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Gender Differences Among Prisoners With Pre-Incarceration Heroin Dependence Participating in a Randomized Clinical Trial of Buprenorphine Treatment

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Abstract

The primary focus of the current study is to examine whether gender and other baseline characteristics were significantly associated with more severe patterns of drug use. It involves data from 260 male and female pre-release prison inmates with pre-incarceration heroin dependence who enrolled in a randomized clinical trial of prison-initiated buprenorphine. Three outcomes are examined: 1) *Lifetime Intravenous drug use*; 2) *Lifetime number of drugs used*; and 3) *Heroin use in prison*. Regarding lifetime intravenous drug use; race ($p = .0001$), education ($p = .009$), age ($p = .0001$), and psychological treatment ($p = .028$) were significant. Concerning lifetime number of drugs used; race ($p = .0001$) and age of first crime ($p = .001$) were significant. Finally, gender ($p = .004$), was the only significant variable in terms of using heroin while in prison. All of these differences may have important clinical, treatment, and research implications, which are discussed.

Keywords

gender differences; heroin; prison

INTRODUCTION

Substantial research evidence indicates that male and female heroin addicts differ in terms of their health and drug abuse treatment needs and that these differences have important implications for treatment planning. Among heroin-dependent individuals, women are at greater risk for HIV infection than are men (Inciardi 2008; Puigdollers et al. 2004; Rowan-Szal et al. 2000a; Webber et al. 1998) through both the sharing of injection equipment and unsafe sex practices (Centers for Disease Control (CDC) 2004; Evans et al. 2003; Inciardi 2008; Rosenbaum 1997). Compared to their male counterparts, heroin-dependent women face additional challenges that increase their vulnerability for HIV infection including violent victimization by intimate partners (El-Bassel et al. 2005a, 2005b; Hearn et al. 2005;

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Shand et al. 2011) and heavy use of crack cocaine (Inciardi 2008; Webber et al. 1998). Among heroin addicts, women are more likely than men to abuse cocaine (Inciardi 1992 2001 2008), suffer from other serious medical conditions (Chatham et al. 1999; Grella & Lovinger 2012; Greenfield et al. 2011; Inciardi 2008; Rosenbaum 1997), mental health problems (Chatham et al. 1999; Greenfield et al. 2011; Rowan-Szal et al. 2000a), unemployment (Rowan-Szal et al. 2000a; Shand et al. 2011), the stress of having sole responsibility for child care (McMahon et al. 2005), and the burden of having a drug-dependent spouse or partner (Greenfield et al. 2011; Inciardi; 2008; Rosenbaum 1997). Although women typically have a later onset of first heroin use, they tend to display an accelerated progression between regular use and treatment entry, having more serious medical, behavioral, psychological, and social problems, even though they have a shorter heroin use career than men (Greenfield et al. 2011).

There is also some variation in the precocity, type, and severity of crime committed by gender among heroin-dependent persons (Chaiken & Chaiken 1990; Hser et al. 2003; Inciardi 2008). Males generally have earlier onsets of criminal activity and greater involvement in more serious offenses (Chaiken & Chaiken 1990; Inciardi, 2008; Kinlock 1995; Kinlock, O'Grady, & Hanlon 2003), whereas females are more likely to commit prostitution, shoplifting, and other covert, nonviolent crimes at high rates. Correspondingly, compared to their female counterparts, heroin-dependent men have more legal problems (Chatham et al. 1999; Pelissier & Jones 2005) and greater involvement with the criminal justice system (Inciardi 2008). In addition to differences regarding criminality, male addicts are more likely to have greater problems with alcohol abuse than are female addicts (Chatham et al. 1999; Pelissier & Jones 2005).

Despite an accumulation of research findings showing considerable gender differences in treatment needs, and emphasis by researchers and practitioners that these differences are important in delivering effective treatment to both men and women, these differences have rarely been examined in treatment outcome studies with criminal justice populations (Greenfield et al. 2011; Hser et al., 2003; Pelissier et al. 2003; Pelissier & Jones 2005). In contrast to the literature that has extensively documented gender differences among heroin-dependent and other drug-dependent individuals and studies involving individuals drawn from the general population indicating that women are more likely to use health care services than men (Bertakis et al. 2000; Kandrak, Grant & Segall 1991; Shalev et al. 2005), the literature is mixed with regard to drug abuse treatment outcomes, including outcomes for individuals who have received drug abuse treatment in prison (Greenfield et al. 2011; Pelissier et al. 2003).

