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Individual Patient and Program Factors Related to Prison and Community Treatment Completion in Prison-Initiated Methadone Maintenance Treatment

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Abstract

While prison-initiated methadone maintenance treatment is effective, it is largely unknown as to what patient and program factors are related to outcomes. These issues were studied in a secondary analysis of data from 67 male prerelease prison inmates with preincarceration heroin addiction. Three outcomes are examined: completed prison treatment; completed 1 year of community treatment; and number of days in community treatment. Being employed ($p = .045$) during the three years prior to index incarceration was significantly and positively related to community treatment completion. Increased frequency of urine tests taken was significantly associated with a greater number of days in community treatment ($p < .001$). Limitations, policy implications, and directions for future research are discussed.

Keywords

drug abuse treatment; employment; heroin; methadone; prison

Heroin addiction is a severe problem among incarcerated individuals. Incarcerated persons in the United States, Canada, European and Asian nations, and Australia have disproportionately higher rates of heroin addiction than the general population (Dolan, Khoei, Brentari, & Stevens, 2007; Fazel, Bains, & Doll, 2007; Kanato, 2008; Kastelic, Pont, & Stöver, 2008; Kinlock, Gordon, & Schwartz, 2011). Scarce resources are devoted to

corrections-based substance abuse treatment in many nations, and many inmates with heroin addiction histories remain untreated (Dolan et al., 2007; Kastelic et al., 2008; Taxman, Perdoni, & Harrison, 2007). As a consequence, heroin addiction either continues or resumes quickly after release from incarceration (Dolan et al., 2007; Kinlock et al., 2011; Strang et al., 2006), placing newly released inmates at greater risk for death from drug overdose (Binswanger et al., 2007, 2011; Bird & Hutchinson, 2003; Farrell & Marsden, 2008; Krinsky, Lathrop, Brown, & Nolte, 2009; Merral et al., 2010; Stewart, Henderson, Hobbs, Ridout, & Knuiman, 2004) and human immunodeficiency virus (HIV) and hepatitis B and C infections (Dolan et al., 2007; Inciardi, 2008; Kanato, 2008). Heroin addiction among newly released inmates also has adverse public safety consequences as it typically results in increased criminal activity (Hough, 2002; Inciardi, 2008; Kinlock, O'Grady, & Hanlon, 2003) and reincarceration (Dolan et al., 2005; Hough, 2002; Substance Abuse and Mental Health Services Administration, 2000). Because of these circumstances, there is an urgent need to improve access to effective treatment interventions that begin during incarceration and continue in the community for inmates with heroin addiction histories (Chandler, Fletcher, & Volkov, 2009; Dolan et al., 2007; Kastelic et al., 2008; Kinlock et al., 2011; Stallwitz & Stöver, 2007).

Individual Factors

In the process of evaluating the effectiveness of such continuity of care models, it is also crucial to identify individual inmate factors associated with greater retention in treatment and successful treatment completion. Evaluations of community-based interventions independent of modality (Anglin & Hser, 1990; Hser, Evans, Huang, & Anglin, 2004; Hubbard et al., 1989; Kinlock & Gordon, 2006; Simpson, 2003) have consistently shown that individuals with longer durations of treatment have improved outcomes with regard to a variety of drug-, health-, and crime-related outcomes. Similar findings have emerged from studies of corrections-based therapeutic community (TC) treatment (Inciardi, 2008; Inciardi, Martin, & Butzin, 2004; Prendergast, Hall, Wexler, Melnick, & Cao, 2004; Zanis, Coviello, Lloyd, & Nazar, 2009) and methadone maintenance treatment (MMT) (Dolan et al., 2007; Kinlock, Gordon, Schwartz, Fitzgerald, & O'Grady, 2009) as individuals who complete both the incarceration and community phases of the intervention typically have the most favorable outcomes. Furthermore, identifying factors related to treatment retention and successful completion are important to both correctional administrators and community-based treatment providers because information is provided on types of individuals who benefit from treatment and, in contrast, persons for whom the intervention may not be appropriate (Hiller, Knight, & Simpson, 1999; Inciardi, 2008). Such information could also be used to better treat and retain individuals at high risk of early dropout (Hiller et al., 1999; Kastelic et al., 2008). Failure to appropriately match inmates to treatments may result in increased substance abuse and its associated adverse health- and crime-related consequences (Farabee, Hser, Anglin, & Huong, 2004; Inciardi, 2004, 2008). Finally, regarding the issue of which individual participant characteristics predict treatment outcome, it is important to consider both fixed (pretreatment characteristics) as well as dynamic (during-treatment factors), as both can impact outcome (Inciardi, 2008; Zanis et al., 2009). Using fixed

