

Federal Prison Residential Drug Treatment:
A Comparison of Three-Year Outcomes For Men and Women

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Abstract

The effectiveness of Federal prison-based residential drug and alcohol treatment programs was evaluated using event history procedures modified to accommodate a test of selection bias since participants could not be randomly assigned to treatment. Gender differences and similarities in the effectiveness of treatment and in predictors of post-release outcomes were examined. There were 1,193 treatment and 1,122 comparison subjects. The gender split was 1,842 men and 473 women. The results indicated that subjects who would have entered and completed in-prison residential treatment were less likely to be arrested and use drugs 3 years after their release than comparison subjects. The separate analyses for men and women showed that the results were statistically significant for men but not for women. When we tested differences in coefficients between the models, only two variables indicated gender differences in the prediction of post-release outcomes. The data suggested that there are many common background characteristics that men and women share that affect their post-release success.

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Introduction

The continued increase in the size of the U.S. prison population and the high percentage of prisoners with a history of drug use led to an expansion of prison-based drug treatment programs in the 1990's. Evaluations of prison-based drug treatment programs (including aftercare treatment) typically report that treatment lowers recidivism (as measured by arrests, reconvictions and return to prison), decreases post-release drug use, and curtails self-reported illegal activities (Field, 1985; Field, 1992; Inciardi, Martin, Butzin, Hooper, & Harrison, 1997; Knight, Simpson, Chatham, & Camacho, 1997; Knight, Simpson, & Hiller, 1999; Martin, Butzin, Saum, & Inciardi, 1999; Pelissier et al., in press; Wexler, DeLeon, Thomas, Kressel, & Peters, 1999; Wexler, Falkin, Lipton, & Rosenblum, 1992; Wexler, Melnick, Lowe, & Peters, 1999). Nonetheless, some evaluations do not report positive effects for prison-based drug treatment programs. For example, Hartmann, Wolk, Johnston, & Colyer, (1997) found lowered recidivism but not decreased drug use among graduates of prison-based drug treatment. Further, Eisenberg (1997) and Eisenberg & Reed (1999) did not find positive effects of treatment in either two-year and three-year follow-up periods until they separated treatment completers from treatment non-completers. A similar pattern of findings indicating no statistically significant differences between a treatment and comparison group was also reported in evaluations of two residential prison-based treatment programs for women in California and Illinois (Gransky & Jones, 1995; Jarman & Lowe, 1993).

One of the major differences between those evaluations which report positive effects of treatment and those which do not is in the categorization of treatment subjects. Those which report positive effects generally use treatment graduates to measure the effect of treatment. In contrast, those which do not report positive effects generally have contrasted the outcomes of the combined group of treatment completers and treatment non-completers with a comparison group. When selection into and out of treatment is nonrandom, such as is the case with treatment

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completion versus non-completion, observed differences between the control group and the treatment group may be due in part, or entirely, to differences in the composition of the respective groups. The effect of treatment is confounded with the effect of selection processes, and there is no simple means of disentangling the two. This represents one aspect of what is referred to in the evaluation literature as the problem of selection bias. The logic of a design where all experimental subjects – those who complete and do not complete treatment – assigned to treatment are compared to all subjects not assigned to treatment is not followed in many prison-based drug treatment evaluation studies.

With the exception of Rhodes et al. (in press), selection bias is typically not addressed by those conducting prison-based drug treatment evaluations, despite the fact that selection bias has been recognized in program evaluation literature and literature on research methodology as a pernicious problem in conducting evaluation research (Berk, 1983; Cochran & Rubin, 1973; Cook & Campbell, 1979; Heckman, 1979; Kisker & Brown, 1997; Moffitt, 1991; Mohr, 1992; Reichardt & Mark, 1998; Rindskopf, 1986; Rosenbaum & Rubin, 1984; Rossi, Freeman, & Lipsey, 1999; Shadish, Cook & Houts, 1986; Stolzenberg & Relles, 1997; Wainer, 1986; Winship & Mare, 1992). Furthermore, several researchers in the drug treatment field have recognized, and some have even addressed, the problem of bias due to selective admission, selective participation, selective detection, and differential follow-up response rates (Ager, 1992; Aiken, Stein, & Bentler, 1994; Fortney, Booth, Zhang, Humphrey, & Wisemen, 1998; Johnson & Gerstein, 1999; Landry, 1997). A recent report on comparative costs and benefits of correctional drug treatment programs did not calculate effect size for five of the 17 evaluation studies because these studies included program graduates only (Aos, Phipps, Barnoski, & Lieb, 1999).

In addition to the problems faced by prison-based program evaluations, a review of the drug treatment literature highlights the limited information available pertaining to gender. Martin, Butzin, Saum and Inciardi's (1999) mixed-gender study of correctional treatment programs in Delaware, where 19% of the participants were women, found no overall gender difference in the percent drug-free or the percent arrest-free after release. The authors did not find gender to be predictive of outcome in their multivariate analyses where outcome was measured as either arrest

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or drug use. In addition, there are several outcome studies of female only prison programs (Gransky & Jones, 1995; Jarman & Lowe, 1993; Prendergast, Wellisch, & Wong, 1996), but they do not contribute to our knowledge about gender differences. Rhodes et al. (in press) found that when treatment was measured as the conditional probability of completing treatment, men were less likely than women to recidivate and use drugs after release. Secondly, the selection bias parameter indicated that men who volunteered for and completed treatment were more likely to recidivate than non-volunteers. Finally, by measuring and controlling for selection bias, the impact of treatment was greater than had there not been an explicit assessment of selection bias. There was no evidence of selection bias operating among women, nor was there evidence that treatment impacted women's drug use or recidivism.