RATIONALE AND PURPOSE OF THE STUDY

While it has long been documented that heroin-dependent individuals' drug use patterns vary considerably (Dolan et al. 2007; Fasel, Bains & Doll 2008; Inciardi 2008; Kinlock & Gordon 2006; Nurco 1998), and these different patterns require different types of interventions. Among these, it is important to examine gender and other variables associated with the more severe problems, such as drug injection, multiple drug use, and drug use during incarceration. These relationships have been rarely studied, particularly among recent prison populations with heroin addiction histories. Injection is important to examine in view of its association with HIV and hepatitis, and; multiple drug use because of greater risk of overdose and medical complications from drug interactions (Inciardi 2008; Kanato 2008; Lee, McNeely & Gourevitch 2011). Heroin use in prison is particularly problematic as the prison may not have appropriate treatment facilities to provide assistance in cases of overdose or other medical complications of use, and more punitive measures rather than treatment is often the response to such situations (Dolan et al. 2007). In addition, factors

associated with heroin and other drug use during incarceration have also been infrequently studied, particularly in the United States; other than immediate situational factors, such as boredom, need for relaxation, and the need to forget one's current situation (Kinlock, Gordon & Schwartz 2011). While evaluations of prison-based treatment show that among drug-dependent inmates, women are more likely to enter prison treatment than men (Belenko & Hauser 2011); with some evidence suggesting that gender-based programs may result in more favorable outcomes than standard programs (Messina et al. 2011), such evaluations have not focused exclusively on heroin-dependent individuals.

METHODS

This is an analysis of baseline (study entry) characteristics of individuals who had consented to participate in a five year National Institute on Drug Abuse (NIDA) funded randomized clinical trial of prison-initiated buprenorphine treatment. In the parent study, imprisoned males and females with pre-incarceration heroin dependence who were nearing release and met criteria (see below) for opioid agonist treatment were randomly assigned to receive buprenorphine in prison three months prior to release or receive buprenorphine immediately following release at an opioid treatment program or a community health center. All participants received 12-weeks of drug education. This study has been described in detail in a prior publication (Kinlock et al. 2010). The primary focus of the current paper is to examine whether gender and other baseline characteristics predict the more severe patterns of drug use, such as injection, multiple drug use, and heroin use in prison. This study was approved by the Friends Research Institute's Institutional Review Board (IRB) and was monitored by an external Data Safety Monitoring Board (DSMB).

Eligibility/Exclusion Criteria

Data for the present analyses were obtained from inmates who met the following criteria: 1) three to six months remaining to serve before release from prison; 2) history of heroin dependence [meeting Diagnostic and Statistical Manual of Mental Disorders (DSM-IV); criteria of dependence at time of incarceration] and being physiologically dependent during the year prior to incarceration; and 3) residing in Baltimore following release. Data on inmates with pending charges and/or pending parole hearings were excluded because of the possibility of them receiving longer prison sentences.

Participant Screening and Recruitment

A total of 353 male and female pre-release prisoners between September 2008 and May 2012 were assessed for study eligibility. Seventy nine were ineligible (22.4%), 12 (3.4%) declined further participation and 262 completed consent and baseline assessments. Two of the participants had incomplete data and were not included in the current analysis. Two hundred and sixty (73.6%) consenting participants were included in the current analyses regardless of randomization to the four treatment conditions.

Measures

Assessments included demographic information and histories of drug abuse, drug abuse treatment, criminal activity, and criminal justice system involvement. Measures included the following:

Addiction Severity Index (ASI)—The ASI is a standardized 40-60 minute clinical research instrument widely used in addiction research to quantify problem areas of alcohol/drug user populations (McLellan et al. 1992). The following areas of functioning during the prior 30 days are measured: medical condition, employment, drug use, alcohol use, illegal activities, family functioning, and psychiatric condition. The major foci within each

functional area are the number of days a problem was experienced in the past month, how troubled the individual was by that problem, and how important it was to get treatment for that problem. This instrument has good inter-rater and test-retest reliability, as well as discriminant and concurrent validity (McLellan et al., 1992).

Supplemental Questionnaire—A structured interview, used in our previous and current research (Gordon et al. 2008; Kinlock et al. 2007), was administered at baseline to obtain more detailed historical, and, in some cases, current, information than obtained with the ASI regarding drug and alcohol use, psychological problems, criminality (including frequency of committing 17 different crimes), criminal justice system supervision and sanctions, legitimate employment, and substance abuse treatment. For the baseline version of this instrument, which elicits personal historical data and for which accuracy of recall covering extended time periods is critical, interviewers were trained to structure the interview around significant life events, with temporal reference points to facilitate recall, in keeping with procedures used successfully by the authors and their colleagues at Friends Research Institute (FRI) in previous research studies (e.g., Nurco, Balter & Kinlock 1994; Nurco 1997).

AIDS Risk Assessment (ARA)—The ARA is a brief questionnaire whose items assess HIV drug-risk and HIV sex-risk behaviors over the 30-day period prior to the interview (Simpson, Knight & Ray 1993). The ARA items inquire regarding the number of times an individual participated in risky behaviors and, the number of people with whom they participated in risky activities.

Statistical Analysis

For descriptive analysis comparing men and women prior to incarceration, we compared across a number of domains to determine differences in baseline characteristics including: demographic, employment substance use, substance abuse treatment, criminal activity, physical, medical, psychological problems, and risky sexual behavior. Analysis involved nonparametric procedures (Chi-Square) and parametric procedures (*t*-tests) to determine differences between gender and specific domain variables. For the multivariate analysis, we examined three distinct models (see below).