characteristics may help identify individuals for risk of early dropout whereas dynamic factors themselves can be modified during treatment (Inciardi, 2008).

Correction-Based MMT

Despite over 40 years of evidence documenting its effectiveness in community settings (R. E. Johnson et al., 2000; Kleber, 2008; Mattick, Kimber, Breen, & Davoli, 2008; Platt, Widman, Lidz, & Marlowe, 1998), particularly for patients who receive average methadone doses of over 60 mg (Bao et al., 2009; Kleber, 2008; Platt, 1995; dose being the most frequently studied dynamic factor) empirical research on the effects of MMT for incarcerated individuals is relatively recent (Nunn et al., 2009; Stallwitz & Stöver, 2007). The majority of this research has involved individuals who were using heroin and therefore tolerant to opioids at initiation of medication. In these circumstances, methadone maintenance is typically began at 20–30 mg with gradual increases to a stable dose of at least 60 mg (Dolan et al., 2005; Stallwitz & Stöver, 2007; Tomasino, Swanson, Nolan, & Shuman, 2001). Quasiexperimental and observational evaluations of jail-based MMT for newly arrived, heroin-dependent inmates in New York City found that it is effective in facilitating community treatment entry (Magura, Rosenblum, Lewis, & Joseph, 1993; Tomasino et al., 2001) and reducing reincarceration (Tomasino et al., 2001). In the prison setting, results of a randomized controlled trial of an Australian program indicated that heroin use during incarceration was lower among treated participants compared to wait list participants during a 4-month, in-prison follow-up (Dolan et al., 2003), and that greater retention in methadone treatment in the community was associated with lower rates of mortality, hepatitis C infection, and reincarceration at 4-year follow-up (Dolan et al., 2005). Similar to community-based research, methadone patients in both the jail-based program (Bellin et al., 1999) and prison-initiated program (Dolan, Wodak, & Hall, 1998) on a sufficiently high dose of methadone (60 mg and above) tended to have the most favorable outcomes in terms of reincarceration (Bellin et al., 1999) and heroin injection (Dolan et al., 1998). Finally, in contrast to the previous findings, in a study of a New Mexico program in which newly arrested inmates had the choice of continuing on MMT in jail, there were no differences in time to reincarceration between those who continued or refused to continue MMT, and there was no significant relationship between final methadone dose received and reincarceration (McMillan, Lapham, & Lackey, 2008).

In contrast to situations in which newly incarcerated individuals are on MMT or dependent on heroin or other opioids, there are instances in which inmates are neither on methadone nor dependent on heroin or other opioids during incarceration, although they otherwise met criteria for MMT before their index incarceration. Such inmates are likely to be at high risk for read-diction upon release and may benefit from MMT prior to reentry (Kinlock et al., 2011). Because these individuals are no longer tolerant to opioids, it is crucial that they begin methadone maintenance at a low dose, with dose induction proceeding slower (particularly at the lower doses) than for tolerant patients. Dole et al. (1969) was the first to study such an approach in a New York City jail in a randomized trial in which 12 inmates were initiated on 10 mg of methadone 10 days before release, with dosage gradually increasing to 35 mg at release. At 7–10 months post-release, these 12 inmates had lower rates of readdiction and reincarceration than 16 untreated controls. Similar to the study by

