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An Assessment of Substance Abuse Treatment Programs in Florida's Prisons Using a Random Assignment Experimental Design

Report Submitted to the
National Institute of Justice
Office of Justice Programs
U.S. Department of Justice

Submitted by

The Florida Department of Corrections and
Florida State University College of Criminology and Criminal Justice

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ABSTRACT

Prior drug involvement and dependence among incarcerated offenders is a critical issue for correctional administrators and policy makers given the financial impact of treatment costs and recidivism. While substance−addicted inmates can cause financial burdens on correctional institutions, they are also at a high risk of recidivism following their release from incarceration. Targeting inmates' substance addiction needs while in prison is intended to reduce reoffending and relapse following prison release. The exact nature of substance abuse treatment within prison systems has yet to be fully examined within the criminological literature. Specifically, while there has been extensive research on the use and effectiveness of therapeutic communities with inmates, other treatment modalities such as outpatient services have received less inquiry.

This study provides an important contribution to the understanding of the role substance abuse treatment plays for inmates' in several key ways. First, we evaluate the results of a randomized experimental design study conducted by the Florida Department of Corrections (FDC) from January 2006 through December 2008 in which all inmates admitted to a Florida prison were given the opportunity to consent to participate in a study of the effectiveness of substance abuse treatment programming in prison. Second, the study assesses the impact of multiple modalities of prison−based substance abuse treatment, as well as the role that duration and recency of treatment play in the recidivism and post−prison employment outcomes of over 11,000 released inmates. Third, we use multiple statistical techniques, including logistic regression, survival analysis, Propensity Score Matching (PSM), and precision matching, to assess whether, and to what extent, evaluation outcome studies of correctional-based substance abuse treatment are impacted by the type of research design and statistical methods used.

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Among the major findings are that aftercare and transitional substance abuse programming has some of the largest effects of increasing employment and reducing recidivism. In addition, among inmates who complete substance abuse treatment, those who do so closer to their release from prison are less likely to recidivate. Another important finding is that some research methods produce similarities in the direction of the effect while others produce different directions in the effect of the same treatment on recidivism. Notably, the strongest design – random assignment – showed the most support for prison-based treatment's effectiveness in reducing recidivism. Due to the non-significance of the majority of results across methods, it was difficult to draw conclusions about similarities across statistical methods in this study. We conclude with a discussion of the policy implications and directions for future research on the effectiveness of prison−based substance abuse treatment.

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INTRODUCTION

To date, there has not been a comprehensive evaluation of a state's prison−based substance abuse programs (SAP) used to reduce post−release reoffending. Duwe (2010) conducted a state-wide study on chemical dependency programs in Minnesota, but did not assess the effectiveness of other prison-based substance abuse programs in that state. Most studies use male−only samples, small sample sizes, or samples from only a handful of prisons. The reality is that multiple types of prison-based substance abuse treatment services exist within state correctional facilities to treat a large percentage of prisoners that are drug offenders. Although several programs exist to treat these offenders, prior research has not evaluated multiple types of prison-based substance abuse treatment programs while using more sophisticated quasi-experimental designs and analytical techniques. The present study examines all types of public prison-based substance abuse treatment across all prisons within the state of Florida. Another limitation of prior research is that many previous studies only use one or two operational definitions of recidivism and do not include a post−release indicator for employment. In addition, studies have not used multiple statistical and matching methods to check the robustness of their results. The current study overcomes these issues noted in prior research. We begin by describing the context and need for substance treatment.

For the past several decades, academics and practitioners have tried to identify correctional programs that effectively reduce recidivism among former prisoners (Mitchell, Wilson, & MacKenzie, 2007; Pearson & Lipton, 1999). More specifically, recidivism for drug offenses is high relative to other offenses among former prisoners (Durose, Cooper, & Snyder, 2014). In 2005, 71.4% of individuals released from prison were rearrested for a new offense within 3 years were identified as drug offenders (Durose et al., 2014). Since substance abuse is a

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critical risk factor for post−release reoffending (Belenko & Peugh, 2005), substantial federal and state government resources have been devoted to improving treatment programming for the substance abuse needs of inmates (Mitchell et al., 2007). One type of rehabilitative programming used to offset these rates is prison−based substance abuse treatment. These programs entail a broad range of services that can vary by state (Bahr, Masters, & Taylor, 2012). Programs may also vary by their cost, including the expense required to create and operate them in prisons, especially over time (Karberg & James, 2005). Due to their critical role in addressing the link between substance abuse problems and recidivism among inmates as well as their expense to society, prison−based substance abuse programming (hereafter SAP) has become a topic of great interest among scholars, practitioners, and policy makers.

The Need for Prison-Based Substance Abuse Treatment

The U.S. prison population has increased at an unprecedented rate over the past two decades from approximately 563,000 inmates in 1987 to 1.6 million in 2008 (Sabol, West, & Cooper, 2009). Approximately 725,000 inmates are released from state and federal prisons each year (West & Sabol, 2009) and research indicates that 67% of these inmates will be rearrested for new offenses, 47% will be reconvicted and 52% will return to prison within three years (Langan & Levin, 2002). The growth in drug−related offenders has been implicated as contributing to the 200% increase in America's prison and jail populations in the last two decades (Belenko & Peugh, 1998). Law enforcement's prioritizing of drug arrests and mandatory sentencing laws have been suggested to be factors related to the rise in drug−related offenders serving time in prison (Farabee, et al., 1999). Drug offenders comprise an appreciable proportion of prison inmates incarcerated in the U.S. Specifically, from 1980 to 1995, drug offenders represented 30% and 68% of the increase in state and federal prison populations,

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respectively (Mumola, 1999). Mumola (1999) reported that 80% of prisoners around the nation indicated having a serious alcohol or substance abuse problem (Daley et al., 2004). Those prison inmates who used illicit substances at the time of their arrest and for which they are incarcerated for a drug conviction comprise 32% of the prison population, while 53% of prison inmates were classified as either drug dependent or abusive (Mumola & Karberg, 2006). It is reported that 73% of state prisoners used drugs in a frequent manner before their incarceration (Petersilia, 2005). Furthermore, drug use among female inmates is more prevalent than among male inmates (Belenko & Peugh, 2005; Mumola & Karberg, 2006). Blumstein and Beck (2005) have linked the overall growth in the prison population from 1975 to 2000 to a considerable increase – approximately 400% – in the proportion of drug offenders.

Incarcerated populations report high levels of drug involvement and dependence prior to imprisonment. For instance, 56% of state prison inmates reported drug use within the month prior to their offense, 32% were on drugs at the time of their crime, and 40% met the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (1994) criteria for drug dependence or abuse (Mumola and Karberg, 2006). Additionally, substance abuse is a significant contributor to the recycling of offenders through correctional systems as evidenced by the fact that 53% of state inmates who are dependent on or abusing drugs prior to incarceration "had at least three prior sentences to probation or incarceration, compared to 32 percent of other inmates" (Mumola & Karberg, 2006: 1). The Florida Department of Corrections (2010) reports that as of June 30, 2010, 65% of the inmate population (66,341 out of 102,232) had been identified as being in need of drug or alcohol treatment. Additionally, of the 36,992 inmates admitted to prison in Florida in FY2009−10, 26.1% (9,643) had a primary current offense of

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drugs (Florida Department of Corrections (FDC), 2010) and 32.6% (12,070) had at least one conviction for a drug offense as part of their most recent prison term.

When released from jail or prison, drug offenders face substantial reentry challenges that negatively impact their reintegration efforts and desistance process (Visher, Kachnowski, LaVigne, & Travis, 2004; Visher & Travis, 2003). These individuals' failure at reintegrating into society has been attributed to their post−release relapse into substance abuse (Blumstein & Beck, 2005). Due to the prevalence of addiction among inmates, the U.S. invests a substantial amount of money to respond to substance abuse issues among offender populations. Recent expenditure estimates indicate that the U.S. allocated $204 billion in 2005 to the overall incarceration of persons who were arrested and convicted at the federal, state, and local levels (U.S. Courts: The Federal Judiciary, 2006; West & Sabol, 2008). West and Sabol (2008) report that this figure has increased by 81% in the past decade, after adjusting for inflation. Despite the increase in the number of inmates admitted to prison for a drug−related offense, the number of treatment slots available to Florida inmates in FY 2006-07 was 2,533 and the budget for the Bureau of Substance Abuse declined by $1.4 million in recent years (from $8.3 million in FY2006−07 to $6.9 million in FY2010−11) (West & Sabol, 2008).

Prison−based drug treatment has been the prominent approach to addressing the problems of drug relapse and reoffending despite the near absence of its use at the national level (Petersilia, 2003). Despite the sizable proportion of prison inmates incarcerated for drug offenses, only about 10% of inmates incarcerated in state prisons report receiving prison−based substance abuse treatment prior to release (Belenko, 2006)[1].

[1] It is important to note that not all drug offenders have a clear need for substance abuse treatment. For instance, many drug offenders are incarcerated for distributing or trafficking illicit drugs and may not suffer from issues related to addiction.

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Building upon Prior Research

One of the objectives of the current research is to build upon prior impact evaluations of prison-based substance abuse treatment. Several evaluations have been conducted on the effectiveness of prison−based substance abuse programming (SAP). Most research has focused on the impact of therapeutic communities (Hiller, Knight, & Simpson, 1999; Inciardi et al., 2004; Pearson & Lipton, 1999; Wexler et al., 2004), intensive outpatient programs (Welsh and Zajac, 2004), and chemical dependency programs (Duwe, 2010). Although the nature and structure of substance abuse treatment varies, there is considerable empirical support for its moderate effectiveness among *some* prisoners (Adrian, 2001; Bahr, Masters, & Taylor, 2012; Dutra, et al., 2008; Hepburn, 2005; Hubbard, Simpson, & Woody, 2009). Specifically, SAP has been shown to be more effective for prisoners who are designated as high-risk, receive multiple treatment modalities, experience intensive treatment, and participate in an aftercare component. In addition, when treatment is not coerced and has positive incentives, prisoners are more likely to have better outcomes.

A variety of methods have been used to assess the effects of these unique programs on recidivism and employment outcomes up to five years after release (see Mitchell et al., 2007). The complexity of these methods has involved an array of procedures including random assignment, post hoc matching procedures, regression−based modeling, and difference of means tests (Mitchell et al., 2007; Bahr, Masters, & Taylor, 2012). There are two broad conclusions about the design of research on prison−based substance abuse treatment in the existing literature. First, the studies with more methodologically rigorous designs have not found a significant effect of treatment on recidivism (see Mitchell et al., 2007) which supports prior discussion about the effect of research design on outcomes (see Weisburd, Lum, & Petrosino, 2001). Mitchell et al.

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(2007) found that nine of the studies in their meta-analysis were rigorous quasi-experimental studies and two were experimental designs.

Second, selection bias is an important issue in prior research on SAP because most studies with weaker designs are not controlling for differences between the treated and untreated comparison groups that might be patterned with the outcome(s) of interest (recidivism and employment). In an ideal scenario, a random procedure would be used to assign participants to the treatment or control groups, which would make the groups probabilistically equivalent in large samples. This random process would account for measured and unmeasured variables that would make the two groups systematically different. The next strongest research design that studies may use is ex−post analytic matching procedures that make the two groups similar or approximately similar based on observed covariates. In other words, inmates who receive the prison−based substance abuse treatment are matched to those who do not receive treatment on characteristics known to influence post-prison outcomes. Most prior evaluation studies on SAPs have not been able to use randomization or matching procedures.