Multivariate Outcomes

In order to examine gender differences among study participants and to examine which baseline factors are associated with heroin use in prison, we used three outcome variables in multivariate analyses. These variables are among those found in the literature to reflect the severity of substance use.

1. *Lifetime Intravenous drug use* (yes versus no) was from the ASI.
2. *Lifetime number of drugs used* (count). Each participant was given one point for every drug they reported using during their lifetime prior to index incarceration as gathered on the ASI, with a total score ranging from 1-12 (Alcohol, heroin, illicit methadone, illicit buprenorphine, other opiates, barbiturates, other sedatives, cocaine, amphetamines, cannabis, hallucinogens, inhalants).
3. *Heroin use in prison* (yes versus no). This variable was recorded by asking the participant if they have used heroin any time during their index incarceration. This question was from the supplemental questionnaire.

For models 1 and 3, a logistic regression analysis was employed whereby model two used linear regression. An alpha level of .05 was chosen to determine statistical significance. Predictor variables in all regression analyses, measured as follows, included: 1) gender; 2)

race; 3) education; 4) age; 5) age at first crime; and 6) ever treated for a psychological problem. A relatively small set of control variables was chosen for the regression analyses because of the relatively small sample size. All control variables were chosen a priori to the regression analyses. The variables were not chosen from the univariate analyses, rather from variables in the literature found to have been related to gender differences. Gender was included as the main predictor variable given the focus of the study. Other variables that previously have been found to predict gender differences with criminal justice-involved populations were included, such as age (Gordon et al., 2008; Kinlock et al., 2009; Larney, Mathers & Dolan 2007; Zanis et al. 2009); age at first crime (Hanlon et al., 1998; Hiller, Knight, & Simpson, 1999; Inciardi, 2008; Kinlock et al., 2005); and race (Hanlon et al. 1998; Nurco 1998). Women have more serious psychological problems (Grella, Scott, & Foss 2005; Hser, Evans, & Huang 2005; Inciardi 2008; Pelissier 2005). Moreover, heroin-addicted women have been found to have less education than their male counterparts (Hser, Evans, & Huang 2005). Furthermore, a review of the literature indicates that among heroin addicts, women tend to have more psychological problems, particularly mood and/or anxiety disorders, whereas men have more antisocial personality disorders (Greenfield et al. 2012). Both psychological problems in general and antisocial personality disorder in particular are associated with relatively poorer outcomes in treatment (Inciardi 2008). In addition, men are more likely to inject heroin compared to women (Greenfield et al. 2012).

RESULTS

Sample Characteristics

Men and women differed on a number of baseline characteristics (see Table 1). The study participants included 177 men and 83 women. Men were significantly more likely to be African American ($X^2 = 12.9$; $p < .001$); were older ($t(256) = -2.8$; $p < .01$), and had a higher level of education ($t(258) = -2.7$; $p < .01$), and more legitimate employment during the past 30 days ($t(258) = -2.9$; $p < .01$); and during the past 3 years ($X^2 = 4.9$; $p < .05$). Men reported using heroin on a significantly higher number of days during the past 30 days prior to incarceration than women ($t(258) = -2.7$; $p < .01$). A greater proportion of men compared to women reported using heroin during their most recent incarceration ($X^2 = 15.9$; $p < .001$). However, more women reported lifetime intravenous drug use compared to their male counterparts ($X^2 = 7.6$; $p < .05$). Men were significantly more likely to initiate criminal activity at a younger age, by an average of 3.5 years ($t(254) = 5.0$; $p < .001$). Significant gender differences were found regarding lifetime drug treatment episodes ($t(258) = 5.2$; $p < .001$) and any lifetime opioid maintenance treatment ($X^2 = 38.8$; $p < .001$) with women more likely to have had prior drug treatment and opioid maintenance treatment episodes. Significant gender differences were found regarding lifetime chronic medical problems ($X^2 = 3.8$; $p < .05$) with women reporting more chronic lifetime health problems compared to men, although there were no gender differences of self-reported health problems during the past 30 days prior to incarceration. Women were almost twice as likely as men to report lifetime treatment for psychological problems ($X^2 = 22.1$; $p < .001$). However, there were no differences in self-reported psychological problems during the past 30 days. Significant gender differences were found regarding lifetime physical abuse ($X^2 = 41.0$; $p < .001$) and sexual abuse ($X^2 = 36.9$; $p < .001$). Women were substantially more likely to suffer both physical and sexual abuse. Significant gender differences were found regarding the number of sexual partners during the past 30 days prior to the most recent incarceration ($t(258) = 2.62$; $p < .01$). Women reported a higher number of sexual partners compared to their male counterparts. There were no differences in the number of times the two groups reported having sex in the past 30 days prior to incarceration. Finally, our population it resembles national prison populations cited by Incardi 2008 with regard to disproportionate African

American ethnicity, lower education and employment status and far more active with regard to drug use and criminal activity compared to the general population

Multivariate Results

Intravenous drug use lifetime—As shown in Table 2, results from the logistic regression analysis found the following variables were significantly associated with intravenous use: race ($p = .0001$), education ($p = .009$), age ($p = .0001$), and psychological treatment ($p = .028$). Non African Americans (primarily Caucasian) compared to African Americans were twice as likely to inject drugs. Also, a history of drug injection was also related to younger age, and having experienced more psychological problems. Gender was not a significant predictor of intravenous drug use in the model.