Dole and colleagues, a subsequent randomized clinical trial of in-prison MMT conducted by the present authors involved inmates who were heroin-dependent prior to incarceration but not at the time of study entry (Kinlock, Schwartz, & Gordon, 2005). This study was preceded by a small-scale pilot project which reported that it was feasible to enroll prerelease prison inmates who were previously, but not currently, opioid-dependent in opioid agonist maintenance and that this institutional intervention facilitated community-based treatment entry (Kinlock, Battjes, & Schwartz, 2005). The larger-scale, randomized clinical trial was undertaken to examine the degree to which starting methadone in prison prior to release with continued treatment in the community would be more effective than beginning methadone maintenance in the community immediately following release or providing counseling only in prison with passive referral to community treatment upon release (Kinlock, Schwartz, & Gordon, 2005). Short-term results at 1 and 3 months (Kinlock et al., 2007; Kinlock, Gordon, Schwartz, & O'Grady, 2008) postrelease and longer-term findings at 6 and 12 months postrelease (Gordon, Kinlock, Schwartz, & O'Grady, 2008; Kinlock, Gordon, Schwartz, Fitzgerald, & O'Grady, 2009) indicated that prison-initiated and community-initiated methadone treatment were superior to counseling only, and prison-initiated methadone was superior to community-initiated methadone with respect to heroin use and community-based treatment entry and retention.

Issues Needing Further Study

Although there is a growing body of evidence for the relative effectiveness of jail- and prison-initiated MMT, individual differences in response to this intervention, either during incarceration or following release to the community, have been less frequently reported. Furthermore, the relationship between individual patient factors and treatment outcomes has been primarily limited to individuals who were tolerant to opioids upon initiation of medication. Also, the relationship between methadone dose and outcome among patients who were nontolerant when medication began remains an important unanswered question.

Two studies have reported on the relationship between individual patient factors and treatment outcomes within the group of patients who were scheduled to receive medication. In their study of MMT among inmates in a New Mexico jail McMillan et al. (2008), found that older inmates and those with lower rates of prior reincarceration in that facility were less likely than other inmates to be reincarcerated. In the present authors' pilot study of opioid agonist maintenance, individuals who declined treatment were more strongly predisposed toward serious criminality, having reported a significantly younger age at commission of first crime, and were also able to achieve longer periods of abstinence from drug use following any prior incarceration (Kinlock, Battjes, & Schwartz, 2005). These findings regarding criminality are consistent with prior studies of heroin-addicted offenders in that individuals who started criminal behavior at an early age are less likely to enter drug treatment (B. D. Johnson et al., 1985) and have poorer outcomes when they do begin treatment (Hanlon, Nurco, Bateman, & O'Grady, 1998; Hiller et al., 1999). Age of onset of crime could be an important predictor of entry and retention in corrections-based MMT, as over 25 years of research evidence has consistently found that heroin-dependent individuals with histories of early criminal involvement, whose onset of crime typically precedes their initiation to heroin addiction, unlike most heroin-dependent individuals, tend to be involved

in frequent, serious crime regardless of addiction status and treatment status (Chaiken & Chaiken, 1990; Inciardi, 2008; Kinlock, Battjes, & Schwartz, 2005; Nurco, 1998). Another participant characteristic that might be important in determining outcomes in corrections-based MMT is prior abstinence from drugs following any previous incarceration. This measure appears relevant in this regard because it may be an indicator of rapid relapse (Kinlock, Battjes, & Schwartz, 2005; Nurco, 1998). There is also considerable evidence that criminally-involved MMT patients who used cocaine most frequently have experienced significantly greater levels of health and social adjustment problems, incarcerations, and unemployment (Inciardi, 2008; Kosten, Rounsaville, & Kleber, 1988; Magura, Nwaskeze, & Demsky, 1998) and are likely to drop out of treatment earlier.

In contrast to corrections-based methadone treatment, there is a wealth of data regarding factors associated with retention in treatment and positive outcomes in community-based methadone treatment. Some of the more prominent factors associated with greater retention in studies of community-based MMT include older age (Deck & Carlson, 2005; Joe, Simpson, & Broome, 1998; Magura et al. 1998), less severe pretreatment criminality (Deck & Carlson, 2005; Fiorentine, Nakoshima, & Anglin, 1999; Kelly et al., 2011; Magura et al., 1998); less severe history of multiple illicit nonopiate drug use (Saxon & Miotto, 2011; Stitzer & Chutuape, 1999), and being legitimately employed. In some studies (e.g., Magura et al., 1998), dynamic, or program, factors, such as methadone dose and the proportion of urine tests positive for opioids and cocaine, have shown to be better predictors of retention than pretreatment patient factors. In 2006, the National Institute on Drug Abuse (NIDA) compiled an online summary of major findings related to methadone maintenance treatment, during the past 40 years. Among the most prominent patient factors associated with positive outcomes in MMT according to this source were older age, no or minimal pretreatment criminal activity, being married, being legitimately employed, age at first heroin use, fewer psychological problems, and less abuse of multiple illicit nonopiate substances (NIDA International Program, 2006).