Due to a combination of FDC's leadership and scholarly interest in informing policy with the use of evidence−based science, prisons in Florida became an ideal site for examining the effectiveness of prison−based SAP. In 2004, a research collaboration between the FDC's Bureau of Research and Data Analysis (BRDA) and several other units in the FDC and a nearby university was developed to better understand the effectiveness of prison−based SAP (Bales, Scaggs, Clark, Ensley, & Coltharp, 2014). The objective of this study is to assess the impact of SAP on post−release recidivism among a cohort of released prisoners within a three−year follow−up period. To this end, we use multiple methodologies (logistic regression, survival analysis, propensity score matching, and precision matching) to examine the consistency of

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results among multiple SAP modalities for effecting three operational definitions of recidivism: rearrest, reconviction, and reimprisonment. The findings for the impact of each modality within each analysis, as well as the robustness of the findings across methodological procedures, are discussed. Finally, the overall conclusions and limitations of the study, as well as implications for policy and future research are discussed.

LITERATURE REVIEW

The literature germane to evaluations of prison−based substance abuse treatment is varied and extensive. One conclusion is that the quality of the methodology used in prior studies on substance abuse treatment has been generally inadequate to draw strong inferences about the true effect of substance abuse treatment on recidivism. Mitchell et al. (2007) identified thirty studies that examine the impact of prison−based drug treatment therapeutic communities from 1968 to 1996. They determined the methodological quality of studies based on a four−point "quality of methods" scale[2]. In their assessment, two of the studies were considered to have "experimental" designs, thirteen were found to have "standard quasi-experimental" designs, and three were found to have a "weak quasi-experimental" design. These results suggest that the data and methods used in prior research could be improved upon in future research.

Based only on short−term outcomes (i.e., a 1 to 2 year follow up period), research has found positive effects of prison−based SAPs (e.g., French, Fang, & Fretz, 2010; Pelissier et al., 1998; Welsh, 2003, 2007; Wexler et al., 1999, 2004). Long−term recidivism outcomes (i.e., 3 year to 5 year follow−up periods) typically show that the effect of prison−based SAPs decreases over time (Knight, Simpson, & Hiller, 1999; Prendergast, Hall, Wexler, Melnick, & Cao, 2004; Zhang, Roberts, & McCollister, 2011). However, these studies indicate that the evidence can

[2] This scale is ranked by the following: 1 = poor, very low confidence, 2 = fair, low confidence, 3 = good, mid−level of confidence, and 4 = excellent, high level of confidence.

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only be generalized to the states where the study occurred (i.e., Texas and California). As a result, these two states' findings cannot be used to guide substance abuse policies and practices in other states. More research is needed to evaluate substance abuse treatment in other states.

While there have been several notable studies of prison−based substance abuse treatment, there are limitations in their applicability to other locations, including but not limited to Florida. First, most studies have been limited to male−only samples. The present study includes both male and female inmates, with the latter group comprising 11.8% of the total prison population. Importantly, the population of female inmates in our study has a high concentration of substance abusers as evidenced by their high Drug Simple Screening Instrument (DSSI) scores[3]. Second, the universal use of only paroled inmates in prior research limits the generalizability of results to many other states like Florida, which eliminated parole in 1983. Inmates on parole supervision may vary in important ways from those who are either unsupervised after release from prison or are subject to alternative forms of post−prison release supervision, such as split supervision. For instance, these offenders are likely to serve longer periods of time in prison, may have different offenses and prior offense histories, and due to their supervision status after release, may have access to additional substance abuse treatment care.

Third, most prior evaluations examined a limited number of programs administered in a small proportion of prisons within a state, while the present study will encompass the entire state prison system and includes four types of programs in 29 different prisons. Specifically, whereas most prior studies examine only intensive outpatient or therapeutic communities, this study measures the effectiveness of intensive outpatient, therapeutic communities, and two other SAP types. Fourth, the majority of prior studies include relatively small sample sizes that limit the

[3] As of January 1, 2006, 75% of female inmates were assessed as needing SAP compared to 63% of male inmates.

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confidence and generalizability of their results (especially for inmate sub−populations), whereas the present study has a sample of more than 11,000 inmates. Most prior studies only examine therapeutic communities or intensive outpatient services. The present study will examine intensive outpatient, therapeutic communities, aftercare programs, and transitional care facilities. Fifth, the duration (amount of time spent in a substance abuse treatment program) and timing of program completion relative to prison release of substance abuse treatment is typically ignored in prior studies but will be accounted for in the present study.

Further, few studies of prison−based SAPs have examined post−release employment as an outcome variable (Welsh, 2007). In fact, Welsh calls for future research to explore "relationships among age, treatment participation, post−release employment and recidivism, using multiple measures and methods" (2007, p. 1494). The present study addresses this gap in the research by examining multiple SAPs in prisons throughout the state of Florida, recidivism variables which include the timing to these events, employment data including measures of whether an inmate was employed prior to incarceration and whether they were employed during the first quarter following release from prison, and multiple methods of analyses including propensity score matching, precision matching, survival analysis and logistic regression.

Finally and most notably, only one study to date (of the Amity therapeutic community program) has used an experimental design with random assignment of inmates to treatment and control groups (Wexler et al., 1999, 2004). However, this study examined only one therapeutic community in the California prison system, with only males being studied, and the sample size was limited to 715 inmates. The present study involves a randomized experimental design study of an entire state correctional system (the third largest state correctional system in the United

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States) that was conducted over the course of three years and will include both male and female inmates.

Modalities of Prison−Based Substance Abuse Treatment

To address the problem of substance abuse and addiction among inmates and to improve the post−release outcomes of inmates there are several possible types (or modalities) of SAP implemented in prisons. Based on recent surveys of prison−based substance abuse treatment programs, three categories of modalities for treatment are generally identified, including some form of alcohol or drug education; therapeutic communities (TC); and outpatient services. The FDC does not consider substance abuse education or prevention services as treatment, and as a result, these services will not be evaluated or discussed here.

Therapeutic Communities

Therapeutic communities (hereafter TCs) represent the dominant evidence−based and most widely studied form of in−prison substance abuse treatment implemented across the U.S. (Grella, et al., 2007; Rockholz, 2004; Welsh, 2011; Wexler et al., 1999). While some evaluations of this treatment modality have focused on examining the effectiveness of TCs as the sole treatment modality (Welsh, 2010; Zhang et al., 2011), TCs are often provided in combination with other treatment modalities. TCs are described as hierarchical in nature, in that inmates can graduate from fewer to more responsibilities in work detail and around the prison (Pearson & Lipton, 1999). In addition, they usually take place in a setting where the inmate works within a group so that they may learn social norms and responsibilities from others in the TC. As inmates progress through the levels of the TC, they generally take on more roles, receive more privileges, and earn more responsibilities. The ultimate goal of TCs is to enhance an inmate's level of self−control as well as their social and psychological functioning, which are

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critical factors for improving post−release success (Welsh, 2010). Importantly, only specialized treatment units and therapeutic communities require that inmates remain in the program longer than 90 days, require more intense participation during the week, and integrate behavioral and cognitive treatment methods (Andrews & Andrews, 2000; Welsh & Zajac, 2004). There are also criterion that would exclude certain inmates from receiving these services, such as having prison−based gang affiliations, displaying violent and disruptive behavior, and having holds from the Immigration and Naturalization Service (Burdon, Farabee, Predergast, Messina, & Cartier, 2002).

Outpatient Services

Outpatient services are considered the second most common modality for substance abuse treatment in prisons (Belenko, Hiller, & Hamilton, 2013). These services are usually allocated to moderate−risk prisoners who do not have the addiction needs to warrant more substantial treatment. In this modality, a certified counselor works directly with the inmate with the overarching objective of helping them to recognize their substance abuse problem (Welsh, 2011). Intensive outpatient programming lasts 12 weeks, or a cumulative total of 72 hours of cognitive behavioral therapy. Inmates who participate in outpatient services are not immersed in the program. Rather than being separated from the general prison environment, these services are integrated into daily prison activities. Belenko and Peugh (2005) report that only 4.9% of all inmates indicate receiving outpatient services. To date, the evidence relating to this modality's effectiveness in reducing recidivism is limited (Belenko et al., 2013). However, there is some evidence that less intensive, counseling−based programs are effective at reducing recidivism (Bennett et al., 2008; Mitchell et al., 2007).

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Empirical Support

Based on their meta−analysis, Pearson and Lipton (1999) found strong support for positive effects of the therapeutic communities in six of the seven studies that they reviewed. McKenzie (2000: 464) concurs with this conclusion after a review of the past literature by stating "treatment of drug−involved offenders in prison−based therapeutic communities (TC's) is effective in reducing criminal activities." Several studies have concluded that those individuals who complete TCs, compared to individuals who do not complete, have significantly lower rates of recidivism (Hiller et al., 1999; Inciardi, Martin, Butzin, Hooper, & Harrison, 1997; Knight et al., 1999; Martin, Butzin, & Inciardi, 1995; Martin, Butzin, Saum, & Inciardi, 1999; Wexler, De Leon, Thomas, Kressell, & Peters, 1999; Wexler, Falkin, & Lipton, 1990; Wexler, Melnick, Lowe, & Peters, 1999).

In contrast, much weaker support was found for the effect on recidivism for group−counseling programs (intensive outpatient), with only two of the seven studies reviewed by Pearson and Lipton (1999) reporting reductions in recidivism rates for program alumni. These findings indicate TCs are more consistently effective than group−based counseling programs on recidivism. While most prior empirical research has tended to examine the effectiveness of TCs and intensive outpatient services, this research has not described the existence or effectiveness of post−prison release aftercare.

Recidivism

The empirical findings regarding the effectiveness of therapeutic communities in reducing recidivism are mixed. Several studies, including multiple meta−analyses, indicate that TCs consistently show promising results in reducing relapse into drug use, as well as reducing recidivism (McMurran, 2007; Mitchell et al., 2007; Pearson & Lipton, 1999). One

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meta−analysis of correctional drug treatment programs implemented from 1968 to 1996 concludes that TC is the only modality effective at reducing reoffending among drug−based offenders. In addition, when combined with an aftercare component during post−prison release, TCs are both effective as well as cost−efficient in lowering levels of drug use and recidivism among drug−related offenders (McCollister & French, 2003; Taxman & Bouffard, 2002).

Still, a recent review of the literature suggests that the most effective results originate from TCs that contain a cognitive behavioral therapy component (see McMurran, 2007). In another meta−analysis, Mitchell and colleagues (2006, 2007) review a total of 66 empirical studies on prison−based drug treatment, 30 of which focused on the effectiveness of TCs. The results indicate that the mean effect size for recommitment and rearrest were reduced when the inmates in the studies participated in TCs; however, a significant effect size for the ability of TCs for reducing relapse was only observed when an aftercare component was coupled with the TC. Another interesting finding is that of the 30 TC programs reviewed, two employed a quasi−experimental design and yielded findings that indicate stronger treatment effects (ES = 1.90; $p<0.05$). The authors also suggest that the effectiveness of participation in TC's was robust. Specifically, Mitchell et al. (2007) found that participation in TC's alone "were associated with lower rates of re-offending, regardless of the age group, gender composition, offender type, use of coercion to compel participation, and several other factors" (p. 366). Mitchell et al. (2007) acknowledge that results showing the success of TCs across studies could be the result of publication bias, which would likely overestimate the effectiveness of TCs. This finding is a departure from previous studies, which show that the more methodologically rigorous studies find weaker treatment effects (see Weisburd et al., 2001). Notably, their experimental or quasi−experimental design selection requirement included studies with

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two−groups, where treatment was administered in one group and no or minimal treatment was provided in the comparison group. The two studies that met the criteria for an "experimental" design used random assignment of cases to the two groups (Mitchell et al., 2007).