Drug use variety—As shown in Table 3 the regression analysis found that race ($p = .0001$) and age of first crime ($p = .001$) were significantly related to the number of types of drugs participants reported using in their lifetime. African Americans reported using a greater variety of drugs compared to other races. In addition, the earlier the age of onset of criminal activity, the greater the variety of drugs used. Gender was not a significant predictor of drug use variety.

Heroin use in prison—Table 2 presents the results of the variable heroin use in prison using logistic regression analysis. Gender ($p = .004$), was the only significant variable. Male participants (42%) were more than 2 times as likely as their female counterparts (17%) to self-report heroin use during the index incarceration.

DISCUSSION

The primary aim of the present analysis was to examine whether gender and other baseline characteristics were significantly related to severity of drug use patterns as evidenced by a history of injection, of polydrug use, and of heroin use during the index incarceration. The results confirm and extend the findings of previous studies on gender differences among drug-dependent adults. In terms of demographics, the majority of men were African American, were slightly older by 3 years, and had slightly more education (completed one grade higher). In terms of substance use, men reported more days of heroin use in the 30 days prior to incarceration, being likely to use heroin in prison. However, female participants were more likely to be intravenous drug users compared to their male counterparts which are similar to findings of others (Centers for Disease Control (CDC) 2004; Evans et al. 2003; Inciardi 2008; Montgomery et al. 2002; Rosenbaum 1997). The finding that men reported committing their first crime at a significantly earlier age (by approximately 4 years) than women has also been found with these types of populations (Inciardi 1986, 2008; Kinlock, O'Grady & Hanlon 2003a).

Gender differences concerning legitimate employment and prior drug abuse treatment in the present sample resemble those found in previous studies of opioid-dependent persons. In terms of legitimate employment, men were significantly more likely to report working during the past 30 days by a 2:1 ratio compared to women and were more likely to have consistent employment during the past 3 years (Greenfield et al. 2011; Inciardi 2008). Women were more likely to have more lifetime drug treatment episodes and 40% more likely to have participated in opioid treatment in their lifetime compared to men (Greenfield et al. 2011; Inciardi 2008). With regard to the medical, psychological, and sexual/physical abuse domains, female participants were more likely to have medical problems during the past 30 days and to have been treated for psychological problems in their lifetime. In addition, female participants were more likely to have been physical and sexually abused

compared to their male counterparts. Finally, in terms of the risky sexual behavior domain, female participants were more likely to have three times as many sexual partners during the past 30 days compared to males, a finding reported previously by Inciardi (2008). Similar to the present finding, Inciardi (2008) reported that among opioid dependent individuals, women were more likely than men to engage in prostitution.

Regarding the multivariate results, being of “other” ethnicity than African American (primarily Caucasian), having less education, being of a younger age, and having a history of psychological treatment were significant predictors of a history of drug injection. Previous research, from a variety of studies, presented below, of a heterogeneous samples of drug dependent adults (most drawn from the community, with various types of drug addiction, and different urban and suburban settings in the US), reported similar findings to the current study. Regarding ethnic group membership, results of a previous study of female prisoners (Jackson et al. 2010) and one of young “street” heroin-dependent individuals (Broz & Ouellet 2008) also found that Caucasian individuals were more likely to inject than African Americans. Authors of a recent literature review (Lawson, Herrera & Lawson 2011) reported that among heroin injectors, African Americans tend to have an older age at first injection than Caucasians. Broz & Ouellet (2008) also found that younger age was associated with heroin injection in the study mentioned earlier. Finally, in another study, which differs from the current one in that frequency of injection was the dependent variable among a sample of heroin injectors, severity of depressive symptoms was significantly related to increased frequency of heroin injection (Stein et al. 2003). With respect to greater variety of drug use, earlier age of first crime and African American ethnicity were significantly related to lifetime use of a greater number of drugs. It was not altogether surprising that increased drug variety was related to early onset of crime, as this finding was reported in a previous sample of male prisoners (Chaiken & Chaiken 1990); furthermore, among both general population samples (Elliott, Huizinga & Ageton 1985; Howell & Hawkins 1998; Moffitt 1993 2006; Piquero, Farrington & Blumstein 2003 2007); prison inmates (Chaiken & Chaiken 1990; Kinlock, O’Grady & Hanlon 2003b); and opioid-addicted individuals (Inciardi 2008; Nurco 1998); the earlier the age of onset of deviant behavior, the greater the variety, as well as the frequency, severity, and persistence of subsequent deviance throughout adolescence and adulthood. Regarding the difference in race, although rates of drug use among the general population do not appear to be substantially different between African Americans and other racial groups in the United States (Lawson, Herrera & Lawson 2011), African Americans may be more subject to heroin addiction as heroin trafficking tends to be found in the poorest areas of inner cities, where ethnic minorities are more likely to live (Lawson, Herrera & Lawson 2011). However, in view of the observation that heroin is more prevalent in African American neighborhoods, Nurco (1998) reported that Caucasian heroin addicts may be more deviant than their African American counterparts. This observation seems consistent with the present study’s findings with regard to heroin injection, but not with regard to drug variety. Finally, concerning heroin use in prison, the observation that male gender was related to this was not surprising in that males tend to engage in crime and other deviant behavior and rule breaking more than women, as noted in the Introduction. However, it was surprising that age at first crime was not a significant predictor.