The limited information on gender differences in prison-based drug treatment outcome evaluations contrasts with a large body of literature arguing for gender-specific treatment (Bloom, 1998; Covington & Surrey, 1997; Drabble, 1996; Fiorentine, Pilati, & Hillhouse, 1999; Lockwood, McCorkel, & Inciardi, 1998; Moras, 1998; Morash, Bynum, & Koons, 1998; Wallen, 1998; Wellisch, Prendergast, Anglin, & Owen, 1993), an emerging literature on gender differences among drug users, and mixed conclusions in the non-prison based drug treatment literature. These other areas of research might help to inform us about where to begin to address the gap in knowledge about gender differences in drug treatment outcomes and recovery processes.

In general, literature on gender differences among drug users has consistently found that women have a greater number of life problems than men. Although research is limited, the few studies of incarcerated female drug users mirror the findings of non-incarcerated users (Henderson, 1998; Langan & Pelissier, in press; Peters, Strozier, Murrin, & Kearns, 1997). Furthermore, many of these gender differences parallel gender differences found within non-offender populations. Women are more likely to have employment problems, mental health problems, and family problems (Byqvist, 1999; Chatham, Hiller, Rowan-Szal, Joe, & Simpson, 1999; Davis & DiNitto, 1996; Fiorentine, Anglin, Gil-Rivas, & Taylor, 1997; Greenfeld & Snell, 1999; Griffin, Weiss, Mirin, & Lange, 1989; Inciardi, Lockwood, & Pottieger, 1993; Kingree,

1995; Marsh & Miller, 1985; NEDTAC, 1997; Robles et al., 1998; Stevens & Glider, 1994; Weiss, Martinez-Raga, Griffin, Greenfield, & Hufford, 1997). Women are also more likely to have experienced trauma in the form of physical and sexual abuse (Bloom, Lind, & Owen, 1994; Browne, Miller, & Maguin, 1999; Greenfield & Snell, 1999; Kilpatrick, Resnick, Saunders, & Best, 1998; Moras, 1998; Peters et al., 1997; Robles et al., 1998; Snell & Morton, 1991; Taylor, 1996). Criminal behavior is the only life area where women sometimes have fewer problems than men. One study found that women are less likely to have a prior record, and their prior records are less serious (Langan & Pelissier, in press).

Unlike the literature documenting consistent gender differences among drug abusers, the limited literature on treatment outcomes within community-based settings reports conflicting results for gender. Some have reported that women have a greater reduction in drug use and criminal activity following treatment (Hagan, Finnegan, & Nelson-Zlupko, 1994; Schildhaus et al., 1998; Weiss et al., 1997), while others have found either no difference (Anglin & Hser, 1987; Davis & DiNitto, 1996; Rounds-Bryant, 1999) or less positive change among (Doshan & Bursch, 1982; NEDTAC, 1997). In addition, one study found that the difference varies with the type of outcome examined (Gerstein et al., 1997).

Differing explanations for how treatment affects women are provided by Zweben (1996) and Fiorentine et al. (1997). Zweben (1996) speculates that existing treatment models are less effective for women because male partners play a large role in recovery but are less supportive and because women have stressful life situations – many competing demands of child care, legal problems, employment, and financial pressures. Women also have poor vocational skills, higher levels of depression, and physical disorders that make recovery much more difficult. In contrast, Fiorentine et al. (1997) propose the “gender paradox”, which refers to the fact that women are no more likely to relapse despite having greater “risk factors” because women are more likely than men to engage in drug treatment (Fiorentine et al., 1997). However, as noted by Fiorentine et al. (1997), we do not know why women are more likely than men to engage in treatment. In fact, it is clear that we do not know much about how treatment impacts women and what other factors affect women’s behavioral outcomes following treatment.

Purpose of Study

We conducted an evaluation of the Federal Bureau of Prisons' (BOP) in-prison drug treatment programs and assessed outcomes for a 3-year post-release period. A primary goal of our study was to assess effectiveness of drug treatment. A major concern of this study was to address the problem of selection bias commonly faced by quasi-experimental researchers. The purpose of this paper was to report gender differences and similarities in treatment outcomes and the effects of other predictors of treatment effectiveness. In addition, this paper determined whether the positive effects of substance abuse treatment previously found for a 6-month follow-up period (Pelissier et al., in press) were sustained over a three-year follow-up period for both men and women.

Method

Subjects

Our sample comprised 1,193 treatment subjects, 592 comparison subjects who had treatment available but did not volunteer, and 530 control subjects who did not have treatment available. These subjects are a subset (86%) of the complete pool of subjects, and they were selected because they were released from prison to supervision by a U.S. Probation officer. There were 1,842 men and 473 women in the sample. Of the 1,193 treatment subjects, 80% of the men and 70% of the women completed treatment. Sixty-one percent of the men were white as compared with 54 % of the women. Among men, 69% had one or more prior commitments and the comparable figure for women was 40%. The average age at the time of release was 37 for men and 35 for women.

BOP Residential Substance Abuse Treatment Programs

The federal prison system offered two types of residential programs. The first type, the moderate intensity programs, which included the majority of programs in this evaluation effort, offered 500 hours of treatment over a 9-month period and had a staff-to-inmate ratio of 1:24. The second type, the high intensity program, was offered at three institutions. These programs provided 1,000 hours of treatment over a 12-month period and had a staff-to-inmate ratio of 1:12. Participation in both types of programs was voluntary.