In Bahr et al.'s (2012) review of empirical studies that met the criteria of a level 3 or higher designs[4] and were published after 2000, several types of treatment were shown to reduce drug use and reoffending. These programs included cognitive−behavioral therapy, therapeutic communities, and drug courts. In addition, contingency management programs assisted in reducing relapse into substance abuse. This review also found that including an aftercare component to these types of treatment reduced both drug use and reoffending. Their review of the literature suggested that the most effective programs focused on higher−risk offenders, incentivized the administration of treatment, combined multiple types of treatment, delivered intensive treatment, and included an aftercare element to the delivery of treatment.

These findings, however, are not universally supported. One quasi−experimental study on inmates in one therapeutic community in a California prison found no difference in the rearrest and recommitment rates between TC inmates and the comparison pool within a five−year follow−up period (Zhang et al., 2011). Several researchers argue that aftercare (post−release) or residential treatment components are the distinguishing characteristic of successful TC programs (De Leon, Hawke, Jainchill, & Melnick, 2000; Inciardi, Martin, & Butzin, 2004; Knight et al., 1999; Prendergast et al., 2004; Wexler et al., 1999). Wexler et al. (1999) used a random assignment component in their study design and found that while there were positive and significant differences in recidivism rates for inmates that participated in TC and aftercare treatment within 1 and 2 years, there were no differences observed between the

[4] This classification system is based on Sherman et al.'s (1997) Maryland Scale of Scientific Methods that established criteria for the methodological rigor of evidence−based interventions.

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treatment and comparison group within the third year of the follow−up period. These findings would suggest that TCs do not necessarily yield the most effective results on their own, but instead are most effective when used in conjunction with other (community−based) treatment programs. A long−term evaluation of the Amity Treatment study (see Prendergast et al., 2004) showed that treatment effects of a single TC program on recidivism dissipated when the effects of age and participation in post−release treatment were held constant. It is possible that as individuals have more distance from exposure to treatment they may lose the "effect" of the treatment and begin to revert back to substance abuse and criminal behaviors. As such, these results represent the most prominent criticisms of most studies on TCs, which are that their outcomes are typically measured in relatively short (within 1 to 2 years) periods and do not generally consider the importance of aftercare (Prendergast et al., 2004).

It is also important to mention that recidivism is measured differently across prior studies which assess the effectiveness of substance abuse treatment. The different operationalizations of recidivism in the literature include drug relapse (Harrison, 2001; Mitchell et al., 2006; Welsh & Zajac, 2013), rearrest (Eisenberg & Fabelo, 1996; French et al., 2010; Harrison, 2001; Welsh & Zajac, 2013), days to rearrest (French, Fang, & Fretz, 2010), reconviction (French, Fang, & Fretz, 2010), and recommitment or re−imprisonment (Eisenberg & Fabelo, 1996; French, Fang, & Fretz, 2010; Welsh & Zajac, 2013; Welsh et al., 2013). Welsh and Zajac (2013) find that TCs have a significant and negative effect on the likelihood of recommitment within a 4−year follow−up period, even without an aftercare component. However, there was no effect of TC on either rearrest or continued drug use or relapse. These findings are consistent with a meta−analysis by Mitchell et al. (2006), which suggests that TCs alone may have the capacity to reduce recidivism but not necessarily prevent drug relapse.

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Post-Prison Employment

There has been minimal research in terms of predicting the effects of prison-based substance abuse treatment on post-prison employment outcomes. However, many of the features of a prison-based SAP focus on re-entry related skills that prepare a person for the labor market, especially aftercare (Inciardi et al., 2004). Welsh (2007) reports that there was no effect of therapeutic community completion on self-reported employment outcomes. However, official or administrative measures of post-prison employment would be preferable to self-reports because of false-reporting or concealment. Aside from this study, there has not been much research in terms of predicting employment outcomes. This finding is interesting due to the nature of prison-based substance abuse treatment being focused on promoting post-prison employment skills.

Duration of Treatment

The findings on the importance of dosage of substance abuse treatment is relatively mixed. The results of Duwe's (2010) propensity score matching analyses indicated that short- and medium-term programs were more effective at reducing recidivism than longer term prison-based chemical dependency programs. Using Cox Proportional Hazard models, the author also found that participation alone had a reduced hazard of recidivism by 17-25%, whereas partial completers (i.e., prisoners who dropped out or were removed from the program) did not have any change in recidivism compared to non-participants of these programs. Wexler (1990) also finds that longer lengths of treatment has diminishing returns on reducing recidivism.

Continuation of Care

Aftercare in the community has been shown to be a critical component to success among former prisoners. Knight et al. (1999) found that in−prison treatment that included an aftercare

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component reduced recommitment to prison at greater odds than the use of only in−prison treatment or no treatment. It is important to note that the motivation to complete treatment among offenders within one TC proved to be an important factor that led to their entry into aftercare programs (De Leon, et al., 2000). In addition, the greatest benefits to the reduction of recidivism, as measured by days reincarcerated, were associated with the combination of both in−prison treatment and aftercare in the community (French, Fang, & Fretz, 2010; McCollister & French, 2003). Treatment continuums, where an inmate receives substance abuse programming in the form of a therapeutic community within prison, transitional aftercare with a work−release component, followed by community−based aftercare has been noted as some of the most critical contributors to the reduction of criminal behavior upon release (Hiller et al., 1999a; Inciardi et al., 2004; Prendergast et al., 2004).

Gendered Effects

To date, only a small number of studies have examined gender differences between inmates participating in substance abuse treatment (see Belenko & Houser, 2012; Langan & Pellissier, 2001; Messina et al., 2003; Messina et al., 2006; Peters et al., 1997). One of the findings from this research is that, controlling for other factors, females are more likely than males to participate in prison−based substance abuse treatment even though there is no evidence to suggest that females have more opportunities to participate in treatment (Belenko & Houser, 2012). In addition, regardless of gender, the extent of the inmates' substance abuse problem predicted their participation in treatment (Belenko & Houser, 2012). Inmates with more severe substance abuse issues are more likely to participate in SAPs. Race was a significant predictor of participation for only males in the study in that white males were more likely to participate (Belenko & Houser, 2012). These studies also consistently find that female inmates present

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more substantial challenges than males to the administration of treatment because they are more likely than men to have more extensive substance abuse histories, to have grown up around substance use in the household, been prescribed medication for psychological problems, and experienced physical or sexual abuse as a child (Messina et al., 2010). However, incarcerated males were generally found to have more extensive criminal histories than female inmates (Burdon et al., 2002; Burdon, Messina, & Prendergast, 2004; Covington & Surrey, 1997). Messina et al. (2006) along with several others extended this research by examining whether these differences in characteristics between males and females influenced treatment outcomes. Among female inmates who participated in both residential and outpatient treatment services, the number of prior arrests and lengthy history of physical abuse predicted post−release drug use and recidivism.

Post-Prison Follow-Up Period

The effectiveness of in−prison substance abuse treatment has been found to be contingent on the length of the follow−up period. Those studies with short−term outcomes (i.e., 1 to 2 year follow up) consistently showed positive effects for prison−based substance abuse programs in reducing recidivism (e.g., French et al., 2010; Pelissier et al. 1998; Welsh 2003, 2007; Wexler et al., 1999, 2004). Alternatively, those studies with long−term recidivism outcomes (i.e., 3−5 year follow−up) indicate that the effect of prison−based SAPs declines over time across each subsequent year of measuring recidivism (Prendergast et al., 2004; Knight et al., 1999; Zhang et al., 2011). An important caveat is that the findings cannot be generalized beyond a few states in which the studies occurred (Texas and California).

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Limitations of Prison−Based Substance Abuse Treatment Literature

Prior research on the effectiveness of prison−based substance abuse treatment is limited in several ways. First, the majority of studies have used male−only samples (Belenko & Houser, 2012; French et al., 2010; Langan & Pellissier, 2001; Messina et al., 2003; Messina et al., 2006;). While females comprise a smaller proportion of substance abuse offenders in prison, they still experience a comparable, if not greater, substance abuse treatment need. Our study will provide an improvement to the prior literature in that we include all inmates – both male and female – released from Florida prisons during the study period (2006 through 2011) and who consented to participate in the randomized experimental component of the study.

Second, the majority of prior evaluations examined a relatively small number of programs administered in a small proportion of prisons within a state (French et al., 2010). Of the programs that have been evaluated, the overwhelming majority of have been on therapeutic communities. Our study is expanding the research in this area by examining multiple substance abuse modalities that are provided in all prison facilities with SAP programs (both privately run and state−operated) within the FDC.

Third, with few exceptions (see Belenko & Houser, 2012; Messina et al., 2006), prior studies include relatively small sample sizes that limit the confidence, generalizability, and applicability of results (especially for inmate sub−populations). Some studies have used sample sizes as small as 38 female (Wexler et al., 1990; Wexler et al., 1999) and 187 male participants (Burdon et al., 2013). Fourth, most of the studies were conducted in the 1990s (Knight et al., 1999; Martin et al., 1999; Pelissier et al., 1998; Wexler et.al., 1999, 2004), which suggests that the findings are dated. This study will improve on both of these issues by using a cohort of over 11,000 inmates that were admitted to Florida's prison system and consented to participate in a

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randomized study of substance abuse programming from 2006 through 2008, and have been released from incarceration through December 31, 2011.

Fifth, few studies include the inmate's level of motivation to complete treatment, which can result in biased samples within the control and experimental groups (DeLeon et al., 2000; Welsh, 2010). By using a randomized experimental study design we are able to control for all measurable and unmeasurable differences between the treatment (inmates receiving substance abuse programming) and control (inmates receiving no treatment during their incarceration) groups. Sixth, the duration of SAP treatment as well as the timing of involvement or completion relative to prison release have been generally neglected in prior research. The current study will examine the duration of time an inmate spends in treatment, as well as the timing of program completion to release from prison[5].

Seventh, there are few prison−based substance abuse treatment studies that have examined post−release employment as a mediating or outcome variable (Welsh, 2007). Welsh calls for additional research that examines the "relationships among age, treatment participation, post−release employment and recidivism, using multiple measures and methods" (2007: 1494). Some scholars have recognized the importance of the role of employment in post−release success (French et al., 2010). The current study responds to this limitation in the literature by incorporating quarterly post−release employment data obtained from the Florida Department of Revenue (FDR).

[5] With indeterminate sentencing laws in effect, prison officials are generally less−able to ensure that inmates will enter and complete treatment programs within a relatively short time frame prior to their release from incarceration. As a part of Florida's determinate punishment structure, inmates are required to serve at least 85% of their court imposed sentence length, regardless of good−time credits. This "truth−in−sentencing" law was enacted on October 1st, 1994. Set sentencing dates allow the FDC to accurately calculate release dates, which allows for timing an inmate's participation in treatment programs nearer to their release date.