The Present Study

The present report is drawn from the completed randomized trial of prison-initiated methadone mentioned above. It examines the impact of methadone dose and other individual participant factors that have been reported to predict treatment retention and completion in the literature, summarized above, on treatment retention over a 12-month postrelease period among the individuals who were randomly assigned to receive methadone in prison and continue upon release. Regarding the individual inmate factors, three separate analyses will be conducted—one employing predictor variables identified from 40 years of research on community-based MMT, and another including factors such as age at first crime, history of cocaine use, and longest time abstinent from drugs following any previous incarceration—variables that might have more of an impact in predicting response to treatment in prison-based MMT (Kinlock, Battjes, & Schwart, 2005). A third set of predictor variables consist of program factors such as methadone dose and urine testing results.

METHOD

The Parent Study

The methods of the parent study, the first randomized clinical trial of prison-initiated methadone maintenance conducted in the United States, have been described extensively elsewhere (Gordon et al., 2008; Kinlock et al., 2007; 2008; 2009). In summary, participants were adult male prisoners who met criteria for MMT in the year prior to incarceration, had no unadjudicated charges or pending parole hearings, had 3 to 6 months remaining to serve in prison before anticipated release, and provided written informed consent to participate. Participants were randomly assigned to one of three treatment conditions: (a) counseling only—counseling in prison, with passive referral to drug abuse treatment upon release; (b) counseling and transfer—counseling in prison, with opportunity to enter methadone maintenance treatment in the community upon release; and (c) counseling and methadone—counseling and methadone maintenance in prison, with opportunity to continue methadone maintenance in the community upon release. In-prison methadone treatment and counseling and community-based MMT for participants in the counseling and transfer and counseling and methadone conditions was provided by the staff of a community-based MMT program, with the community-based MMT being provided for free up to one year post-release. Participants in these two treatment conditions were advised by treatment staff at release to report to the community-based clinic to either start or continue MMT within 10 days. Participants in these two treatment conditions began methadone at 5 mg and increased 5 mg every eighth day to a target dose of 60 mg. However, dose could be adjusted based on clinical need. Induction began at low doses and proceeded slowly because participants were not tolerant to opioids at initiation of medication. All participants were scheduled to receive, within treatment condition, 12 weekly group sessions of drug abuse education in prison. This drug education intervention, which was not evidence-based, also included an individual intake and exit interview that addressed drug treatment, housing plans, and employment plans. Participants were assessed five times during the course of the study: at baseline (study entry) and at 1, 3, 6, and 12 months postrelease. The study was approved by Friends Research Institute's Institutional Review Board.

Outcome Measures

The current analysis was conducted exclusively on participants in the counseling and methadone condition. Three outcome measures were employed: (a) completed prison treatment (yes or no), defined as staying on MMT until release; (b) completed 1 year of community treatment (yes or no); and (c) number of days in community treatment. The rationale for examining two community-based outcomes is as follows: First, regarding the first measure, there is considerable evidence that continuous enrollment for at least 1 year in MMT is needed to produce longer-term behavioral change; in other words, staying 1 year in treatment has been frequently viewed as a minimum standard for effectiveness in terms of retention and outcome (see L. Greenfield & Fountain, 2000; Joe, Simpson, & Broome, 1999; Kelly et al., 2011; Kinlock et al., 2009; MacGowan et al., 1996; Moolchan & Hoffman, 1994). Furthermore, another reason that the 1 year postrelease outcome was selected is that 1 year is the extent of time that participants will receive free MMT postrelease. Concerning the second measure, the number of days in treatment has been found to be a major

continuous predictor of a variety of favorable outcomes, including reduced heroin use and crime and increased legitimate employment, not only in MMT, but in other treatment modalities (see the Individual Factors section).