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All residential substance abuse treatment programs (DAP) were unit-based; that is, all program participants lived together — separate from the general population — for the purpose of building a treatment community. Each unit had the capacity for approximately 100 inmates, and treatment was conducted for a half-day, five days per week. The DAP programs were based on a cognitive-behavioral model which attempted to identify, confront, and alter the attitudes, values, and thinking patterns that led to criminal behaviors and drug or alcohol use. Most program content was standardized across the treatment programs.

Any inmate — including comparison subjects who did not participate in DAP — may have received other substance abuse treatment services within the BOP, particularly during a halfway house placement and during their post-release supervision period. Approximately two-thirds of our subjects were released from BOP custody through a halfway house. For DAP graduates released through a halfway house, continued drug treatment was required. In contrast, participation among other releasees was required only when the inmates were released to a halfway house participating in one of several new program initiatives. Drug treatment in the halfway houses consisted of an average of two hours of services per week.

Individuals continued to receive treatment when released to supervision by a U.S. Probation officer (approximately 14 % were released directly to the streets). Most of the individuals with a drug use history were required to participate in urine testing. Treatment services, primarily individual and group counseling, were provided to 46% of those with a drug use history. In general, offenders participated in these treatment services because treatment was usually imposed as a condition of supervision by a judge or the Probation officer.

Sample Selection

We identified residential drug treatment subjects from four female and 16 male DAP's in institutions ranging from minimum to low and medium security. Three of the programs consisted of 1,000 hour programs and the remaining 17 consisted of 500 hour programs. Treated subjects were in DAP programs between 1991 to 1997.

To explicitly test for selection bias, our study design required selecting two types of comparison subject groups in addition to the treated group. The first comparison group consisted

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of individuals with a substance use history who were housed at a residential substance abuse treatment institution (i.e., had treatment available) but did not volunteer for treatment. The second group consisted of individuals with a substance use history who came from institutions without a residential treatment program and who thus did not have the opportunity to volunteer for residential treatment. Comparison subjects were drawn from more than 40 institutions.

Data Collection Procedures

Inmate background information was obtained from automated data files as well as from interviews and surveys. Interviews were generally administered to treatment subjects within the first 6 weeks after admission to the treatment program and to comparison subjects approximately three to 9 months before release from prison. Survey data were collected from treatment subjects, on average, within the first 2 weeks of treatment and for comparison subjects at the same time the interviews were administered. Subjects were surveyed and interviewed again at the end of treatment. Halfway house treatment information was obtained from automated data files. We obtained 3-year post-release information for subjects released to supervision through telephone interviews with U.S. Probation officers.

Outcome measures

Our measure of recidivism consisted of the first occurrence of an arrest for a new offense or a revocation during the first 3 years after release from custody. We also conducted analyses for recidivism defined two other ways: arrest for a new offense only among all subjects (both supervised and unsupervised) and among only those subjects released to supervision. The results were similar and are reported in Rhodes et al. (in press). Our outcome measure of substance use referred to the first occurrence of evidence of substance use, either of an illicit drug or alcohol during the 3-year post release period. Evidence of drug use was defined as a positive urinalysis (u/a) test, refusal to submit to a urinalysis test, admission of drug use to the Probation officer, or a positive breathalyser test. When a person refused a urine test, the assumption was that he or she would have had a positive urine test result. Although we would have liked to model the *number* of drug use occurrences, we limited our analyses to the first occurrence. This was necessary because probation officers in some districts revoked individuals after the first positive urinalysis

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while in other districts individuals were revoked only after repeated positive test results. In addition, for obvious reasons, we limited this outcome measure to individuals who received urinalysis testing. There were 150 men and 43 women released to supervision who were not included in the analyses of drug use because they had no urinalysis testing.

Predictor measures

We selected a set of background and other predictor factors because past research has found them to be important predictors of recidivism, they are relevant to substance-using populations, they have been found to predict treatment outcomes, or because we considered them to be important control variables omitted in previous studies. Although there is considerable overlap in predictors of our outcome measures, we chose predictors specific to each outcome measure. For example, we used history of past drug and alcohol treatment only in our models of drug use.

The background characteristics obtained from official records included gender, race, ethnicity, prior commitments (yes/no), and age upon release from incarceration. Other measures from official records included disciplinary infractions which occurred during the 6 months before release – most serious infraction and drug-related infractions (yes/no), and halfway house placement before release to supervision (yes/no)

Self-report information obtained through interviews included age of first commitment, employment status during the month before incarceration – employed full- or part-time, not in work force, unemployed, unemployed but looking for work – number of years of education, type of daily drug use in the year before arrest – alcohol only, marijuana only, marijuana and alcohol, one illicit drug other than marijuana with and without alcohol, two or more illicit drugs other than marijuana with and without alcohol contrasted with no daily drug use) – drug and alcohol treatment history (yes/no), history of drug problem for spouse (yes/no), and mental health treatment history (yes/no). DSM-III-R (American Psychiatric Association, 1987) diagnoses of depression and antisocial personality were obtained using the Diagnostic Interview Schedule (DIS) (Robins, Helzer, Croughan, & Ratcliff, 1981)

Measures obtained from interviews with Probation officers included: average number of