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Eighth, only one study, to date, has employed a true experimental design with random assignment of inmates to treatment and comparison groups (Wexler et al., 1999; 2004). However, this study examined a single therapeutic community in the California prison system, with a male−only sample of limited size (715 total inmates). A separate prison−based therapeutic community program in California conducted a randomized controlled trial of substance abuse treatment for only women (Messina et al., 2010). However, this study only compared inmates who received a gender−responsive treatment to a control group who received a standard prison−based therapeutic community treatment. A comparison group of offenders who did not receive treatment were excluded from the study. The design of the current study uses random assignment of participants to treatment and comparison pools. The procedures by which inmates were randomly assigned are described in some detail below. The current study will expand on prior literature by using this randomized study design for a cohort of male and female prison inmates entering in Florida over a three year period.

A limitation recognized as major in the substance abuse literature is selection bias (see Bahr et al., 2012). Aside from the one study that used random assignment, there has been minimal use of experimental or quasi−experimental methodologies to establish equivalence between treatment and comparison groups. The majority of studies conducted, to date, have employed regression−based models (Burdon et al., 2004; Martin et al., 1999; Welsh, 2003; Wexler et al., 1999, 2004), survival analysis (Pelissier et.al., 1998; Welsh, 2003), chi−square (Burdon et al., 2004; Knight et al., 1999), and mean difference tests (Burdon et al., 2004). While several studies (Burdon et al., 2004; Martin et al., 1999; Pelissier et.al., 1998; Welsh, 2003; Wexler et al., 1999, 2004) have controlled for the criminal history and age of the offender, only one study has controlled for inmates' behavior while incarcerated (Welsh, 2003). Some studies

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have used quasi−experimental methods, such as propensity score matching, in place of random assignment, but have only controlled for a small number of covariates (see French et al., 2010). Importantly, these matching methods only simulate random assignment to the extent that they can match on relevant covariates that are theoretically linked to recidivism. The current study will expand on the prior literature in two important ways. First, our examination of the findings from the randomized experimental design that was employed by the FDC from 2006 through 2008 will provide an additional empirical evaluation of substance abuse programming among incarcerated populations. Second, we will use multiple matching methods, as well as logistic regression and survival analysis to address potential selection bias issues that may have arisen due to limitations in the randomization process of inmates that consented to participate in the substance abuse treatment study.

Finally, the literature on in−prison substance abuse treatment is limited by the very few studies that juxtapose the effectiveness of different modalities and instances in which inmates are exposed to multiple forms or combinations of treatment. These comparisons are important because of the differing amount of resources required by various modalities and potential for differential effects on recidivism. The literature has only begun to focus on comparing the effectiveness of outpatient services relative to TCs (Mitchell et al., 2006; Pearson & Lipton, 1999; Welsh et al., 2013; Welsh & Zajac, 2004). The present study will advance the literature by comparing the results of inmates who complete treatment across multiple treatment modalities.

PRESENT STUDY

The objective of the present study is to assess the effectiveness of prison−based substance abuse treatment in reducing recidivism and increasing employment among a cohort of prisoners released in Florida between 2006 and 2011. The study examines the effects of completion of

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treatment as well as the timing to release and duration of treatment using multiple analytic procedures. Specifically, this study includes a cohort of 11,005 Florida inmates who consented to participate in the randomized substance abuse treatment study, and were only housed in FDC operated facilities. Inmates who served one or more days in a privately operated facility were excluded from the analyses. Overall, the number of cases in the current study is considerably larger than studies in prior research.

The FDC assigns inmates to treatment modalities based on an assessment from the Drug Simple Screening Instrument (DSSI), which is administered at intake. Inmates can be assigned to one of four different treatment modalities including: 1) intensive outpatient; 2) therapeutic communities; 3) aftercare with a work release component; or 4) transitional centers. The specific research questions addressed are:

1. Does the completion of prison−based substance abuse treatment programs have an impact on recidivism (rearrest, reconviction for a new felony, and reimprisonment)?
2. What is the impact of prison−based substance abuse treatment on the likelihood of post-release employment?
3. Does the length of exposure to substance abuse treatment result in inmates having differential probabilities of post-prison employment and/or recidivism?
4. Does the timing of treatment relative to the inmate's release date impact the substance abuse treatment effect on employment, recidivism, and reimprisonment?
5. Do the results of the first four questions change based on the research methods used? If so, how do they change?

METHODS

Data

Three data sources were used to create the measures described in this report. First, corrections (administrative) data were derived from the FDC's Bureau of Research and Data Analysis (BRDA). Second, the data which resulted in the creation of measures of pre− and post−prison arrests were provided by the Florida Department of Law Enforcement (FDLE).

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Third, the pre− and post−prison employment data was accessed through the Florida Department of Revenue (FDR). We begin this section with a brief explanation of these data sources and then provide details relating to each of the measures used in the subsequent data analyses conducted.

Corrections (Administrative) Data

The corrections data from BRDA originates from the FDC's Offender−Based Information System (OBIS). Established in 1979, the OBIS database contains detailed data on all offenders who were in Florida's correctional system in 1979, and all subsequent offenders sentenced to state prison or community supervision (probation, community control, etc.). Data include but are not limited to sentencing information recorded on the Sentence and Judgment Form completed by the court when an offender is convicted, comprehensive data relating to the demographic data, information on all inmate movements within and in and out of prison and related to community supervision movements and outcomes (absconding, technical violations, new offenses, and revocations), and initial and all subsequent custody classification decisions. Additionally, all entries, exits, and outcomes associated with prison−based substance abuse and other programs are recorded in OBIS along with details relating to disciplinary infraction, visits by family or friends, etc. To facilitate the tracking of individual offenders over time, the FDC utilizes a unique offender identifying number that remains constant throughout the system and over the course of each individual offender's criminal career in the state of Florida. There is also data relating to unique personal identification numbers such as the number assigned to arrestees by FDLE when they are booked into a local jail, social security number, and FBI number; as well as their prison experiences, including disciplinary actions, programs completed, educational level, and custody classification.

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In 1996, the BRDA built a SAS data warehouse of research files that are extracted from OBIS and contains detailed information relating to prison and supervision admissions, releases, and status populations. This data repository now comprises over 200 research files that contain event−based files such as prison movements, supervision gains and losses, disciplinary infractions, and prison and supervision program information, among others. Additionally, composite files that contain numerous variables on specific types of offenders based on their contact with the FDC, such as active prison or supervision population and admission and releases from prison or supervision, are contained in the SAS data warehouse and updated routinely. These files can be linked using the offender identification number and are routinely used by FDC and external researchers to build cohorts of offenders released from prison and supervision.

Pre− and Post−Prison Arrest Data

The source of both pre− and post−prison arrest data for this study was FDLE, which created the Computerized Criminal History (CCH) data system several decades ago. This data system contains detailed information on all arrests in Florida in which the suspect was fingerprinted at a local jail facility. The Florida Statistical Analysis Center (FSAC) at FDLE maintains a SAS data warehouse of all of the CHH data (Burton, et al., 2004). The BRDA and FSAC have shared data for several years, and in doing so have developed an accurate method of ensuring that the resulting matching of arrest and corrections data is based on the same individuals who are in their respective databases.

The accuracy of the matching process is facilitated by the fact that the two data systems are populated with the unique individual identifier used by each agency to track multiple entries into the state correctional system, including both prisons or community corrections offices, and arrests at the local level. For the creation of the data set that was used in the analyses included in

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this study, the BRDA provided FSAC with all of the relevant individual identifying variables, such as last name, first name, gender, race, FDLE number, FDC number, FBI number, date of birth, and Social Security number for each record in their 2004 – 2011 inmate recidivism file. The FSAC then matched the data to their CCH repository and provided the resulting dataset to FDC. Prior to sharing this file with their research partners at Florida State University (FSU), BRDA staff encrypted the FDC offender unique identification number and eliminated all personal identifying information, such as last name first name, Social Security number, and date of birth, in order to ensure the anonymity of each individual.

Employment Data

Pre− and post−prison release employment data were obtained from the Florida Department of Revenue (FDR). The FDR collects annual and quarterly individual-level data on employment, wages earned, and public assistance status. Using an individual identifier, the study sample was matched to the FDR data, and from this measures of pre−incarceration employment and post−prison release employment were created.

Florida Department of Corrections' Recidivism Dataset and the Process of Building Data for the Researcher−Practitioner Partnership Projects

This section provides a description of the BRDA's development and use of recidivism datasets on an annual basis. The BRDA began building annual post−prison recidivism research datasets for analysis and reporting purposes in the mid 1980's. These files have been used by the FDC to produce general annual reports to document changes in post−prison recidivism in Florida, to report what factors are most influential on post−prison recidivism, to conduct special analyses relating to the predictors of recidivism, and to complete various requests from policy makers and practitioners. The most recent FDC annual recidivism report is based on a cohort of inmate released from Florida's prisons from 2005 to 2012 (FDC, 2014).

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During initial meetings between the FDC and FSU research partners, it was decided that the recidivism dataset used to conduct the analyses that resulted in the report, "Florida Prison Recidivism Report: Releases from 2004 to 2011" (FDC, 2014) would be used as the basis of the analyses for the three major projects the two research units agreed to complete as part of the NIJ funding. Therefore, the initial phase of the project involved the FSU research team becoming familiar with the recidivism dataset. This was followed by numerous meetings and sharing of information relating to BRDA's warehouse of research data to identify datasets in the SAS repository that would be used to build a comprehensive recidivism analysis file that would be used to conduct the requisite studies and to build the BRDA's capacity to complete recidivism analyses in numerous other areas after the partnership project was completed. Importantly, while most of the dialogue and correspondence that occurred relating to identifying the appropriate independent, control, dependent variables to quantify and include in future analysis was between FSU and the and BRDA's research staff, it also involved numerous meetings with subject area experts at the FDC. Specifically, FSU and BRDA research staff had numerous meetings with experts at the FDC's Central Office to learn about each of the topical areas to be studied, i.e., substance abuse treatment, work release, and post−prison supervision. These meetings began as opportunities for the FSU researchers to learn more about the programs and their processes, the types of questions the practitioners were interested in having answered through the research, and the forms of data and measures the research partners should access. In later stages of the research project when the datasets were developing, additional meetings were held with the subject matter experts in which FSU and BRDA staff presented the measures and plans for analyzing the data. This proved to be invaluable because the FDC staff held insights into the

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meaning of the data that informed how we were able to measure and quantify practices, concepts, and outcomes.

The Randomization Process in the Florida Department of Corrections' Substance Abuse Study

This statewide study provided the opportunity for all 110,703 inmates entering into any one of Florida's five prison reception centers from January 1, 2006 to December 31, 2008 to participate by providing each inmate a consent form during the prison intake process. Those who consented to participate were randomly assigned to either the experimental or control group based on their unique prison identification number. Depending on their assignment, inmates had a greater or lesser probability of receiving substance abuse treatment based on their need for treatment and the availability of resources within each facility. Inmates were then assigned to a specific type of state−run substance abuse programming using the Drug Simple Screening Instrument (DSSI)[6]. The arrest, conviction, and reimprisonment outcomes among inmates who were released from prison within this cohort were examined in the data analyses. For more information on the randomization process, see Bales et al. (2014). There were 11,005 consenters in the study.