As reported elsewhere (Kinlock et al., 2009), 67 of the 71 (94.3%) participants randomly assigned to the counseling and methadone condition began prison treatment (two refused to receive MMT and two others became administratively ineligible, having been either transferred to another correctional facility and/or received additional prison time). Fifty participants completed prison treatment, 48 participants entered community treatment, and 26 completed one year of community treatment.

Assessments/Procedures

Data were obtained from two sources: (a) from participants and (b) from treatment program records. Data on pretreatment patient characteristics were obtained from participants at baseline (study entry) included the Addiction Severity Index (ASI) (McLellan et al., 1992), which assesses problem severity in the following domains: alcohol use; drug use; medical; psychiatric; family/ social; employment; and legal. Additional, more detailed historical information about criminality, criminal justice system sanctions, drug abuse, and drug abuse treatment were also obtained at baseline from a supplemental self-report questionnaire based on previous research on heroin-dependent offenders (Nurco, 1998). Information on participants' prison treatment status, community-based treatment completion status, the number of days that participants were in community treatment, methadone dose received, and the results of urine tests for opioids and cocaine required for treatment program participation were obtained from treatment program records.

Predictor variables—We conducted three separate analyses because, based on the preceding review of the literature (see the Issues Needing Further Study section), we thought it meaningful to determine which of three sets of variables would be more effective in predicting each of the three outcomes. One set would be derived from findings of community-based MMT, summarized in 2006 by NIDA, mentioned earlier, whereas the other would focus on factors that might apply more specifically to an incarcerated population. A third set of variables include those recommended by NIDA and guided by our previous research as well as program factors. We chose to do this in three separate models rather than one single large model due to the relatively small sample size. Next are the listings of the variables in each model, as well as a description of how each was measured.

Model 1: The first variable was obtained from the baseline supplemental self-report questionnaire and the remaining six variables were obtained from the baseline ASI.

1. None or minimal criminal activity (those scoring 1 in the classification). We classified each participant's lifetime (any point in the individual's life prior to the current incarceration) criminal activity according to severity as follows: 3 = violent crime, represents life-threatening aggressive behavior and involvement in one or more of the following activities: murder, manslaughter, attempted murder, rape, assault, robbery, and/or deliberately hurting animals; 2 = moderately severe to major drug sales and/or property crime, includes activity in one or more of the

following offenses: drug sales or dealing, burglary, larceny, forgery, and/or arson; and 1 = minor property crime and/or victimless crime (voluntary participation of targeted individuals); includes vandalism, shoplifting, prostitution, or other drug distribution (holding drugs, buying drugs for others, serving as a lookout for the police). This measure has been found to be useful in assessing the severity of pre-addiction criminal activity among individuals addicted to narcotic drugs (principally heroin; Kinlock, O'Grady, & Hanlon, 2003).

2. Age.
3. Marital status (married vs. not married).
4. Legitimate employment history (last 3 years before current incarceration (was legitimate employment the respondent's usual employment pattern; yes or no).
5. Age at first heroin use.
6. Extent of substance abuse involving nonopioids (a count of the total number of substances that the participant has used for 20 days or more days for at least a month prior to the current incarceration; national surveys have designated use of a substance for 20 or more days for at least a month as regular drug use; see Inciardi, 2008).

Model 2: All three variables were obtained from the baseline supplemental self-report questionnaire.

1. Age at first crime—the earliest age a participant reported any of the crimes listed previously.
2. Longest time abstinent from drugs following any previous incarceration.
3. Prior cocaine use (number of days used cocaine in the month preceding the current incarceration).

Model 3: (Employed in the prediction of the two community-based outcomes) the first variable was obtained from the baseline ASI and the others were obtained from the records of the community-based methadone program.

1. Methadone dose in the community.
2. Number of urine tests positive for opioids at the community-based MMT program.
3. Number of urine tests positive for cocaine at the community-based MMT program.
4. Number of urine tests at the community-based MMT program. (This variable is a control variable. It controls for number of urine tests conducted, so that the number of opiate-positive and cocaine-positive urines have the number of tests conducted partialled out).