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urinalysis tests, personal contacts with Probation officer, and collateral contacts by Probation officer per month, type of treatment assigned to during first month of supervision (no treatment, individual treatment, group treatment, and both individual and group treatment), self-help group involvement (yes/no) during the first 6 months or release (e.g., Alcoholics Anonymous, Cocaine Anonymous, etc.), and living situation – living with spouse, living with common-law spouse, and living without spouse

Our predictor variables can be separated into those that have a substantive interpretation and others that serve simply as control factors which represent different levels of supervision or services that individuals received which were determined by prison policies, self-selection, or Probation officers. The control variables included: halfway house placement, frequency of urinalysis testing during post-release supervision, frequency of personal contacts with and collateral contacts by Probation officers during supervision, participation in a self-help group after release, assignment to receive treatment while under post-release supervision. Because the control variables did not have a substantive interpretation, we chose not to discuss those coefficients.

Data Analyses

The three different methods of analyses used in this evaluation study are reported in Rhodes et al. (in press) which focuses upon the study's methodology. We note that the use of different methods served as a form of sensitivity analysis. The results from the different methods were similar and led us to conclude that our findings were not method dependent. Since the purpose of this paper is to focus upon comparing post-release outcomes for men and women and to draw out the implications of our findings, we focus our presentation in this paper on one of these three approaches, the instrumental variable approach (Davidson & MacKinnon, 1993). This approach represents one of the two methods we used to address selection bias. However, our discussion of the findings pertaining to gender differences in selection bias will include brief reference to the Heckman (1979) method, the other method that was used to address selection bias.

The instrumental variable approach (Davidson & MacKinnon, 1993) requires the

development of a suitable instrument which is highly correlated with the treatment variable but that is distributed independent of the error term. Our instrument was the conditional probability of entering and completing treatment. Inmate assignment to institutions during the study period was independent of drug use history. Furthermore, institutions started drug treatment programs at different times. Both of these features affected the rate of volunteering for treatment but were independent of individual decisions to enter treatment. The treatment effect in the instrumental variable approach does not directly assess the effects of treatment for those who entered and completed treatment but rather the effect of the likelihood of entering and completing treatment (Rhodes et al, in press).

We analyzed the data using survival models where we modeled the length of time of non-occurrence of an event – arrest or drug use – during the 3 years of post-release supervision. Survival modeling is the most suitable type of analysis because it models whether an event occurred as well as when an event occurred. It also adjusted for instances where individuals did not fail during the 3-year post-release observation period and where individuals were not observed during the entire post-release period due to termination of supervision before the end of the 3-year period, incarceration for a detainer, or death (Allison, 1984; Blossfeld, Hamerle, & Mayer, 1989). Thus, the results reflect the effects of variables on the survival time, that is, time until first arrest or time until first evidence of substance use.

Parametric survival models typically assume that all subjects must eventually recidivate (fail) if given enough time and thus assume unobserved homogeneity. An alternative assumption is that a proportion (PRO) will recidivate given a follow up period of infinite length, but 1-PRO will never recidivate. This is referred to as a split-population model. We believed that it would be unreasonable to assume that all subjects would eventually fail. Therefore, we modified the likelihood function to accommodate a split-population assumption (*see* Greene, 1998).

We assumed that:

$$PRO = \frac{1}{1 + e^{-s}}$$

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where S is a parameter to be estimated and defines whether the subjects is or is not in the failure group. The parameter S (referred to as split population) is reported in all of our survival models.

Because the statistical models were nonlinear, parameter interpretation is more complicated. Therefore, estimates for the treatment effect parameters were translated into probabilities, which are easier to understand. This was accomplished by substituting the mean value for each variable that entered the regression. Of course, these means varied from regression to regression, because each regression used a somewhat different variable set and data. Using those means, together with the parameter estimates reported in the tables, we computed the probability of recidivism or drug use by substituting a zero in place of the mean treatment effect. This provided an estimate of the probability of recidivism or drug use for someone who was not treated. Then we replicated the calculation after substituting a one in place of the mean treatment effect. This provided an estimate of the probability of recidivism or drug use for someone who was treated. These probabilities are reported in Figures 1 and 2.

Effects vector coding was used for nominal and ordinal level variables. In effects vector coding, each coefficient represents the contrast of that category with the adjusted grand mean. Dummy variable coding was used only in coding for the categories of daily drug use in the year before arrest, since we were interested in the contrast between the various types of drugs used on a daily basis when compared to no daily drug use in the year before arrest.

Because men and women were in separate treatment programs, a thorough representation of male and female differences would have required the inclusion of a large number of interaction terms in analyses of men and women combined. Therefore, we modeled male and female outcomes separately. In addition, we chose to conduct separate analyses for each gender because little is known about differences in treatment outcomes of criminal justice based treatment programs between men and women. Furthermore, a review of the literature on gender differences among drug users (Pelissier et al., 2000) suggests that the process of change from a drug using criminal lifestyle to one without drug use and criminal activity may differ between men and women.

Results

In presenting the results, we discuss coefficients significant at $p = .05$ or less. We used a two-tailed test for all coefficients except those representing effects for DAP in-prison treatment. For these treatment effects, we used a one-tailed test consistent with the implicit assumption that individuals who received in-prison drug treatment would have more favorable outcomes than those who did not receive drug treatment. Furthermore, as argued by (Lipsey, 1990), evaluation research is better served by accepting an increased likelihood that an effect will be found when there is none (Type I error) and lowering the probability that an effective treatment is falsely found to be ineffective (Type II error).