The Attrition of Cases from the Recidivism Dataset

There were 250,803 cases in the initial recidivism dataset. There were 25,571 cases in this dataset that were either sentenced to prison in another state or released to a state other than Florida or to another country. These cases were eliminated because the recidivism measures of rearrest, reconviction, and reimprisonment rely exclusively on Florida data. The recidivism rates of these cases were examined and found to be extremely low relative to cases that were

[6] As such, privately operated substance abuse programs are not considered in the description and private facility inmates are excluded from analyses in the current study.

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sentenced and released in Florida. Another set of 2,151 were removed from the dataset due to the fact that, while the offender was sentenced from a Florida court to serve a prison term in Florida, they never actually entered the prison system. The specific reasons behind these instances is not known, however, the logical reason is that offenders sentenced to prison receive credit for time served in local jail pretrial and these cases likely served enough time in jail to satisfy the entirety of the prison sentence.

The next set of cases eliminated were those inmate who served one or more days in a private prison, which resulted in the attrition of 24,146 additional records. This step was taken based on input from the FDC's substance abuse experts who felt strongly that we should not be evaluating programs that were not under their direct control. Additionally, there was no assurance that the private prisons entered programming data to the same degree and quality as the FDC. The next criterion for selecting cases for this analysis was if the inmate was part of the substance abuse treatment random assignment study. Specifically, all inmates admitted to prison from January 1, 2006 and December 31, 2008 were given the opportunity to consent to be randomly assigned to a substance treatment control or experimental group. For this analysis, we retained only those inmates who consented to participate in the experiment (n=16,171).

The final criterion for excluding cases from the final analyses dataset was due to missing data on one or more variables in the multivariate analysis. These included four variables; custody level at prison release, education tested grade level (TABE), substance abuse dependence, and the number of prior arrests. These variables were found to be highly predictive of post-prison recidivism and employment and so the decision was made that, while 5,166 cases were eliminated from the analysis, these measures were too critical as control variables to be excluded in the analysis. Therefore, the final analysis file contains 11,005 cases. However, the

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receipt of completion was also based on available bed space to receive treatment, which reduced the sample size further.

Variables

Independent Variables

The key independent variables used in the current study are the successful completion of SAP treatment modalities. The following sections will briefly describe each of these modalities as used by the FDC. Three measures assess the effect of treatment modalities on outcomes: (1) completion (yes = 1; no = 0) of any one type of SAP (modalities one, two, three, or four) or combined completion of any type of state−operated prison−based SAP; (2) length of time in SAP programs measured in months (completers only); and (3) time from completion of SAP to prison release measured in months.

Modality One (Intensive Outpatient Services)

Modality one involves a four to six month substance abuse intensive outpatient licensed program provided to inmates at designated institutions throughout the state. Treatment occurs for half a day, at least four days per week. Inmates participate in a minimum of 12 hours of counselor−supervised activities that include group and individual counseling. The inmates spend the remainder of their days performing institutional work assignments

Modality Two (Residential Therapeutic Community)

Modality two involves a nine to 12 month therapeutic community (TC) program housed within the institution or at a designated community−based facility. A TC program usually has four characteristics that distinguishes it from other modalities. First, inmates in a TC are housed together in the same dormitory, segregated from non−TC inmates. Second, TC services are provided in a positive, supportive environment wherein participants share similar substance

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abuse issues and patterns of criminal thinking. Third, inmates in TCs live and work together to change their lives while residing in the therapeutic community. Finally, the TC model emphasizes structure, responsibility, credibility, accountability, discipline, consistency and limit setting with consequences

Modality Three (Aftercare)

Modality three involves programming that is provided to inmates that have completed modalities one and two, but have not been released from prison. They provide counseling for offenders, generally in a group setting, who have completed a secure, or non−secure residential treatment program, probation and restitution center Phase I program, or an outpatient program. This type of program usually lasts from 16 to 24 months and focuses on relapse prevention. Additional services that are provided to inmates in this program include vocational, educational, and other work-related programming.

Modality Four (Transitional Care Program Centers)

The Department of Corrections Substance Abuse Transitional/Re-entry Programs is a 16−24 month program model designed to assist inmates nearing release in making a successful transition from the correctional institution to the community. These programs offer a continuum of substance abuse and work-related training services. In addition, inmates who successfully complete the initial intensive programming component (9 − 12 months) are eligible to participate in the work release component (FDC, 2011/2012). While these modalities contain substance abuse counseling services, they also contain vocational, educational, and work-related training aspects which should promote post-prison employment outcomes.

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Control Variables

We include several control variables that are known to influence recidivism in the analyses for this report to hold constant across our experimental and control groups. There are numerous factors that have been shown to be empirically linked to differences in the likelihood that released prisoners will recidivate, which are described in more detail below. We control for the demographic characteristics of gender, race, and age, which have consistently been shown to be strong predictors of recidivism (Bales & Mears, 2008; Beck & Shipley, 1987; Langan & Levin, 2002). These include sex (male=1, female=0), three dichotomous variables capturing race and ethnicity of white (1=white/non-Hispanic, 0=non-white), black (1=black/non-Hispanic, 0=white), Hispanic (1=Hispanic, 0=black/non-Hispanic or white/non-Hispanic), and age at prison release as a continuous variable in years. Education level is measured through the results of the Test of Adult Basic Education (TABE) which was administered most recently prior to the inmates release date. This test determines the equivalent grade level the inmate has achieved based on their reading, writing, and math proficiencies at that time.

Whether inmates have substance abuse dependency problems is determined through the Drug Simple Screening Instrument (DSSI) and is operationalized as having a physical or psychological dependency (=1) or not (=0). There have been several studies which have examined the link between mental illness and recidivism and have found mixed results (Baillargeon et al. 2009; Bonta & Hanson, 1998; Grann & Fazel, 2008). The variable psychiatric diagnosis at prison release (0=no, 1=yes) is based on if the inmate's latest mental health evaluation resulted in a psychiatric diagnosis which required some type of medication. If the inmate was assessed by the FDC to be a suspected or confirmed gang member (0=no, 1=yes) was an important control variable based on findings from prior research that has found a positive

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influence of this affiliation with recidivism (Huebner, Varano, & Bynum, 2007; Dooley, Seals & Skarbek, 2014). Whether the inmate was employed during first full quarter prior to their admission to prison (0=no, 1=yes) is included a as a control variable along with the number of tattoos inmates adorned (Bales, Blomberg, & Waters, 2013).

The most serious type of crime which resulted in offenders being imprisoned and their prior criminal record has been associated with reentry outcomes (Bales & Mears, 2008; Putnins, 2005). Therefore, the most serious crime which resulted in a conviction and sentence to prison is measured through dummy variables (0=no,1=yes) based on nine different crime types of murder/manslaughter, sex offenses, robbery, other violent offenses, burglary, property, drugs, weapons, and other miscellaneous offenses. While a host of prior criminal record measures were available to use in the models, due to multicollinearity problems when including all of them in the analysis, we selected four measures that had the greatest influence on recidivism and were not collinear. These include the number burglary convictions in the five years preceding prison admission, the number of theft convictions in the five years preceding admission, total number of prior arrests, and the number prior Florida prison admissions.

The effect of the length of stay in prison on recidivism explored in prior studies have found from mixed results (Beck & Shipley, 1987; Langan, et al., 2003), positive effects (Visher et al., 1991), and negative relationships (Bales & Mears, 2008; Beck & Shipley, 1997). Therefore, time served in prison in months is included in the analysis. Institutional adjustment as indicated by violations of institutional rules and resulting infractions has been found to influence post-prison offending behavior (Chen & Shapiro, 2007; Mears & Bales, 2009). If inmates had one or more disciplinary infraction within 365 days of their prison release (0=no, 1=yes) and the total number of infractions per month served in prison (Mears & Bales, 2008). Provided that

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research has demonstrated that inmates who are visited in prison and those who are visited more often have significantly lower recidivism rates (Bales & Mears, 2008) we include a measure of the number of visits inmate received per month served. Additionally, whether inmates were under some form of community supervision post-prison was accounted for in the analysis (0=no, 1=yes). Finally, for two reasons, we include dummy variables reflecting the year inmates were released from prison during our cohort period of 2006 to 2011. First, this six year span of all prison releases provides a unique opportunity to control for changes in policies and practices related to prisoner reentry that are not directly measurable. Second, the "Great Recession" in the U.S. began in December 2007 and ended in June 2009 (U.S. Bureau of Labor Statistics, 2012). The Recession occurred in the middle of our cohort period and the dire economic conditions and in particular high unemployment rates, especially among minorities and young males, may have some influence on post-prison employment and recidivism.

[INSERT TABLE 1 HERE]

Dependent Variables

Tables 2 and 2a describe the dependent variables used in the current analyses. The recidivism measures related to arrest events were derived from the FDLE arrest data described previously. These data contain the date of each arrest event and the type of charge(s). This data was used to determine whether an individual was arrest for any crime (felony or misdemeanor, excluding technical violations of supervision) after release from incarceration, and if they were arrested solely for a felony offense (excluding technical violations of supervision). Multiple measures of arrest were used in order to distinguish between those who were arrested for any reason, and those who were arrested for more serious offenses (felonies). The recidivism measures capturing a conviction for a felony crime was obtained from the FDC's "component"

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dataset which contains detailed data on every convicted charge for a felony in Florida which results in a sentence to state prison or some form of community supervision. The recidivism measures which indicate a return to Florida's prison system for any reason was obtained from the FDC's "prison movement" dataset which contains a record for every movement resulting in an entry into or an exit from a Florida prison. These records contain the movement date and the reason for the movement, such as whether it was a new sentence or a technical violation of supervision.

[INSERT TABLES 2 AND 2a HERE]

Analytic Procedures

t−tests of Means for Randomized Experimental and Control Groups

To answer the first two research questions relating to the post−release impact of substance abuse treatment on employment and recidivism, we will compare the outcomes across the control and experimental groups using t−test mean comparisons. Additionally, to assess the equivalency in the control and experimental groups, t−test comparisons will be conducted across a host of variables demonstrated by prior research to be predictive of recidivism. Specifically, age, race, ethnicity, prison commitment offense(s), time served, disciplinary infractions, prior convictions, supervision violations, prison commitments, mental health, and post−release supervision will be included in this analysis.

Comparison of Methods

The objective of the comparison of methods is to assess the comparability of experimental and non−experimental methodologies used in criminology based on a case study of the effectiveness of prison−based substance abuse treatment (SAP). First, this study assesses the impact of prison−based substance abuse treatment on recidivism and employment outcomes

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using quasi−experimental methods such as logistic regression, survival analysis, propensity score matching, and precision matching. Second, the study examines the results from the random assignment of participants to the experimental (treatment) group who successfully completed substance abuse treatment programming prior to release, or the control group of inmates who did not receive any substance abuse treatment programming during their incarceration. Third, the results for the difference of means test from the randomized experiment and the estimates from the non−experimental methodologies will be compared to determine both the validity and robustness of multiple methodologies in this criminal justice example.

Survival and Logistic Regression Modeling

Survival analysis is used to examine the probability of recidivism (rearrest, reconviction, and reimprisonment) and the time to failure across those inmates that completed prison−based substance abuse treatment and those who did not participate, after controlling for a host of variables known to impact recidivism including age at release, gender, race, ethnicity, offenses for which the inmate was incarcerated, prior convicted offenses, number of prior prison commitments, time served in prison, disciplinary infractions, employment status of the inmates prior to incarceration, and the substance abuse needs of released inmates. Logistic regression will be used to estimate the impact of treatment, i.e., substance abuse treatment, on employment, rearrest, reconviction, and reimprisonment within one, two, and three years post−release.