Individual characteristics and treatment approaches can differentially affect outcomes by gender. All of these differences may have important clinical, treatment, and research implications. Women with criminal justice involvement are more likely to have experienced psychological, sexual, and physical abuse therefore focusing on only drug addiction without the interplay of these other important domains may not be effective. Therefore, from a therapeutic vantage point a solution might be to address victimization and trauma first (Cohen et al. 2009). This is the first study, to our knowledge, that has examined treatment

needs by gender in a population of incarcerated heroin-dependent individuals. It extends the literature on differences by gender among heroin-dependent individuals by focusing specifically on three specific, severe drug-related problems.

LIMITATIONS

There are several limitations to the current study. First, the population was primarily African American males from a large US city so the results may not be generalizable to other geographic locations. Second, nearly all data obtained were based on participant self-report, which may be subject to underreporting, over reporting, and/or problems with recall given the wide range in sentences being served among our participants (Schmallegger 2010). Also, the data on crime, drug use, legitimate employment, and psychological problems were obtained for the 30 days prior to the most recent incarceration, which may not be a typical or representative period of an individual's heroin use and/or criminal careers, and extent and nature of one's history of psychological problems. In addition, the time-order of variables may raise concerns, in that it is not completely clear if each predictor, or independent variable occurred earlier in time than each outcome, or dependent variable. For example, the onset of treatment for psychological problems may have occurred after the onset of IV drug use. Finally, the issue of self-selection for study inclusion may impact generalizability.

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References

- Belenko S, Houser K. Gender Differences in Prison-Based Drug Treatment Participation. *International Journal of Offender Therapy and Comparative Criminology*. 2011 Jul 14. Epub ahead of print.
- Bertakis KD, Azari R, Helms LJ, Callahan EJ, Robbins JA. Gender differences in the utilization of health care services. *Journal of Family Practice*. 2000; 49:147–152. [PubMed: 10718692]
- Broz D, Ouellet LJ. Racial and ethnic changes in heroin injection in the United States: implications for the HIV/AIDS epidemic. *Drug and Alcohol Dependence*. 2008; 94:221–233. [PubMed: 18242879]
- Center for Substance Abuse Treatment (CSAT). Clinical Guidelines for the Use of Buprenorphine in the Treatment of Opioid Addiction. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2004. Treatment Improvement Protocol (TIP) Series 40. DHHS Publication No. (SMA) 04-3939
- Chaiken, JM.; Chaiken, MR. Drugs and predatory crime. In: Tonry, M.; Wilson, JQ., editors. *Drugs and crime*. Vol. 13. Chicago: University of Chicago Press; 1990. p. 203-239. *Crime and Justice: A Review of Research*
- Chatham LR, Hiller ML, Rowan-Szal GA, Joe GW, Simpson DD. Gender differences at admission and follow-up in a sample of methadone maintenance clients. *Substance use and Misuse*. 1999; 34:1137–1165. [PubMed: 10359226]
- Cohen LR, Tross S, Pavlicova M, Hu MC, Campbell AN, Nunes EV. Substance use, childhood sexual abuse, and sexual risk behavior among women in methadone treatment. *The American Journal of Drug and Alcohol Abuse*. 2009; 35(5):305–310. [PubMed: 19637103]
- Dolan, K.; Khoei, EM.; Brentari, C.; Stevens, A. *Prisons and drugs: A global review of incarceration, drug use and drug services*. Oxford: Beckley Foundation; 2007.
- El-Bassel N, Gilbert L, Wu E, Go H, Hill J. HIV and intimate partner violence among methadone-maintained women in New York City. *Social Science and Medicine*. 2005a; 61:171–183.
- El-Bassel N, Gilbert L, Wu E, Go H, Hill J. Relationship between drug abuse and intimate partner violence: A longitudinal study among women receiving methadone. *American Journal of public Health*. 2005b; 95:465–470. [PubMed: 15727978]