The results reported refer to the effects of variables on the survival time, that is, time until recidivism, time until first evidence of substance use, or time until censored. The interpretation of the treatment coefficients depend upon the underlying survival distribution (see note in Tables 1 and 2). Because we modeled gender outcomes separately, we contrast the two sets of coefficients highlighting similarities and differences. A Wald chi-square statistical test of the difference between the coefficients was performed for those coefficients which were found to be significant for one gender but not the other or were found significant for both men and women (Allison, 1999).

Recidivism

For our criterion measure of recidivism — arrest for a new offense or revocation among supervised subjects — approximately 55% of the men failed as compared with 34% of the women. The analyses show that the treatment parameter was statistically significant for men but not for women (see Table 1). However, the Wald chi-square test did not show a statistically significant difference between men and women for the treatment coefficient. Treated males tended to recidivate at lower rates than untreated males (see Figure 1). For an arrest or revocation among men, given post release supervision, an estimated 53% of the untreated group would recidivate compared with 44% of the treated group. For women, we found that 30% of the untreated women would recidivate compared with 25% of the treated women.

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Two covariates were significant predictors for both men and women. Both a prior commitment and the occurrence of one or more serious disciplinary infractions in the six months before release decreased the time to arrest after release.

Covariates that were found to be significant predictors of recidivism only for men included age at first commitment (younger), age at release (younger), drug use history (multiple drug and alcohol use), employment history (unemployment in month before incarceration), and post-release marital status (living with common law partner) (see Table 1). However, the Wald chi-square tests of differences between the coefficients in the male and female models were not statistically significant. In contrast, the Wald chi-square test showed a significant difference between men and women for one predictor associated with decreased recidivism – living with a spouse after release. Men, but not women, who lived with a spouse after release were less likely to recidivate.

Drug Use

The results for post-release drug use, like those for recidivism, were limited to those subjects who were released to supervision and for whom data were obtained from a Probation officer. In addition, we limited the analyses to subjects who had their urine tested as a condition of supervision. There were 1,692 treated and untreated males and 430 treated and untreated females in this sample. Approximately 54% of the men had evidence of drug use after release as compared to 42% of the women. In looking at the results reported in Figure 2 we see that for men only, substance abuse treatment is effective at reducing subsequent relapse to drug use. However, the Wald chi-square test of the difference between men and women for the treatment coefficient was not significant. An estimated 59% of untreated men would relapse to drug use compared with 50% of treated men. Although an estimated 43% of untreated women relapsed compared with only 35% of those women who were treated, the differences were not statistically significant (see Table 2).

We found both similarities and differences between men and women when comparing the covariates which were found to be significant predictors of drug use after release. We found a history of prior commitments was associated with a higher likelihood of drug use, while a higher age at release was associated with a lower likelihood of drug use for both men and women.

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African American men and women were more likely to use drugs following release than men or women on average. The results indicated that among both men and women, a drug related infraction before release was associated with a higher likelihood of drug use after release.

Previous drug treatment, history of daily drug use, and several types of daily drug use patterns were associated with post-release drug use for men only. Living with a spouse after release was associated with a decreased likelihood of drug use among men and was found to be near significance for women. However, none of these coefficients were found to differ significantly when performing the Wald chi-square test. There was only one coefficient for which the Wald chi-square test showed a gender difference – history of previous mental health treatment. Women, but not men, who had a history of previous mental health treatment were less likely to engage in post-release drug use (see Table 2).

Discussion

The topic of gender differences in the drug-using population has received wide attention in the past decade and many treatment programs have been designed to meet the special needs of women. Yet, little is known about gender differences in the treatment process and treatment outcomes. Our study attempted to increase our understanding of gender differences by modeling treatment outcomes separately for men and women.

The results showed that the positive effects of in-prison residential drug treatment previously found for a 6-month post-release period were sustained over a 3-year post-release period. However, the results showed that although both treated men and treated women were less likely to recidivate and use drugs after release, the results were statistically significant only for men. The Wald chi-square test for differences between coefficients was not significant suggesting that perhaps a larger sample would have shown a statistically significant treatment effect for women.

Effects which were consistently significant among both men and women for our analyses of recidivism were those associated with criminal history and serious prison misconduct. For both men and women, those with a prior commitment or a serious disciplinary infraction within 6 months before release had shorter survival times. Our analyses of drug use showed prior

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commitments, younger age at release, race (black), and drug-related disciplinary infractions before release were associated with shorter survival times for both men and women.

Many other predictors of recidivism and drug use were found to be statistically significant for men only or women only. However, the Wald-chi square test for differences in coefficients was significant for only two of these predictors. Men who lived with a spouse after release were less likely to recidivate and women with a history of mental health treatment were less likely to use drugs. The results show that there are many common background characteristics that men and women share that affect their post-release outcomes.

The absence of statistically significant differences between many of the coefficients may be due to the higher standard errors for the female sample which was considerably smaller in size than that of men. Although we were able to model outcomes separately for men and women, our ability to detect gender differences was likely hindered by the smaller sample size of women.