Urine testing was conducted during the time that participants were enrolled in the community treatment program. Generally, more frequent (typically weekly) testing was performed at the beginning (usually the first month) of a participant's tenure at the program and less frequently (usually monthly) thereafter if the participant was performing well in treatment as determined by their counselor.

There was one change to the abovementioned measures after we examined the frequency distributions. For the measure of crime severity, 63 of the 67 (94%) participants reported committing violent crime one or more times in their lives prior to study entry. Therefore, we decided to use a different classification of severity, distinguishing participants who reported committing murder/attempted murder ($n = 16$; 23.9%) from all other participants. This type of classification has been useful in our previous research to identify individuals in our above mentioned pilot study who were randomly assigned to the condition that receives opioid agonist treatment in prison but refused to initiate medication (Kinlock, Battjes, & Schwartz, 2005) as well as to identify prison inmates with the earliest onsets of criminal activity who were disproportionately likely to torture animals as children and have family members involved in criminal activities (O'Grady, Kinlock, & Hanlon, 2007).

Statistical analysis—Logistic regression analysis (Agresti, 1990; Hosmer & Lemeshow, 1989) was used to predict that dichotomous variables of completed prison treatment and completed community treatment. The analysis predicting completed prison treatment included data on all 67 participants who began MMT in prison, whereas the analysis predicting completed one year of community treatment only included data on the 49 participants who entered community treatment. Poisson regression analysis (McCullough & Nelder, 1989) was used in the prediction of days in community treatment because the dependent variable represented counts. Data from only the 49 participants who entered community treatment were included in this analysis.

RESULTS

Participant Characteristics

Characteristics of the participants randomly assigned to begin MMT in prison, with opportunity to continue that treatment in the community, have been reported elsewhere (Kinlock et al., 2009). The participants were predominately (70%) African American; on average, they were 40 years of age at study entry, having begun their use of heroin, on average, at age 18. Although nearly 75% reported one or more prior episodes of drug abuse treatment, only 21% reported a previous episode of MMT. On average, the lifetime years of incarceration for the sample was 7.5, with their index incarceration averaging just under 2 years in duration.

Outcomes

Completed prison treatment—It is important to note that 74.6% (50 of 67) participants remained in MMT until their release from prison. Data on the reasons for dropout were obtained on 15 of the 17 participants who voluntarily discontinued prison treatment. Seven participants stopped taking MMT because they thought it was not effective or they were not sure about it. An additional four participants attributed their discontinuation to side effects of the medication; three stopped only after a few doses (two reported feeling drowsy and the other reported having an upset stomach) and one ended treatment after several weeks because he was “not feeling well.” Of the remaining four participants, one was pressured by his girlfriend to quit, another violated institutional rules and had to be detoxified because he

received additional prison time, one reported that MMT would cause liver disease, and one inmate stopped treatment because it interfered with other activities.

Results of logistic regression analyses of prison treatment completion are shown in Table 1. None of the predictor variables were statistically significant. This was found in both Models 1 and 2.

Completed 1 year of community treatment—Results of community treatment completion are presented in Table 2. Employment status (in Model 1) was significantly related to completion of MMT for one year in the community. Specifically, participants who had reported having been legitimately employed in the last three years prior to their index incarceration were more likely to complete community treatment. Of the 26 participants who completed 1 year of community treatment, 15 (57.6%) were legitimately working during this 3-year period. This proportion is nearly twice as large as the proportion of employed participants who did not complete one year of community treatment (7 of 23, or 30.4%); $\chi^2 = 3.67$; $p = .056$. None of the other predictor variables were statistically significant. In addition, although not examined in a multivariate analysis, those individuals who completed one year of MMT in the community reported significantly more days working at a legitimate job in the 12-month postrelease period than participants who did not complete 1 year of community MMT. Individuals completing 1 year of community-based MMT reported working over twice as many days as other participants, $M = 122.3$, $SD = 97.5$ vs. $M = 56.3$, $SD = 79.0$; $t(df = 65) = 3.04$; $p = .003$.