- Elliott, DS.; Huizinga, D.; Ageton, SS. Explaining delinquency and drug use. Newbury Park, CA: Sage; 1985.
- Evans JL, Hahn JA, Page-Shafer K, Lum PJ, Stein ES, Davidson PJ, Moss AR. Gender differences in sexual and injection risk behavior among active young injection drug users in San Francisco (the UFO study). *Journal of Urban Health*. 2003; 80(1):137–146. [PubMed: 12612103]
- Fasel S, Bains P, Doll H. Substance abuse and dependence in prisoners: A systematic review. *Addiction*. 2008; 101:181–191.
- Gordon MS, Kinlock TW, Schwartz RP, O'Grady KE. A randomized clinical trial of methadone maintenance for prisoners: findings at 6 months post-release. *Addiction*. 2008; 103(8):1333–1342. [PubMed: 18855822]
- Greenfield, SF.; Back, S.; Lawson, K.; Brady, KT. Women and addiction. In: Ruiz, P.; Strain, E., editors. *Substance abuse: A comprehensive textbook*. 5. Philadelphia: Lipincott Williams & Wilkins; 2011. p. 847-870.
- Grella CE, Lovinger K. Gender differences in physical and mental health outcomes among an aging cohort of individuals with a history of heroin dependence. *Addictive Behaviors*. 2012; 37(3):306–212. [PubMed: 22154506]
- Hearn KD, O'Sullivan LF, El-Bassel N, Gilbert L. Intimate partner violence and monogamy among women in methadone treatment. *AIDS and Behavior*. 2005; 9:177–186. [PubMed: 15933837]
- Hanlon TE, Nurco DN, Bateman RW, O'Grady KE. The response of drug abuser parolees to a combination of treatment and intensive supervision. *The Prison Journal*. 1998; 78:31–44.
- Hser YI, Huang D, Teruya C, Anglin DA. Gender comparisons of drug abuse treatment outcomes and predictors. *Drug and Alcohol Dependence*. 2003; 72(3):255–264. [PubMed: 14643942]
- Hser YI, Evans E, Huang YC. Treatment outcomes among women and men methamphetamine abusers in California. *Journal of Substance Abuse Treatment*. 2005; 28(1):77–85. [PubMed: 15723735]
- Grella CE, Scott CK, Foss MA. Gender differences in long-term drug treatment outcomes in Chicago PETS. *Journal of Substance Abuse Treatment*. 2005; 28(2S):S3–S12. [PubMed: 15797637]
- Inciardi, JA. *The war on drugs II: The continuing epic of heroin, cocaine, crack, crime, AIDS, and public policy*. Mountain View, CA: Mayfield; 1992.
- Inciardi, JA. *The war on drugs III*. Boston: Allyn and Bacon; 2001.
- Inciardi, J. *The War on Drugs IV*. 4. Upper Saddle River, NJ: Prentice Hall; 2008.
- Jackson L, Parker J, Dykeman M, Gahagan J, Karabanow J. The power of relationships: Implications for safer and unsafe practices among injection drug users. *Drugs: Education, Prevention, and Policy*. 2010; 17:189–204.
- Kanato M. Drug use and health among prison inmates. *Current Opinion in Psychiatry*. 2008; 21:252–254. [PubMed: 18382223]
- Kandrack M, Grant KB, Segall A. Gender differences in health related behaviour: Some unanswered questions. *Social Science & Medicine*. 1991; 32(5):579–590. [PubMed: 2017726]
- Kinlock, TW. [Doctoral dissertation]. Diss Abstr Int. Maryland: University of Maryland, 1993; 1995. Precursors and correlates of serious criminal behavior over a narcotic addiction career.
- Kinlock TW, O'Grady KE, Hanlon TE. Prediction of the criminal activity of incarcerated drug-abusing offenders. *Journal of Drug Issues*. 2003a; 33:897–920.
- Kinlock TW, O'Grady KE, Hanlon TE. The effects of drug treatment on institutional behavior. *The Prison Journal*. 2003b; 83:257–276.
- Kinlock TW, Battjes RJ, Schwartz RP. A novel opioid agonist program for prisoners: Report of post-release outcomes. *American Journal of Drug and Alcohol Abuse*. 2005; 31:433–454. [PubMed: 16161728]
- Kinlock, TW.; Gordon, MS. Substance abuse treatment: New research. In Nova Publications (Ed), *Substance abuse treatment: New research*. Hauppauge, NY: Nova; 2006.
- Kinlock TW, Gordon MS, Schwartz RP, O'Grady K, Fitzgerald T, Wilson M. A Randomized clinical trial of methadone maintenance for prisoners: Results at 1-month post-release. *Drug and Alcohol Dependence*. 2007; 91(2-3):220–227. [PubMed: 17628351]