With respect to gender differences in our post-treatment outcomes, we found that among our combined sample of treated and untreated incarcerated offenders, women had lower rates of recidivism and positive urinalyses after release. The difference in the overall post-release recidivism rate of men and women was consistent with previous findings for overall recidivism of prison releasees, in that men generally have higher recidivism rates than do women (Chard-Wierschem, 1992; Corrections, 1999; Donnelly & Bala, 1994; Saylor & Gaes, 1995). Further, the findings for our outcome measures of drug use were also consistent with the limited literature on gender differences which found that women have lower rates of post-treatment drug use than men. Additionally, our previously reported 3-year outcome results showed gender differences in selection bias (Rhodes et al., in press). That is, holding the observable covariates constant, only among men did we find that those who were more likely to recidivate or use drugs after release were selected into the group of those who entered and completed treatment.

Although limited in number, the differences in background characteristics predictive of outcome point to some possible variations among men and women in the recovery process. Our inability to detect an effect for living with a spouse among women on recidivism is consistent with the literature on gender differences. Women are more likely to have been initiated into drug use

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and antisocial behavior by male partners (Griffin et al., 1989; Henderson, Boyd, & Mieczkowski, 1994; Hser, Anglin, & McGlothlin, 1987; Kassebaum, 1999; Robles et al., 1998). Therefore, it is not surprising that, without being able to identify whether the spouse was a drug user, we did not find an effect for living situation among women. The importance of identifying characteristics of a woman's spouse is highlighted by differences prior to incarceration. In our sample, 55% of the women had a spouse with a drug problem as compared with 23% of the men. The absence of a gender difference in living situation on post-release drug use suggests the need to compare and contrast the interaction between recidivism and drug use among men and women.

Our finding that women, but not men, with a history of mental health treatment had a lower likelihood of post-release drug use, suggests the need to compare the nature of drug-related and other mental health problems between men and women. In our sample we found that twice as many women (40%) as men (20%) reported a history of mental health treatment. In addition, 33% of the women were found to have a DSM-III-R lifetime diagnosis of depression as compared with 16% of the men.

Despite the small number of gender differences in factors predictive of post-release outcomes, we cannot clearly conclude that men and women have similar recovery processes. Rather, similarities and differences in predictive factors must be assessed within the context of both the initial differences in the background characteristics and in baseline rates of post-release success. Women had lower rates of recidivism and post-release drug use than did men. These more positive post-release outcomes among women occurred despite the fact that women in our sample had more serious life problems. Women were more likely to have had a spouse with a drug use problem, were less likely to have been employed part- or full-time before release, were more likely to have a lifetime diagnosis of depression, were more likely to have a history of mental health treatment and were more likely to have used one or more illegal drugs other than marijuana in the year before arrest. The only area where women had a less serious life problem was criminal history. Women were less likely to have a prior incarceration and were older at the time of their first commitment (Pelissier et al., 2000). The question about why women who have more serious life problems have lower recidivism and drug use remains unanswered.

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Thus, when we consider together all of our findings, the need to better understand how gender differences in treatment processes may be related to outcomes is underscored. While the effects of treatment did not differ between men and women, a few other factors which were predictive of post-release outcomes differed. Such findings occurred within a framework of significant differences in background characteristics and in baseline rates of success and failure after release. Conclusions about gender differences that were drawn from these findings may be ambiguous because treatment is but one of several components of the pathway to post-release behavior. Our understanding of the role of treatment cannot be adequately understood without an understanding of how treatment addresses both the problems common to men and women as well as the unique problems faced by women and men. Furthermore, differences in treatment outcomes may be more a product of differences in treatment processes rather than initial differences in the amount and severity of life problems, as is sometimes assumed. For example, as has been suggested by Fiorentine et al. (1997), women are more likely to engage in treatment than men.

The results suggest that studies of treatment outcomes are unable, by themselves, to provide researchers and clinicians with a comprehensive understanding of gender differences in treatment outcomes. Future studies which can increase our understanding of differential processes of achieving successful post-release outcomes will need to incorporate additional predictors that reflect gender-specific pathways to successful post-release behaviors. Studies are needed which add to outcome analyses by examining the cognitive and psychological processes of change occurring during treatment, particularly as these changes relate to engagement in the treatment process. In addition, ethnographic studies comparing living situations and stressors of men and women after release are needed to complement outcome studies. Our findings suggest the need for outcome studies to obtain information about the social network, including spouse or living partner, of women after release. Lastly, studies which examine gender differences for other post-release outcomes such as employment and in the relationship between the various post-release outcomes may enhance our understanding of gender differences and similarities in treatment outcomes.

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Author Note

The interpretations and conclusions contained in this article represent the views of the authors and do not necessarily represent the views of the Federal Bureau of Prisons or the Department of Justice.

This evaluation was funded in part by the National Institute on Drug Abuse through an interagency agreement with the Bureau of Prisons (BOP MOU-201-0). This research was supported by Bureau of Prisons Director Kathleen Hawk Sawyer and Assistant Director Thomas R. Kane. Feedback and guidance were provided throughout the project by the advisory board members and Bennett Fletcher, National Institute on Drug Abuse. Ron Dyson, Substance Abuse Treatment Administrator, Administrative Office of the U.S. Courts, and substance abuse, community corrections center, and transitional services administrators from the Bureau of Prisons provided administrative support for the data collection. John Cashwell, Susan Wallace and Suzy Vanyur provided programming and other support during the project.