Alternatively, because previous studies (e.g., Bellin et al., 1999; Dolan et al., 1998) have found that individuals on higher (60 mg or greater) doses of methadone in prison were found to have more favorable outcomes (reduced reincarceration and heroin injection, respectively) postrelease than other patients, we examined the relationship between last dose received in prison and completion of one year of community treatment. Methadone dose in prison (defined as the last dose received in prison or prior to detoxification in instances in which participants were detoxified) was substituted for methadone dose in the community in a regression equation predicting completion of 1 year of community treatment, with all other predictor variables remaining the same. Prison methadone dose and community methadone dose were not included together as the two variables were highly correlated ($r = .62$; $p < .01$). The results were essentially the same as those reported previously predicting completion of 1 year of community treatment when community methadone dose was used as a predictor variable.

Number of days in community treatment—Results of treatment duration (number of days in community treatment) are presented in Table 3. The number of urine tests taken while in the community-based treatment (in Model 3) program was significantly related to community treatment duration ($p = .0001$). It is important to reiterate that number of urine tests taken was a control variable, and neither number of opiate-positive nor cocaine-positive urine specimens were significantly related to outcome. The greater the number of urine specimens analyzed, the longer the stay in treatment tended to be. None of the other predictor variables were statistically significant.

Furthermore, prison methadone dose was substituted for community methadone dose in a logistic regression equation predicting the number of days in community treatment, with all other predictor variables remaining the same. The results were essentially the same as those reported above predicting number of days in community treatment when community methadone dose was used as a predictor variable.

DISCUSSION

As noted previously (Gordon et al., 2008; Kinlock et al., 2007; 2008; 2009), results of this study have strongly indicated that starting nontolerant inmates on methadone approximately 3 months prior to release was feasible and effective in facilitating post-release treatment entry and retention. The current analysis builds on such results as it provides some clues about what individual and dynamic factors may be associated with treatment completion in prison and for one year in the community as well as number of days retained in community-based MMT. In addition to these results, questions for future research, detailed next, have also been generated.

First, none of the factors in either Model 1 or Model 2 were significantly associated with completion of prison treatment. To further shed light on the factors related to dropout from prison-based treatment, it is particularly important to understand participants' reasons for discontinuing MMT expressed to treatment and/or research staff. These data are limited in that reasons were not obtained for all participants who dropped out of treatment (information on such reasons was obtained from 15 of the 17, or 88.2% participants who voluntarily discontinued prison treatment), and specific questions were not asked. However, these data point out that a considerable minority of those who started this intervention had doubts of its effectiveness. There were also some non-treatment factors expressed by several participants for their not completing prison treatment (competing options to programming).

Also, in contrast to previous research involving incarcerated MMT patients (Bellin et al., 1999; Dolan et al., 1998), prison methadone dose was not significantly associated with favorable post-release outcomes. An important difference between the current study and those cited above is that in the current study, inmates were not tolerant to opiates at initiation of medication, whereas participants in the studies by Bellin et al. (1999) and Dolan et al. (1998) were heroin-dependent when MMT began. And unlike many studies of community-initiated MMT, summarized earlier in this manuscript, community methadone dose was not significantly related to community-based outcomes. Future study of corrections-based MMT patients who were not tolerant to opiates at initiation of medication using larger, more representative samples is needed to more precisely examine the relationship between methadone dose and treatment outcomes.

With regard to completion of community-based treatment, individuals with a history of legitimate employment in the 3-year period preceding the index incarceration were significantly more likely to remain in treatment throughout the 12-month post-release period. (Note that the results were essentially the same in terms of what predictor variables were statistically significant when data from 67 participants were included). In addition, individuals who completed one year of community-based MMT spent significantly more

days working at a legitimate job during the 12-month postrelease period than did participants who did not complete one year of community-based MMT. These findings are consistent with those summarized by NIDA, reported earlier, in studies of community-based MMT—that individuals with longer and more successful legitimate work histories are more likely to remain in treatment longer. Similar findings have been associated with treatment completion in other modalities, including therapeutic communities and drug-free outpatient treatment (Anglin & Hser, 1990; S. F. Greenfield, Brooks, & Gordon, 2007; Inciardi, 2008; Nurco, Kinlock, & Hanlon, 1994) and drug court treatment (Brown et al., 2011). Recovering substance abusers with more stable prior work histories have been found to have an easier time of resuming legitimate employment, refraining from drug use and crime, and engaging in other prosocial activities, including drug abuse treatment (Engelhart & Taormina, 2011).