Precision (Exact) Matching

Precision (or exact) matching is one method available for researchers to improve causal inference when random assignment of individuals to receive a/an intervention, sanction, etc. is not possible due to ethical and practical constraints. Also known as "variable−by−variable" matching (Nagin et al., 2009: 145), this method selects cases within the treatment and control

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group where the values of each matching variable are identical. Those cases that do not match precisely are pruned from the analysis. Cases that remain and match across the treatment and control groups are made equivalent in their attributes. The only measured difference between these groups is the treatment, sanction, or condition of interest. While this method is characterized as a "foolproof way of controlling for potentially confounding variables" (Nagin et al., 2009: 145), there are some issues associated with requiring large case sizes to use it (Selltiz, Jahoda, Deutsch, & Cook, 1959).

Propensity Score Matching

Propensity Score Matching (PSM) is another common technique used to infer causality in an observational study. This technique was originally developed by Rosenbaum and Rubin (1983) and is now commonly used in many different fields including health, economics, as well as in psychological and sociological applications. The propensity score is the conditional probability of selection into the treatment or control group given a set of covariates, and is used either to construct matches or as a weight in contrasting the treatment and control conditions. The application of PSM to sanction−based research has become prominent in the criminal justice and correctional literature, and can be applied to the likelihood of receiving prison programming, such as substance abuse treatment (Apel & Sweeten, 2010; Nagin et al., 2009). The specific type of propensity score matching that was used in these analyses include nearest neighbor matching using a 0.05 caliper.

RESULTS OF RANDOMIZED EXPERIMENT

The objective of the present study is to assess the effectiveness of prison−based substance abuse treatment at reducing multiple measures of recidivism and improving employment outcomes using multiple methodologies. We conducted t−tests for the randomized experimental

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design aspect of the study as well as precision and propensity score matching, binary logistic regression, and survival analysis (Cox proportional hazard models) of a non-randomized group of inmates that consented to participate in the study. However, some of the methodological procedures, by their nature of matching cases based on similar characteristics, substantially reduced the final sample sizes to the point at which models became unstable and statistical significance could not be assessed. For instance, none of the precision matching models detected significant differences between completion and non−participation for any outcomes. In addition, modalities three and four could not be computed because there were no matched cases between completers of either modality and non−participants. As a result, any results that were based on fewer than 20 cases as an end size are not displayed[7]. In addition, several tables were displayed in the Appendix instead of the body of the text due to the lack of any significant results in those tables.

The Effects of SAP Treatment on Post-Prison Recidivism

The first objective was to address whether prison−based substance abuse treatment programs had an impact on multiple measures of recidivism. Table 3 displays the t−test results of the randomized design study of prison−based substance abuse treatment overall and for each modality on arrest for any crime within one, two, and three years. The table indicates that for overall treatment completion for one and two years, prison−based SAP significantly reduced arrest for any crime type. However, the strongest effects for distinct treatment modalities were observed for modalities three (aftercare) and four (transitional care facilities) across all three years. Those individuals that completed treatment modality three were arrested 19.3% less within one year ($p<0.001$), 18.9% less within two years ($p<0.001$), and 12.3% less in three years

[7] Full results are available upon request.

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($p<0.05$) than non−participants. Inmates who completed modality four were arrested 20.2% less within one year ($p<0.001$), 25.2% less within two years ($p<0.001$), and 16.3% less within three years ($p<0.05$) than non−participants. Inmates who completed modalities one (intensive outpatient services) and two (therapeutic communities) still only had significantly lower levels of arrest for any crime in the first year and these effects were not as substantively strong as those observed for modalities three and four. One caveat of these findings, however, is that these modalities contained the lowest number of completers. Only 59 individuals completed modality four in the first year and only 37 completed it in the third year.

[INSERT TABLE 3 HERE]

Table 4 displays the t−test results of the randomized design study of overall SAP completers and each modality of prison−based substance abuse treatment on arrest for a felony crime within one, two, and three years. The table indicates that for overall treatment and nearly all modalities across all three years, prison−based SAP significantly reduced the probability of arrest for a felony offense. Those individuals that completed any SAP are arrested for a new crime 5.7% less within one year ($p<0.001$), 7.2% less within two years ($p<0.001$), and 5.3% less within three years ($p<0.01$) than non−participants.

The findings are mixed when effects across treatment modalities are compared. Those individuals that completed modality one are arrested for a new crime 4.3% less within two years ($p<0.05$), 5.2% than non−participants. Those individuals that completed modality two are arrested for a new crime 12.0% less within one year ($p<0.001$) and 9.0% less within two years ($p<0.05$) than non−participants. Again, as seen in Table 3, the results indicate that completing modalities three and four, compared to not participating in SAP, exert the strongest relative reductions in arrest for a felony across all three years. Those individuals that completed

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modality three are arrested for a new crime 16.0% less than non-participants within one year ($p<0.001$), 21.7% less within two years ($p<0.001$), and 18.7% less within three years ($p<0.001$) than non−participants. Those individuals that completed modality four are arrested for a new crime 12.6% less within one year ($p<0.05$), 20.5% less within two years ($p<0.01$), and 19.9% less within three years ($p<0.05$) than non−participants.

[INSERT TABLE 4 HERE]

Table 5 displays the t−test results of the randomized design study of prison−based substance abuse treatment overall and for each modality on conviction within one, two, and three years. The table indicates that overall completion of treatment (all modalities grouped together) was not significantly different than non−participation in any SAP at reducing conviction. Similar to the results in the first two tables, inmates who completed modalities three and four consistently had significantly lower reconviction rates at one, two, and three years than non-participants. For example, inmates who completed modality four had significantly 12.2% less reconvictions within one year ($p<0.001$), 17.1% less reconvictions within two years ($p<0.001$), and 21.8% less reconvictions within three years ($p<0.001$). The levels of reconviction for completers of modality two were also 7% less than non−participants in the control group within one year, but was not significantly different within two and three year follow up periods. There were no significant differences in reconviction across all three years between completers of modality one or intensive outpatient services and non−participants in the control group.

[INSERT TABLE 5 HERE]

Table 6 displays the results of the effects of SAP on returning to prison. The results in Table 6 are slightly mixed as to the effectiveness of SAP and, in some cases, show that it actually leads to higher recidivism. First, inmates who complete any SAP did not have significantly

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lower levels of returning to prison. Second, the findings indicate that inmates who complete modality two and three have significantly lower levels of returning to prison within the first and second years. Third, inmates who complete modality one have significantly higher reimprisonment levels than the comparison group within all three follow-up periods indicating that this treatment modality has a criminogenic effect of returning to prison.

[INSERT TABLE 6 HERE]

Overall, these findings indicate that multiple SAP treatment modalities are effective at reducing several indicators of recidivism across multiple follow-up years. However, treatment modalities three and four consistently show the strongest reductions in recidivism relative to other treatment modalities. Aftercare and transitional programs are the most effective treatment modalities for reducing recidivism.

The Effects of SAP Treatment on Post-Prison Employment

The second research question addressed by this research was to assess the post−release impact of prison−based substance abuse treatment on the likelihood of employment within the first quarter upon release. Table 7 displays the t−test results of the randomized design study of prison−based substance abuse treatment overall and for each modality on employment outcomes within the first quarter (three months) upon release from incarceration. The results indicate that, overall, SAP is not effective at improving employment outcomes. However, the only treatment modality that was effective at significantly improving employment outcomes upon release was aftercare or modality three ($p<0.001$). Those who completed this modality had 24.5% higher employment levels then non-participants. Overall treatment does not appear to be effective, but aftercare is showing some promising results for improving employment outcomes.

[INSERT TABLE 7 HERE]

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Overall, results from the randomized experiment indicate that inmates who complete treatment modality three or aftercare are more likely to gain post-prison employment. However, the results indicate that employment levels between completers of other modalities and non-participants were not significantly different.

MULTIVARIATE RESULTS

The next several tables display the results of logistic regression and propensity score matching models for the effect of treatment completion, duration of treatment, and recency of treatment relative to release on reentry outcomes, net of control variables. It is important to mention that while the sample does not change[8] from the comparison of means tests for the randomized design to the quasi- and non-experimental research methods, the structure of the key treatment variable does change. For instance, the key treatment variable used in the experimental design sample include those people who consented, had a need for substance abuse treatment, were randomly assigned to the "treatment" group, and completed a SAP prior to release from incarceration, compared to the control group of inmates who consented, were assigned to the "control" group, and never completed a SAP prior to release from incarceration. The key treatment variable used in the multivariate analyses removes the element of randomization by comparing those inmates who consented to participate in the study, had a need for treatment, and completed a SAP (=1) compared to those who consented to participate and did not complete a SAP prior to release (=0). As a result, there are fewer cases in the randomized experimental design as many of the 11,005 inmates who consented to participate in the study and were assigned to the treatment group did not complete a SAP modality prior to release, likely due to limited bed space, as previously discussed.

[8] In both instances the sample of cases is those offenders who consented to participate in the randomized experimental design study from January 1, 2006 through December 31, 2008 (n=11,005).

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The cohort of inmates who consented to participate in the randomized experimental study are used for the multivariate analyses instead of the entire available cohort of over 201,000 inmates released from 2004 through 2011 in order to effectively compare results across methodologies. Previous analyses of the cohort of inmates who consented to participate in the randomized experimental study were found to be statistically significantly different from those who did not consent to participate in the study, and in ways that are predictive of recidivism and employment after release from incarceration (see Bales et al., 2014). Because of these differences it was determined that the most appropriate comparison would be between the randomized cohort of inmates and multivariate tests of the same cohort (minus the element of randomization) in order to assess the strength of findings as well as the likely influence of selection bias in the sample.

The Effects of Duration of SAP Treatment on Reentry Outcomes

The third research question addressed in this study is whether the length of exposure to substance abuse treatment results in inmates having differential probabilities of post-prison employment and/or recidivism. Table 8 presents the results for the effect of duration of treatment on the timing to recidivism for all combined SAP treatment and for each modality, net of control variables. The results indicate that there is no effect of duration for overall SAP completion, compared to non−participants, on any type of recidivism. For completers of modality three, greater duration in treatment led to significantly higher levels of arrest for any crime and returns to prison. The model predicting return to prison was only significant at the $p<0.1$ level. However, caution should be used when interpreting the results for each separate modality since there were small case sizes in these models.

[INSERT TABLE 8 HERE]

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There were no significant effects in the logistic regression analyses for effect of duration of any type of SAP treatment on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, net of the effects of control variables. The end sizes ranged from 1,400 in the first year to 1,083 in the third year follow−up period for arrest for any new crime. These results are located in the Appendix.

Table 9 displays the results for the logistic regression analyses for effect of duration of modality one on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison[9]. The only significant finding in this table is for conviction within two years (O.R. = 0.743; $p<0.05$). This finding indicates that greater duration of treatment for completers of modality one or intensive outpatient leads to significantly lower odds of conviction within two years upon release among completers compared to non−participants. The end sizes ranged from 832 in the first year to 669 in the third year follow−up period for arrest for any new crime.