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Table 1

Rearrest or Revocation: Supervised Subjects: Instrumental Variable Survival Models

<u>Predictors</u>	<u>Men: Exponential</u>		<u>Women: Lognormal</u>	
	<u>Estimates</u>	<u>s.e.</u>	<u>Estimates</u>	<u>s.e.</u>
Constant	-5.1310**	0.3001	6.0129**	0.708
Treatment coefficient	-0.2515**	0.114	0.2264	0.315
Age first committed	-2.3069**	0.516	2.0540	1.642
Spouse ever have drug problem	-0.0377	0.043	0.0213	0.093
History of past mental health treatment	0.0155	-0.047	0.1654*	0.099
Disciplinary infraction before release	0.3062**	-0.048	-0.4985**	0.137
Did not receive halfway house placement	0.0988**	-0.040	-0.1592	0.104
Individual counseling during supervision	-0.0728	0.066	0.2174	0.157
Group counseling during supervision	-0.0528	0.090	0.1273	0.252
Individual and group counseling during supervision	0.1512*	-0.083	-0.5303**	0.186
Involved in self-help group during supervision	-0.0042	0.048	0.1245	0.113
Average # monthly urinalyses during supervision	-0.1267*	0.068	0.1050	0.176
Average # monthly contacts with Probation officer	0.1878	-0.117	0.0184	0.323
Average # monthly collateral contacts	0.5183**	-0.079	-0.6981**	0.193
Lived with spouse upon release	-0.3441**	0.064	-0.0643	0.197
Lived with common-law partner after release	0.1866**	-0.061	0.1461	0.204
African-American	0.0982	-0.077	-0.2114	0.214
Other race	0.1510	-0.132	-0.0941	0.376
Hispanic	-0.0505	0.029	0.1468	0.174
Level of education	-0.6011	0.375	-0.0280	0.848
Age at time of release	-1.5834**	0.480	0.9650	1.758
Employed in month before incarceration	-0.1700**	0.063	0.1109	0.161
Not in work force in month before incarceration	0.1841	-0.123	-0.0101	0.235
Looking for employment month before incarceration	0.0411	-0.095	0.0763	0.241
Previous commitments -yes	0.3772**	-0.046	-0.4614**	0.100
Daily use of alcohol only	0.1686	-0.103	0.3248	0.354
Daily marijuana & alcohol use	-0.0469	0.163	0.3773	0.538
Daily use of marijuana only	0.0536	-0.126	-0.0422	0.338
Daily use of one illicit drug with alcohol	0.1057	-0.128	-0.4772	0.292
Daily use of one illicit drug without alcohol	0.1313	-0.122	0.0185	0.253
Daily use of two or more illicit drugs with alcohol	0.4228**	0.175	-0.3356	0.423
Daily use of two or more illicit drugs without alcohol	0.2551	-0.164	-0.0880	0.349
Diagnosis of antisocial personality only	0.0285	-0.067	-0.1683	0.187
Diagnosis of depression only	-0.0184	0.105	0.1181	0.188

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Diagnosis of depression and antisocial personality	0.0075	-0.100	-0.0463	0.210
Split population	2.4213**	0.277	2.9654	2.962

* $p < .05$, two-tailed test ** $p < .05$, one-tailed test

Note: where we used a lognormal distribution, significant positive coefficients implied that treatment increased the survival time of an offender, while significant negative coefficients implied that survival time was decreased. However, where we used an exponential distribution, significant negative coefficients were associated with an increased survival time (details about the diagnostic tests and other aspects of the research design are reported in (Rhodes et al., in press)).

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Table 2

Relapse to Drug Use: Supervised Subjects: Instrumental Variable Survival Model

<u>Predictors</u>	Men: Lognormal		Women: Lognormal	
	<u>Estimates</u>	<u>s.e.</u>	<u>Estimates</u>	<u>s.e.</u>
Constant	4.3493**	0.521	5.9553**	1.237
Treatment Coefficient	0.4615**	0.188	0.4356	0.462
Spouse ever have drug problem	0.0392	0.070	0.0391	0.138
History of past mental health treatment	-0.0218	0.078	0.3383**	0.150
No previous use of drug on a daily basis	0.2055	0.166	1.1305**	0.465
History of previous drug treatment	-0.2224**	0.064	-0.2119	0.147
History of previous alcohol treatment	-0.2034	0.128	-0.0034	0.425
Drug-related infraction before release	-0.7001**	0.090	-0.9907**	0.238
Did not receive halfway house placement	-0.1153*	0.067	0.0620	0.163
Individual counseling during supervision	0.0060	0.103	0.2369	0.222
Group counseling during supervision	0.2344	0.149	-0.1646	0.368
Individual and group counseling during treatment	-0.5867**	0.134	-0.8568**	0.271
Involved in self-help group during supervision	0.0131	0.077	0.4757**	0.165
Average # monthly urinalyses during supervision	-0.6824**	0.113	-0.3361	0.282
Average # monthly contact with Probation officer	-0.0640	0.196	-0.1123	0.493
Average # monthly collateral contacts	-0.2270	0.142	-0.8259**	0.325
Lived with spouse upon release	0.4113**	0.102	0.5491*	0.312
Lived with common-law partner after release	-0.1384	0.102	-0.2750	0.303
African-American	-0.4819**	0.142	-1.1193**	0.384
Other race	-0.0780	0.248	1.2385*	0.707
Hispanic	-0.3375**	0.108	-0.1116	0.263
Level of education	1.0520*	0.603	-0.5025	1.347
Age at time of release	2.1053**	0.737	4.4226**	1.957
Employed in month before incarceration	0.1942*	0.106	0.1324	0.237
Nor in work force in month before incarceration	-0.1759	0.215	0.0151	0.360
Looking for employment in month before incarceration	-0.1590	0.160	-0.2541	0.344
Previous commitments- yes	-0.3995**	0.068	-0.3969**	0.140
Daily use of alcohol only	0.0832	0.174	0.2303	0.542
Daily marijuana & alcohol use	-0.4453*	0.254	-0.6446	0.727
Daily use of marijuana only	-0.4981**	0.218	0.2315	0.569
Daily use of one illicit drug with alcohol	-0.1050	0.227	-0.1123	0.506
Daily use of one illicit drug without alcohol	-0.6095**	0.209	-0.2249	0.413
Daily use of two or more illicit drugs with alcohol	-0.8335**	0.307	-1.0107*	0.608
Daily use of two or more illicit drugs without alcohol	-0.6387**	0.275	0.3620	0.567
Diagnosis of antisocial personality only	-0.0696	0.110	0.2779	0.293
Diagnosis of depression only	-0.0702	0.168	0.1654	0.287
Diagnosis of depression and antisocial personality	0.1023	0.168	-0.4098	0.297
Split population	3.2084**	0.948	12.5129	19.514

