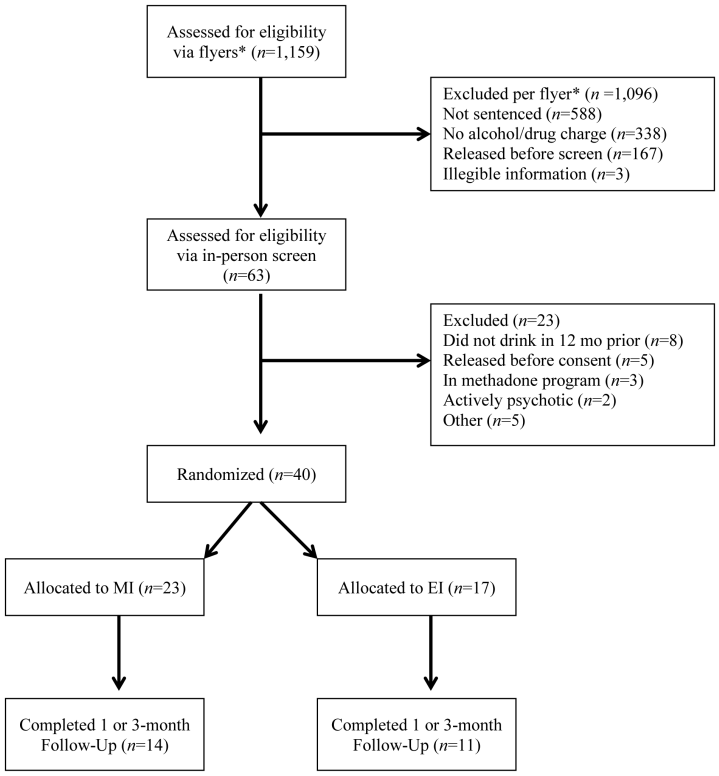

Figure 1.
Chart of study flow. *Includes flyers by females.

Table 1

Sample Characteristics

Variable	By Condition – *M* (*SD*)		
	MI (*n* = 23)	**EI (*n* = 17)**	**Total (*n* = 40)**
Male – *n* (%)	23 (100.0)	17 (100.0)	40 (100.0)
Age	34.8 (10.5)	33.7 (8.9)	34.4 (9.8)
Race – *n* (%)			
Hispanic	4 (17.4)	7 (41.2)	11 (27.5)
Non-Hispanic White	7 (30.4)	1 (5.9)	8 (20.0)
Native American/Alaskan Native	5 (21.7)	2 (11.8)	7 (17.5)
African American	3 (13.0)	0 (0.0)	3 (7.5)
Biracial/Multiracial/Other	4 (17.4)	7 (41.2)	11 (27.5)
Education (years)	11.6 (2.3)	11.1 (2.5)	11.4 (2.4)
Annual Income (dollars)	13,924 (19,256)	25,402 (27,390)	19,344 (23,820)
Days Incarcerated	146.6 (83.0) *	156.8 (93.9)	151.1 (86.9)
Lifetime Alcohol Use Disorder – *n* (%)	23 (100.0)	17 (100.0)	40 (100.0)
Current Alcohol Use Disorder – *n* (%)	15 (65.2)	14 (82.3) **	29 (72.5)
Lifetime Any Other Substance Use Disorder – *n* (%)	21 (91.3)	17 (100.0)	38 (95.0)
Current Any Other Substance Use Disorder – *n* (%)	15 (65.2)	11 (64.7)	26 (65.0)
Pre-Incarceration Network Size	7.7 (3.4)	8.3 (3.0)	7.9 (3.2)
Pre-Incarceration Percentage Heavy Drinkers	16.5 (21.2)	21.6 (19.0)	18.7 (20.2)
Pre-Incarceration Percentage Heavy Drug Users	24.8 (26.3)	25.7 (22.0)	25.2 (24.2)
Pre-Incarceration Percentage Users of Any Kind	74.9 (20.8)	66.1 (19.6)	71.2 (20.5)
On Probation at Booking – *n* (%)	21 (91.3)	13 (76.5)	34 (85.0)
Lifetime Incarceration (months)	53.7 (53.7)	41.0 (50.2)	48.3 (52.0)
Lifetime Number of Convictions	10.9 (10.8)	10.8 (6.2)	10.9 (9.0)
Pre-Incarceration Percentage of Days Alcohol Only	16.3 (25.5)	26.6 (37.4)	20.7 (31.1)
Pre-Incarceration Percentage of Days Drug Use Only	46.0 (38.4)	16.0 (25.9)	33.2 (36.5)
Pre-Incarceration Percentage of Days Alcohol and Drugs	14.5 (21.2)	25.0 (38.9)	19.0 (30.0)
Pre-Incarceration PDA	22.6 (26.5)	32.4 (31.4)	27.4 (28.9)
Length of Session	55:58 (6:14)	57:33 (4:07)	56:48 (5:26)

Notes. Substance use variables are non-transformed data.

* One individual was incarcerated for 874 days, which was more than two standard deviations above the mean, and was removed.