Although prior history of legitimate employment was significantly related to community treatment completion, it was not significantly associated with the number of days in treatment, although the bivariate correlation was significant ($r = .31$; $p = .01$). It may be that both treatment retention and legitimate employment are concurrent indicators of successful reentry. Rather, the number of urine tests taken was the only significant variable predicting number of days in treatment. (Similar to the results for completion of one year of community treatment, results for the number of days in community treatment were essentially the same when data from 67 participants were included the same predictor variables were statistically significant).

Limitations and Suggestions for Future Research

This study is limited for several reasons: the relatively small sample size—because the participants were male prisoners from Baltimore and the findings cannot be generalized to female prisoners and to inmates from other geographic locations. Future studies of this nature need to be conducted on larger samples of inmates, including women and those from other geographic locations. Further, in view of the ambivalence or apparent negative view of the effectiveness of methadone maintenance treatment among a number of participants who discontinued MMT in prison, perhaps the administration of a scale or measure to assess participants' attitudes about methadone would have been helpful and needed in future research. Finally, it would also be important to obtain reasons not only for dropping out of treatment, but why participants remained in treatment.

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TABLE 1

Results of Logistic Regression Analyses of Completed Prison Treatment

	Completed prison treatment			
	Wald	OR	95% CI	P
<i>Model 1</i>				
Crime severity	.01	1.12	(.11, 11.97)	.925
Age	2.88	1.09	.99–1.19	.090
Marital status	.06	.78	(.12, 5.30)	.802
Employed	1.52	.45	(.13, 1.61)	.218
Heroin onset	2.99	.88	(.77, 1.02)	.084
Drug scale	.01	1.04	(.52, 2.11)	.906
<i>Model 2</i>				
Onset crime	1.02	.94	(.84, 1.06)	.312
Drug-free treatment	.04	.88	(.25, 3.09)	.845
Cocaine 30	1.24	1.02	(.98, 1.07)	.256

TABLE 2

Results of Logistic Regression Analyses of Completed Community Treatment

	Completed community treatment			
	Wald	OR	95% CI	P
<i>Model 1</i>				
Crime severity	.22	6.04	(.44, 83.98)	.180
Age	.20	.98	(.90, 1.07)	.656
Marital status	1.32	.25	(.04, 6.60)	.596
Employed	4.19	.25	(.07, .94)	.041
Heroin onset	.26	.96	(.81, 1.14)	.608
Drug scale	2.87	.57	(.30, 1.07)	.090
<i>Model 2</i>				
Onset crime	1.48	1.09	(.95, 1.24)	.223
Drug-free treatment	.06	.86	(.25, 2.97)	.814
Cocaine 30	.40	.99	(.95, 1.03)	.526
<i>Model 3</i>				
Age	.12	.95	(.70, 1.28)	.732
Methadone dose	.91	.95	(.85, 1.06)	.340
Urine tests	2.53	2.05	(.85, 4.70)	.111
Positive opiate	.24	1.38	(.39, 4.96)	.619
Positive cocaine	.11	1.23	(.35, 4.31)	.744

TABLE 3

Results of Poisson Regression Analyses of Days Retained in Treatment

	<u>Days in community treatment</u>		
	Wald	95% CI	Sig.
<i>Model 1</i>			
Crime severity	.93	(-.33, .97)	.336
Age	.00	(-.03, .03)	.956
Marital status	.50	(-1.15, .54)	.481
Employed	1.10	(-.68, .21)	.294
Heroin onset	.08	(-.07, .05)	.772
Drug scale	1.00	(-.34, .11)	.318
<i>Model 2</i>			
Onset crime	.01	(.06, .05)	.912
Drug-free treatment	.65	(-.79, .33)	.422
Cocaine 30	.00	(-.02, .02)	.967
<i>Model 3</i>			
Age	.17	(-.04, .03)	.677
Methadone dose	.09	(-.01, .01)	.760
Urine tests	12.27	(.01, .05)	.000
Positive opiate	.27	(-0.2, .04)	.607
Positive cocaine	.52	(-0.3, .01)	.472