[INSERT TABLE 9 HERE]

The Effects of Recency of SAP Treatment Relative to Release on Reentry Outcomes

The fourth research question we addressed is whether the timing of treatment relative to the inmate's release date influenced the substance abuse treatment effect on employment, recidivism, and reimprisonment outcomes. Table 10 displays the results for the logistic regression analyses for effect of timing of completing any type of SAP treatment to release from prison on arrest for a new crime, arrest for a felony offense, conviction, and return to prison

[9] Logistic regression analyses were conducted on the effects of duration of modality two, three, and four on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, however, the maximum likelihood estimates for all of these outcomes do not exist due to extremely small case sizes. As a result, the validity of their model fit is questionable. Models are not reported, but are available upon request.

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within one, two, and three years and employment outcomes within the first quarter after release from prison, net of the effects of control variables. The only significant findings from this table are for employment within the first quarter after release (O.R. = 1.019; $p<0.05$), which indicates that among completers of any type of SAP, a longer period of time (in months) between completion and release significantly increases the odds of employment within one quarter after release. The end sizes ranged from 1,402 in the first year to 1,085 in the third year follow−up period for arrest for any new crime.

[INSERT TABLE 10 HERE]

Table 11 displays the results for the logistic regression analyses for effect of timing of completing modality one to release from prison on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, net of the effects of control variables[10]. The only significant findings from this table are for arrest for any crime within one (O.R. = 1.026; $p<0.05$) and two (O.R. = 1.030; $p<0.05$) years, arrest for a felony within two years (O.R. = 1.027; $p<0.05$), and employment within one quarter upon release (O.R. = 1.041; $p<0.01$). These findings indicate that among completers of modality one or intensive outpatient services, a longer period of time (in months) between completion and release significantly increases the odds of arrest within one and two years and reduces the odds employment within one quarter after release.

[INSERT TABLE 11 HERE]

[10] Logistic regression analyses were conducted to assess the effects of timing of completing modality two, three, and four to release from prison on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, however, the maximum likelihood estimates for all of these outcomes do not exist, likely due to extremely small case sizes. As a result, the validity of their model fit is questionable and results are not reported. Full results available upon request.

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Overall, there is some evidence that recency of treatment completion relative to release has an effect on improving reentry outcomes. First, completion of SAP treatment modality one closer to the inmates' release significantly reduces rearrest. However, completion of this same SAP treatment modality nearer to a release date significantly reduces the odds of gaining employment within the first quarter upon release.

Comparison of Results across Research Methods

Recidivism Similarities

The fifth objective was to determine if the results changed based on the methods used to assess the effects of completing treatment modalities on post-prison recidivism and employment outcomes. Table 12 presents the results for the logistic regression analyses for effect of completion of any type of SAP on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within a quarter upon release. Unexpectedly, the completion of any type of treatment significantly increases the odds of reconviction within three years. Aside from the chi−square statistics, no other estimates were statistically significant in the models showing the effect of overall treatment completion.

[INSERT TABLE 12 HERE]

Since there were no significant results found from the logistic regression models for modality one, it will be located in the Appendix. Table 13 presents the results of the logistic regression analyses for effect of completion of modality two on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, net of control variables. The only significant findings in this table is for arrest for a felony within one year upon release (O.R. = 0.711; $p<0.1$), reconviction within one (O.R. = 0.550; $p<0.1$) and two (O.R. = 1.388;

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p<0.1) years, and return to prison within one (O.R. = 0.468; p<0.1) and two (O.R. = 0.590; p<0.1) years. This finding indicates that completion of modality two significantly reduces the odds of arrest for a felony, reconviction, and return to prison. However, these results are mixed and weak since all betas were only significant at the p<0.10 level and were the reverse relationship of odds ratio at reconviction within three years.

[INSERT TABLE 13 HERE]

Table 14 presents the results from the logistic regression analyses for effect of completion of modality three on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, net of the effects of control variables. The only significant findings in this table are for return to prison within two (O.R. = 0.541; p<0.05) and three years (O.R. = 0.67; p<0.1) and employment within the first quarter (O.R. = 2.610; p<0.001) upon release. These findings indicate that completion of modality three significantly reduces the odds of returning to prison within the second and third years. In addition, those inmates who complete modality three have significantly higher odds of securing employment within the first quarter upon release. There are no other significant effects in the model.

[INSERT TABLE 14 HERE]

The next analyses were the logistic regression models for effect of completion of modality four on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison net of the effects of control variables. There were no significant effects in the models in this table and as a result, this table is located in the Appendix.

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Table 15 presents the results for propensity score matching analyses for any prison−based substance abuse treatment on recidivism and employment outcomes. The only significant finding after matching on the conditional probability to receive treatment is arrest for a felony within two years. Specifically, the average treatment effect of conviction within one year is significantly higher among of any SAP completers compared to non−participants, which suggests that combined SAP completion actually has a criminogenic effect for this type of recidivism. The end sizes ranged from 10,992 in the first year to 9,628 in the third year follow−up period for arrest for any new crime.

[INSERT TABLE 15 HERE]

Table 16 presents the results for propensity score matching analyses for modality two of prison−based substance abuse treatment on recidivism and employment outcomes. The only significant findings, after matching on the conditional probability to receive treatment, are returning to prison within one and two years. Specifically, the average treatment effect of returning to prison within two years is significantly higher among modality two completers compared to non−participants, which suggests that completion of modality two actually has a criminogenic effect for this type of recidivism. The end sizes ranged from 9,945 in the first year to 8,812 in the third year follow−up period for arrest for any new crime.

[INSERT TABLE 16 HERE]

The results for propensity score matching analyses for modality one, three, and four of prison−based substance abuse treatment on recidivism and employment outcomes did not include significant findings for any model. As a result, these models are located in the Appendix.

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Employment Similarities

Table 12 presents the results for the logistic regression analyses for effect of completion of any type of SAP on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within a quarter upon release. The results indicate that completion of any type of treatment significantly increases the odds of gaining employment within one quarter upon release (O.R. = 1.171; $p<0.05$).

Table 14 presents the results for the logistic regression analyses for effect of completion of modality three on arrest for a new crime, arrest for a felony offense, conviction, and return to prison within one, two, and three years and employment outcomes within the first quarter after release from prison, net of the effects of control variables. One of the significant findings in this table are for employment within the first quarter (O.R. = 2.610; $p<0.001$) upon release. Modality three does improve the odds of gaining post-prison employment. Several of the tables that included models from quasi-experimental methods that assessed the effect of any SAP on recidivism on reentry outcomes did not display any significant results. The matching analyses suffered from considerable sample size reduction due to the matching process so it was difficult to conclude the actual effect of SAP on employment. As a result, the tables displaying the results from propensity score matching and precision matching were placed in the Appendix.

Overall Research Method Similarities

Tables 17 through 21 summarize the results of the effectiveness of combined SAP and each modality on recidivism and employment outcomes across all methodologies. One of the problems with these results is in most cases for survival analysis, logistic regression, propensity score matching, and precision matching, the results are not significant, which limits the ability to compare findings. For instance, there are only estimates across methods that can be compared in

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Table 17 because of this issue. Specifically, the results of the comparison of means and propensity score matching consistently showed a significant reduction in arrest for a felony within three years. In Table 18, there were no estimates that could be compared. The results in Table 19 indicate the comparison of means and propensity score matching consistently showed a significant reduction in returning to prison within one and two years. There were no estimates that could be compared across any methodologies in Tables 20 and 21. These results provide preliminary and slight evidence of consistent findings between experimental and quasi-experimental methods when evaluating the effectiveness of prison-based substance abuse treatment.

[INSERT TABLES 17, 18, 19, 20, AND 21 HERE]

DISCUSSION AND CONCLUSION

This study examined whether prison−based drug treatment has an impact on recidivism and post−release employment outcomes. First, the study used a randomized experimental design to examine whether combined completion of treatment modalities or each treatment modality had an effect on arrest for a new offense, arrest for a felony offense, conviction, and return to prison within one, two, and three years and post−release employment outcomes. Regardless of the modality assessed those individuals that completed SAP had significantly lower levels of arrest for a new offense, a finding which was stable across all three years. In addition, modality three (aftercare) and four (transitional care facilities) consistently had the strongest effects across all three years compared to both modality one (intensive outpatient) and two (therapeutic communities) or combined SAP treatment. Theoretically, modalities three and four occur after an inmate completes modalities one or two, and as a result, is nearer to their prison release date. The findings give credence to the idea that timing from SAP treatment completion to prison

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release is a critical component for reducing recidivism for the current study sample. Specifically, correctional agencies should attempt to provide SAP treatment as close to inmates' prison release date as possible.

Based on findings from both the randomized design and the logistic regression models, inmates who completed modality three (aftercare) also had significantly higher levels of post−release employment outcomes. This finding was not observed for inmates that completed other modalities. These findings indicate that the effect of aftercare on recidivism is substantiated across more than one method.

There were also some unexpected findings in the randomized design. Completers of Modality 1 (intensive outpatient services) actually had significantly higher levels of returning to prison. This finding may be partially due to the type of inmates that receive intensive outpatient. The majority of resources for substance abuse treatment are allocated to intensive outpatient services, so a more diverse population of inmates will receive this treatment modality. The descriptive tables (located in the Appendix) indicate that completers of modality one had significantly higher levels of returning to prison, prior arrests and prison commitments, and a longer average time served.

Second, the study used logistic regression and survival analysis (Cox proportional hazard regression models) to assess the effect of duration of treatment among completers of combined treatment modalities and each separate treatment modality on those recidivism outcomes within one, two, and three years and employment within one quarter. With few exceptions, the logistic regression and survival analyses indicated that duration of treatment did not have a significant effect on any recidivism or employment outcomes among completers. The impact of duration may have more meaning for partial completers, but have less of an effect for those people have

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completed treatment modalities. Future research should further investigate this issue of duration, or length of exposure, among partial completers.

The results from the logistic regression and survival analyses also indicate that timing from the completion of treatment to prison release had a significant effect on some rearrest outcomes. This finding also lends support to the idea that a shorter length in time from SAP completion to release resulted in more successful recidivism outcomes among completers. Overall, the findings from the strongest design (randomized experiment) show that several types of substance treatment are effective at reducing post-prison recidivism and improving employment outcomes. The results from quasi-experimental designs are more mixed and weaker in magnitude.

Limitations

Due to the substantial loss of cases in precision matching and the already small sample size in the other quasi− and non−experimental methodologies, some research questions could not be addressed. First, the study could not separate the groups into bins based on need. However, the analyses in this study did match on whether a physical or psychological need was present. Second, the effects of stability and consistency of substance abuse treatment on post−release outcomes could not be examined. Third, small sample sizes in logistic regression, survival models, and precision, and propensity score matching would not permit separate analyses based on level of substance need, gender, age, race, offense types, prior criminal record, correctional experiences, co−occurring disorders, and post−release supervision. However, the analyses that assesses the effect of combined substance abuse programming and each individual modality of treatment either controls for and matches on all of these characteristics. Finally, the comparison across methods was not possible. With a combination of multiple null findings and small sample

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sizes, it is difficult to determine if the effects are truly indistinguishable from zero or if there was simply not enough statistical power in the models to produce a significant effect. As a result of this issue, it is inconclusive as to whether the methodology is inversely related the effect of the intervention on recidivism, as others have found (Weisburd et al., 2001). While the small sample size in each modality is a limitation of the current study, it should be noted that the strongest design yielded several substantial findings. Specifically, most t−test models using randomized design among SAP completers were statistically significant. Since this method is arguably the strongest among others used in the study, more weight should be applied to its findings.