** Current alcohol use disorder data were missing for one participant.

Table 2

Motivation and Confidence Ratings Across All Time Points

Variable	By Condition – *M* (*SD*)					
	MI (*n* = 9)			EI (*n* = 9)		
	Pre	Post	1 Month	Pre	Post	1 Month
Motivation to Decrease Drinking	8.3 (2.3)	8.9 (1.3)	7.9 (3.6)	5.6 (3.9)	7.9 (2.9)	7.2 (3.2)
Confidence to Decrease Drinking	7.4 (3.2)	8.3 (1.7)	9.3 (1.4)	7.0 (3.1)	7.9 (2.3)	7.4 (3.6)
Motivation to Decrease Drug Use	8.0 (2.0)	8.9 (1.5)	7.9 (1.9)	7.9 (3.7)	8.4 (2.9)	7.8 (2.8)
Confidence to Decrease Drug Use	7.0 (3.4)	8.1 (1.8)	8.0 (1.9)	7.2 (3.4)	7.7 (2.9)	8.0 (3.0)
Motivation to Seek Substance Treatment	6.3 (3.8)	6.6 (3.8)	4.6 (4.6)	6.6 (4.1)	6.7 (3.8)	6.1 (3.5)
Confidence to Seek Substance Treatment	7.0 (3.0)	6.9 (4.0)	4.6 (4.6)	7.6 (3.5)	7.6 (3.1)	6.9 (3.2)
Motivation to Change Social Network	8.9 (1.4)	9.3 (0.9)	8.3 (1.8)	8.3 (2.1)	8.4 (1.8)	7.9 (2.0)
Confidence to Change Social Network	8.2 (1.6)	8.8 (1.6)	8.1 (1.8)	7.8 (2.2)	8.4 (1.7)	7.7 (2.2)

Note. Only ratings for participants who completed the one-month interview are reported.

Table 3

Group Differences in Substance Use and Social Network Variables Post-Intervention Outcomes (Aim 1)

Variable	By Condition – *M* (*SD*)					
	MI (*n* = 23)		EI (*n* = 17)		β	*g*
	Pre	Post	Pre	Post		
Intervention Helpfulness – Participant		8.7 (1.6)		9.3 (1.2)	-0.190	-0.407
Intervention Helpfulness – Therapist		9.0 (1.8)		6.5 (2.3)	0.537	1.210
Motivation to Decrease Drinking	7.5 (2.7)	8.3 (2.3)	6.8 (3.3)	7.9 (2.5)	0.010	−0.123
Confidence to Decrease Drinking	7.7 (2.4)	8.3 (1.6)*	7.5 (2.6)	7.9 (2.1)	0.072	0.107
Motivation to Decrease Drug Use	7.9 (2.4)	8.6 (1.6)*	8.1 (2.9)	8.6 (2.4)	0.034	0.099
Confidence to Decrease Drug Use	7.0 (3.3)	8.0 (2.0)**	7.5 (2.9)	8.0 (2.3)	0.067	0.230
Motivation to Seek Substance Treatment	6.7 (2.9)	6.4 (3.4)	6.9 (3.5)	7.1 (3.2)	−0.078	−0.148
Confidence to Seek Substance Treatment	7.0 (2.4)	6.7 (3.2)	7.3 (3.2)	7.4 (2.7)	−0.073	−0.131
Motivation to Change Social Network	8.7 (1.5)	8.2 (2.1)	8.0 (2.1)	8.2 (2.1)	−0.105	−0.327
Confidence to Change Social Network	8.0 (2.0)	8.2 (2.1)	7.7 (2.1)	8.2 (2.1)	−0.141	−0.140

Notes.

***$p < 0.001$.

Paired sample *t* tests examined pre- and post-intervention within-group differences. There were no significant changes in pre- to post-intervention ratings for individuals in the EI group. Regression models included study condition as a predictor and controlled for baseline values. Negative *g*s indicate results that favored the EI group.

*$p < 0.05$;

**$p < 0.01$;

Table 4

Differences in Substance Use and Social Network Variables Pre- and Post-Incarceration (Aim 2)

Variable	By Condition – *M* (*SD*)					
	MI (*n* = 14)		EI (*n* = 11)			
	Pre	Post	Pre	Post	β	*g*
Any Substance Use Treatment Seeking – *n* (%)	4 (28.6%)	5 (35.7%)	5 (45.5%)	3 (27.3%)	0.193	0.506
Substance Use Treatment Days	0.8 (1.6)	3.3 (8.0)	1.3 (1.8)	1.2 (3.0)	0.201	0.397
Percentage of Days with Alcohol Use Only	16.4 (25.2)	14.3 (33.6)	35.4 (42.9)	22.6 (35.1)	0.097	−0.302
Percentage of Days with Drug Use Only	49.1 (40.3)	17.2 (31.7) *	15.2 (28.4)	3.9 (8.1)	0.083	0.816
Percentage of Days with Alcohol and Drug Use	11.9 (19.1)	1.2 (4.5)	16.8 (32.9)	8.5 (27.4)	−0.093	0.126
Percentage of Days Completely Abstinent	22.6 (22.5)	67.3 (41.4) **	32.7 (35.3)	65.0 (40.0)	0.087	0.294
Percentage of Networks – Heavy Drinkers	18.2 (23.8)	9.2 (19.3)	18.8 (16.6)	7.3 (11.3) *	0.067	−0.148
Percentage of Networks – Heavy Drug Users	29.3 (27.5)	7.1 (10.8) *	19.1 (18.3)	15.6 (19.3)	−0.311	1.198
Percentage of Networks – Users of Any Kind	78.3 (18.2)	45.8 (28.1) **	66.3 (23.6)	56.7 (23.7)	−0.265	0.843

Notes.

***$p < 0.001$.

Pre-incarceration substance use treatment days were divided by three to account for longer baseline time period. Paired sample *t* tests examined pre- and post-incarceration within group-differences and were done with arcsin transformed data; *M*s and *SD*s for the substance use variables show raw data. Regression models included study condition as a predictor and controlled for baseline values. Negative *g*s indicate results that favored the EI group.

*$p < 0.05$;

**$p < 0.01$;