* p<.05, two-tailed test ** p<.05, one-tailed test

Note: where we used a lognormal distribution, significant positive coefficients implied that treatment increased the survival time of an offender, while significant negative coefficients implied that survival time was decreased.

Prison Drug Treatment: Gender Comparisons

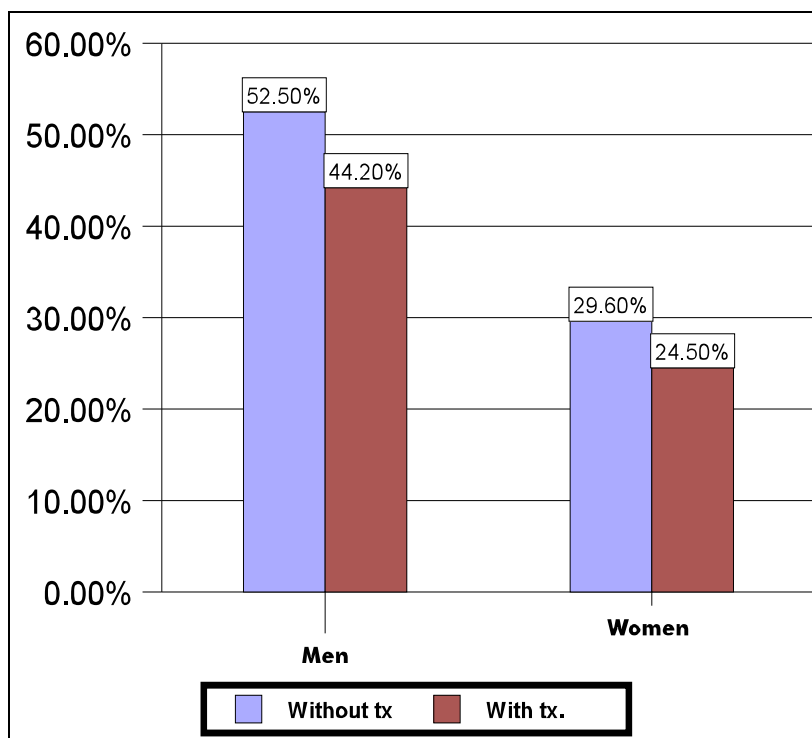


Figure 1. Three-year post-release arrest and revocation rates: Treated and untreated male and female incarcerated drug users.

Prison Drug Treatment: Gender Comparisons

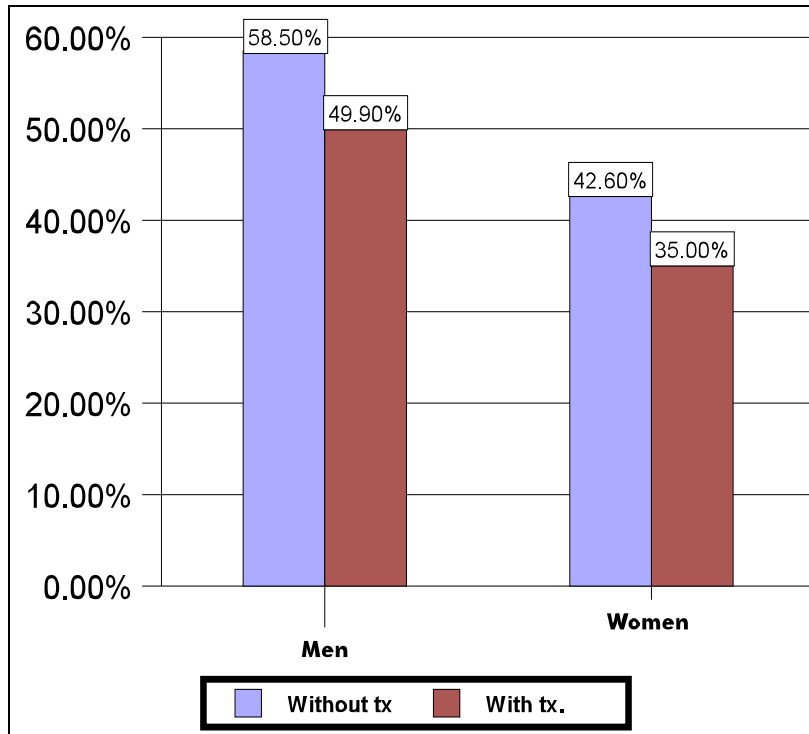


Figure 2. Three-year post-release drug use rates: Treated and untreated male and female incarcerated drug users.