- Kinlock TW, Gordon MS, Schwartz RP, Fitzgerald TT, O'Grady KE. Methadone maintenance for prisoners: Results at twelve-months post-release. *Journal of Substance Abuse Treatment*. 2009; 37:277–285. [PubMed: 19339140]
- Kinlock TW, Gordon MS, Schwartz RP, Fitzgerald T. Developing and Implementing a New Prison-Based Buprenorphine Treatment Program. *Journal of Offender Rehabilitation*. 2010; 49(2):91–109. [PubMed: 20473351]
- Kinlock, TW.; Gordon, MS.; Schwartz, RP. Incarcerated populations. In: Ruiz, P.; Strain, E., editors. Lowinson & Ruiz's Substance Abuse: A Comprehensive Textbook. Fifth Edition. Lippincott Williams & Wilkins; 2011.
- Larney, S.; Mathers, B.; Dolan, K. Illicit drug treatment in prison detoxification, drug-free units, therapeutic communities and opioid substitution treatment. Sydney: National Drug and Alcohol Research Centre; 2007. technical report no. 266
- Lawson, WB.; Herrera, J.; Lawson, RG. African Americans: Alcohol and substance abuse. In: Ruiz, P.; Strain, E., editors. Substance abuse: A comprehensive textbook. 5. Philadelphia: Lipincott Williams & Wilkins; 2011. p. 813-828.
- Lee, JD.; McNeely, J.; Gourevitch, M. Substance abuse: A comprehensive textbook. 5. Ruiz, P.; Strain, E., editors. Philadelphia: Lipincott Williams & Wilkins; 2011. p. 663-681.
- McLellan AT, Kushner H, Metzger D, Peters R, Grissom G, Pettinati H, Argeriou M. The fifth edition of the Addiction Severity Index: Historical critique and normative data. *Journal of Substance Abuse Treatment*. 1992; 9:199–213. [PubMed: 1334156]
- McMahon TJ, Winkel JD, Luthar SS, Rounsaville BJ. Looking for poppa: Parenting status of men versus women seeking drug abuse treatment. *American Journal of Drug and Alcohol Abuse*. 2005; 31:79–91. [PubMed: 15768572]
- Messina N, Grella C, Cartier J, Torres S. A randomized experimental study of gender responsive substance abuse treatment for women in prison. *Journal of Substance Abuse Treatment*. 2010; 38(2):97–107. [PubMed: 20015605]
- Moffitt TE. Adolescence-limited and life-course persistent antisocial behavior: A developmental taxonomy. *Psychological Review*. 1993; 100:674–701. [PubMed: 8255953]
- Moffitt, TE. Life-course persistent versus adolescence-limited antisocial behavior. In: Cichetti, D.; Cohen, DJ., editors. Developmental psychopathology: Vol 3, Risk, disorder, and adaptation. 2. Hoboken NJ: John Wiley; 2006. p. 570-598.
- Nurco DN, Balter MB, Kinlock TW. Vulnerability to narcotic addiction: Preliminary findings. *Journal of Drug Issues*. 1994; 24:292–313.
- Nurco, DN. Narcotic users: Work performance, social relationships, and other illicit drug taking; Paper presented at the National Institute of Health; Bethesda, MD. 1997.
- Nurco DN. A long-term program of research on drug use and crime. *Substance Use and Misuse*. 1998; 33:1817–1837. [PubMed: 9718181]
- Pelissier B, Jones N. A review of gender differences among substance abusers. *Crime and Delinquency*. 2005; 51:345–372.
- Pelissier BM, Camp SD, Gaes GG, Saylor WG, Rhodes W. Gender differences in outcomes from prison-based residential treatment. *Journal of Substance Abuse Treatment*. 2003; 24(1):149–160. [PubMed: 12745032]
- Piquero, AR.; Farrington, DP.; Blumstein, A. The criminal career paradigm: Background and recent developments. In: Tonry, M., editor. Crime and justice: A review of research. Vol. 30. Chicago: University of Chicago Press; 2003. p. 359-506.
- Piquero, AR.; Farrington, DP.; Blumstein, A. Key issues in criminal career research: New analyses of the Cambridge Study in Delinquent Development. New York: Cambridge University Press; 2007.
- Puigdollers E, Domingo-Salvany A, Brugal MT, Torrens M, Alvaros J, Castillo C, Magri N, Martin S, Vasquez JM. Characteristics of heroin addicts entering methadone maintenance treatment: Quality of life and gender. *Substance Use and Misuse*. 2004; 39:1353–1368. [PubMed: 15462234]
- Rosenbaum, M., editor. Drug Policy Alliance (Ed), Substance abuse: A Comprehensive Textbook. Third Edition. Baltimore, Maryland: Williams and Wilkins; 1997. Women: Research and policy, Part I; p. 654-665.

- Rowan-Szal GA, Chatham LR, Joe GW, Simpson DD. Services provided during methadone treatment: A gender comparison. *Journal of Substance Abuse Treatment*. 2000; 19:7–14. [PubMed: 10867295]
- Schmallegger, F. *Criminal justice today: An introductory text for the 21st century*. 10. Upper Saddle River, NJ: Pearson Prentice Hall; 2010.
- Shalev V, Chodick G, Heymann AD, Kokia E. Gender differences in healthcare utilization and medical indicators among patients with diabetes. *Public Health*. 2005; 119(1):45–49. [PubMed: 15560901]
- Shand F, Degenhardt L, Slade T, Nelson EC. Sex differences amongst dependent heroin users: histories, clinical characteristics and predictors of other substance dependence. *Addictive Behaviors*. 2011; 36:27–36. [PubMed: 20833480]
- Simpson DD, Knight K, Ray S. Psychosocial and cognitive correlates of AIDS-related risky behaviors. *AIDS Education and Prevention*. 1993; 5:121–130. [PubMed: 8323854]
- Stein MD, Solomon DA, Herman DS, Anderson BA, Miller I. Depression severity and drug injection HIV risk behaviors. *American Journal of Psychiatry*. 2003; 160:1659–1662. [PubMed: 12944342]
- Webber MP, Schoenbaum EE, Gourevitch MN, Buono D, Chang CJ, Klein RS. Temporal trends in the progression of human immunodeficiency virus disease in a cohort of drug users. *Epidemiology*. 1998; 9:613–617. [PubMed: 9799169]
- Zanis DA, Coviello DM, Lloyd JJ, Nazar BL. Predictors of drug treatment completion among parole violators. *Journal of Psychoactive Drugs*. 2009; 41:173–180. [PubMed: 19705679]

Table 1

Bivariate Gender Differences by Domains

Variables	Women (<i>n</i> = 83)	Men (<i>n</i> = 177)	<i>P</i> value
Demographic Domain			
Race, <i>n</i> (%)			.0001
African American	45 (54.2)	135 (76.3)	
Other	38 (45.8)	42 (23.7)	
Age, <i>M</i> (<i>SD</i>)	38.5 (8.2)	41.6 (8.5)	.006
Education, <i>M</i> (<i>SD</i>)	10.7 (1.6)	11.3 (1.7)	.007
Marital status, <i>n</i> (%)			.369
Married	34 (44.7)	18 (22.0)	
Not married	142 (55.3)	64 (87.0)	
Homeless, <i>n</i> (%) ¹	9 (10.9)	19 (10.8)	.560
Substance Abuse Domain			
Heroin use <i>M</i> (<i>SD</i>) ¹	22.0 (11.8)	25.7 (9.1)	.007
Cocaine use <i>M</i> (<i>SD</i>) ¹	15.4 (12.7)	13.5 (13.6)	.313
Age of Onset of first heroin use	20.3 (6.5)	18.9 (5.4)	.101
Heroin use in prison	14 (16.9)	64 (42.0)	.0001
IV drug use ²	56 (67.5)	87 (49.2)	.004
Criminal Activity Domain			
Crime days, <i>M</i> (<i>SD</i>) ¹	20.3 (15.5)	20.6 (12.3)	.839
Onset of criminal activity, <i>M</i> (<i>SD</i>)	16.2 (7.2)	12.4 (94.8)	.0001

Variables	Women (n = 83)	Men (n = 177)	P value
Illegal income from crime(\$), $M(SD)$	17268.46 (109593.5)	5284.8 (11191.4)	.151
Employment Domain			
Work, $M(SD)^I$	4.0 (8.2)	8.5 (12.6)	.0001
Employed past 3 years, $n(\%)$	32 (38.6)	94 (53.1)	.020
Drug Treatment Domain			
Number of Drug Treatment episodes $M(SD)^2$	5.4 (5.1)	2.5 (3.7)	.0001
Ever been in Opioid Treatment, $n(\%)^2$	54 (65.1)	44 (24.9)	.0001
Medical Problem Domain			
Medical problem, $n(\%)^2$	40 (48.2)	62 (35.0)	.035
Medical problems $M(SD)^I$	5.49(10.1)	4.7 (11.6)	.614
Psychological Problems Domain			
Psychological problems, $M(SD)^I$	6.5 (11.4)	6.0 (13.6)	.768
Ever treated for psychological problem, $n(\%)^2$	56 (67.5)	65 (36.7)	.0001
Sexual/Physical Abuse Domain			
Physical abuse, $n(\%)^2$	36 (43.3)	17 (9.6)	.0001
Sexual abuse, $n(\%)^2$	25 (30.1)	7 (4.0)	.0001
Risky Sexual Behavior Domain			
Number sexual partners, $M(SD)^I$	12.3 (47.3)	2.9 (5.2)	.009
Number times sex no condom, $M(SD)^I$	20.24 (35.07)	18.6 (30.2)	.704

1 past 30 days;
2 lifetime

Table 2Logistic Regression Results for Intravenous Drug Use and Heroin Use in Prison¹

<i>Intravenous drug use lifetime</i>	Odds Ratio	95% CI	p
Gender	1.58	.79, 3.11	.190
Race	6.92	3.25, 14.80	.0001
Education	.82	.69, .99	.033
Age	1.08	1.03, 1.12	.0001
Age first crime	.97	.93, 1.0	.241
Ever treated for a psychological problem	.52	.29, .93	.028
Heroin Use in Prison²			
Gender	.34	.16, .70	.004
Race	1.34	.68, 2.63	.393
Education	1.16	.98, 1.38	.087
Age	1.00	.97, 1.04	.822
Age first crime	.95	.89, 1.00	.082
Ever treated for a psychological problem	1.07	.59, 1.94	.826

¹Overall Model: $\chi^2 = 54.66$; $df = 6$; $p = .0001$ ²Overall Model: $\chi^2 = 24.19$; $df = 6$; $p = .0001$

Table 3Regression Results for Drug Use Variety[/]

Drug Use Variety	b	95% CI	p
Gender	.016	-.59, .62	.957
Race	-2.410	-3.01, -1.81	.0001
Education	.025	-.12, .17	.741
Age	-.023	-.07, .02	.310
Age first crime	.054	.02, .09	.001
Ever treated for a psychological problem	.450	-.08, .98	.096

[/] Overall Model: $F = 13.081$; $df = 6, 247$; $p = .0001$