This study provides only an outcome evaluation of the effectiveness of various modalities of substance abuse treatment. While the findings here are supplemented by the historical report of the study's origins[11], future studies that examine the effectiveness of prison−based substance abuse treatment should include documentation of the implementation of the actual study. For instance, the rate of consent to participate in the randomized experimental design study declined over the three years in which the study was in effect. This may have been due, at least in part, to staff turnover (new employees not being properly trained on the importance of the study and the function of the consent forms) or general disinterest in the study by staff that were responsible for explaining the consent forms to newly admitted inmates.

In addition, there were an unequal number of participants who received and completed each of the four modalities. While it would have been beneficial for there to be an equal number of participants in each modality, the FDC does not allocate services in this manner. The receipt of a treatment modality is a function of a prisoner's substance abuse need with higher modality levels being provided to prisoners with greater treatment need. The receipt of services also

[11] Report forthcoming from the National Institute of Justice. For more information see Bales et al., 2014 or contact the authors.

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depends on the location of the facility within the state. If a prisoner has a high need for treatment but is already at a facility with, say, aftercare, they may not get in-patient treatment because that would require moving them to another facility just to receive treatment. There is also other considerations about facility placement (i.e., gang affiliation, co-defendants, etc.) that may outweigh someone's need for treatment if they are at a facility that does not offer SAP.

Another limitation in the current study, which has been acknowledged in prior studies, is programmatic integrity (see Taxman & Bouffard, 2002). The integrity of the administration of treatment is a factor that could not be captured with any certainty in the current study. A number of private vendors provide substance abuse treatment in Florida, which is how treatment is provided to the inmates. While they should have theoretically offered a certain number of hours per week of treatment, there is no exact way of determining the total number of treatment hours. In addition, there is no way of knowing that treatment, regardless of a specific modality, was administered in the same way across institutions.

Florida does not have parole and prevents the continuum of care from prison to the community. Only one-third of prisoners in Florida will receive post-prison supervision upon release (FDC, 2014). As a result, the majority of them will not receive any type of SAP services in the community. Based on the evidence which suggests post-prison aftercare programming is an important factor for reducing recidivism (French, Fang, & Fretz, 2010; McCollister & French, 2003), prison-based SAP in Florida prison may be even more effective if the state provided some type of aftercare in the community.

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Policy Implications

The policy implications of the current research are important. First, the prior literature on inmate substance abuse treatment is largely discontinuous, fragmented, and inconclusive. At present, we are uncertain about prison−based drug treatment's effect upon recidivism and continued drug use. The current study responds to this question and the related methodological limitations of prior relevant research and provides the most comprehensive study to date of the effectiveness of prison−based substance abuse treatment. The findings will have direct policy implications on prison−based drug treatment to the estimated 80% of the U.S.'s prison inmates that have a serious alcohol or substance abuse problem. Currently, most states are unable to respond to the drug treatment needs of incarcerated inmates because of limited treatment resources. In Florida, for example, of those inmates diagnosed as in need of drug treatment, only 20% receive treatment because of limited treatment services. Should it be empirically substantiated with strong and comprehensive findings demonstrating that prison−based drug treatment does reduce recidivism, the costs and benefits of expanding drug treatment will be clear as will the policy of expanding prison−based treatment programs and services.

This study also found that timing to release is a critical element in the administration of substance abuse treatment in prisons. Due to the nature of Florida's punishment structure being a truth-in-sentencing correctional system, release dates for nearly every inmate is approximately known to correctional administrators at the point of entry into prison. As a result, these administrators attempt to provide treatment that is closer in time to their release date to obtain more effective results. While truth-in-sentencing has been criticized for being too punitive in nature, this research highlights one of its unexpected benefits for treatment – knowledge of a person's expected release date.

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The objective of this study was to examine the effectiveness of multiple prison-based substance abuse treatment programs. While most research has been conducted on therapeutic community and even intensive outpatient treatment modalities, very little was known about aftercare or residential treatment facilities. This study highlighted these other programs rarely examined in other studies and evaluated their effectiveness in improving reentry outcomes using several analytical techniques. In addressing the five research questions, one of the overarching conclusions is that the timing of the programming in relation to an inmates expected release date is a critical element in the administration of programming. This research will hopefully pave the way for other state correctional systems to collectively evaluate all of their substance abuse treatment programs.

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Table 1. Control Variables Included in the Analyses

Variable Name	Values
Sex	1=Males, 0=Female
Race/Ethnicity:	
White	1=White/Non−Hispanic, 0=Non−White
Black	1=Black/non−Hispanic, 0=White
Hispanic	1=Hispanic, 0=Black/non−Hispanic/White Non−Hispanic
Age at Prison Release	Continuous in Years
Age at Prison Release − Truncated	Ages: 15 – 24 = 0; 25 – 29 = 1; 30 – 39 = 2; 40 – 49 = 3; 50 + = 4
Education Tested Grade Level (TABE)	Continuous in Years
Education Tested Grade Level (TABE)−Truncated	Grade Level: 1−5.9=1; 6−8.9=2; 9−10.9=3; 11 + =4
Psychiatric Diagnosis at Prison Release	0=No, 1=Yes
Employment Prior to Prison Admission	0=Not employed first quarter prior to prison, 1=employed
Number of Tattoos	Continuous number
Number of Tattoos−Truncated	0=None, 1−3=1, 4+=2
Primary Offense at Prison Admission	Charge With Longest Sentence
Murder/Manslaughter	0=No, 1=Yes
Robbery	0=No, 1=Yes
Other Violent	0=No, 1=Yes
Burglary	0=No, 1=Yes
Property Offenses	0=No, 1=Yes
Drug Offenses	0=No, 1=Yes
Weapons Offenses	0=No, 1=Yes
Other Offenses	0=No, 1=Yes
Prior Convicted Burglary Offenses	Continuous number
Prior Convicted Burglary Offenses−Truncated	0=0, 1+ = 1
Prior Convicted Theft Offense	Continuous number
Prior Convicted Theft Offense−Truncated	0=0, 1+ = 1
Prior Arrests	Continuous number
Prior Arrests−Truncated	1 − 7 = 1 , 8 − 15 = 2, 16+ = 3
Prior Florida Prison Commitments	0=None, 1=One, 2=Two, 3=Three or More
Prior Florida Prison Commitments−Truncated	0=0, 1 = 1, 2+ = 2
Time Served in Prison	Months From Prison Admission to Release
Time Served in Prison−Truncated	Months: 1−11=1,12−23=2,24−35=3,36=59=4,60+=5
Number of Disciplinary Infractions	Continuous number
One+ Disciplinary Infraction 1 Year of Release	0=No, 1=Yes
Visits Inmate Received per Month Served	Continuous number
Visits Inmate Received per Month Served−Truncated	0 = 0, .01−.99 = 1, 1+ = 2
Post−Prison Supervision	0=No, 1=Yes

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Table 2. Recidivism Measures: Arrests

Variable Name	Values
Recidivism	
Survival Variable − Arrest for any crime excluding violations − if censored	0 = Not arrested for any crime, excluding violations, prior to the last follow−up date; 1 = Number of months to first arrest for any crime excluding violations prior to the last follow−up date
Survival Variable − Number of months to first arrest for any crime excluding violations for uncensored cases or number of months to the last follow−up date for censored cases	Number of months to last follow−up date for cases not arrested for any crime excluding violations (censored) or number of months to first arrest for any crime excluding violations (uncensored)
If arrested for any crime excluding violations within one year post−prison release	0 = Not arrested for any crime, excluding violations, within one year post−prison release; 1 = Arrested for any crime, excluding violations, within one year post−prison release; missing = less than one year from prison release to last follow−up date
If arrested for any crime excluding violations within two years post−prison release	0 = Not arrested for any crime, excluding violations, within two years post−prison release; 1 = Arrested for any crime, excluding violations, within two years post−prison release; missing = less than two years from prison release to last follow−up date
If arrested for any crime excluding violations within three years post−prison release	0 = Not arrested for any crime, excluding violations, within three years post−prison release; 1 = Arrested for any crime, excluding violations, within three years post−prison release; missing = less than three years from prison release to last follow−up date
Survival Variable − Arrest for a felony crime − if censored	0 = Not arrested for a felony crime prior to the last follow−up date; 1 = Number of months to first arrest for a felony crime prior to the last follow−up date
Survival Variable − Number of months to first arrest for a felony crime for uncensored cases or number of months to the last follow−up date for censored cases	Number of months to last follow−up date for cases not arrested for a felony crime (censored) or number of months to first arrest for a felony crime (uncensored)
If arrested for a felony crime within one year post−prison release	0 = Not arrested for a felony crime within one year post−prison release; 1 = Arrested for a felony crime within one year post−prison release; missing = less than one year from prison release to last follow−up date
If arrested for a felony crime within two years post−prison release	0 = Not arrested for a felony crime within two years post−prison release; 1 = Arrested for a felony crime within two years post−prison release; missing = less than two years from prison release to last follow−up date
If arrested for a felony crime within three years post−prison release	0 = Not arrested for a felony crime within three years post−prison release; 1 = Arrested for a felony crime within three years post−prison release; missing = less than three years from prison release to last follow−up date

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Table 2a. Recidivism Measures: Conviction and Return to Prison, and Employment

Variable Name	Values
Recidivism	
Survival Variable − Conviction for a felony crime − if censored	0 = Not convicted for a felony crime prior to the last follow−up date; 1 = Number of months to first conviction for a felony crime prior to the last follow−up date
Survival Variable − Number of months to first conviction for a felony crime for uncensored cases or number of months to the last follow−up date for censored cases	Number of months to last follow−up date for cases not convicted for a felony crime (censored) or number of months to first convicted for a felony crime (uncensored)
If convicted for a felony crime within one years post−prison release	0 = Not convicted for a felony crime within one year post−prison release; 1 = Convicted for a felony crime within one year post−prison release; missing = less than one year from prison release to last follow−up date
If convicted for a felony crime within two years post−prison release	0 = Not convicted for a felony crime within two years post−prison release; 1 = Convicted for a felony crime within two years post−prison release; missing = less than two years from prison release to last follow−up date
If convicted for a felony crime within three years post−prison release	0 = Not convicted for a felony crime within three years post−prison release; 1 = Convicted for a felony crime within three years post−prison release; missing = less than three years from prison release to last follow−up date
Survival Variable − Return to Prison for Any Reason − If Censored	0 = Not arrested for a felony crime prior to the last follow−up date; 1 = Number of months to first arrest for a felony crime prior to the last follow−up date
Survival Variable − Number of months to first return to prison for any reason for uncensored cases or number of months to the last follow−up date for censored cases	Number of months to last follow−up date for cases that did not return to prison for any reason (censored) or number of months to first return to prison for any reason (uncensored)
If returned to prison for any reason within one year post−prison release	0 = Returned to prison for any reason within one year post−prison release; 1 = Not returned to prison for any reason within one year post−prison release; missing = less than one year from prison release to last follow−up date
If returned to prison for any reason within two years post−prison release	0 = Returned to prison for any reason within two years post−prison release; 1 = Not returned to prison for any reason within two years post−prison release; missing = less than two years from prison release to last follow−up date
If returned to prison for any reason within three years post−prison release	0 = Returned to prison for any reason within three years post−prison release; 1 = Not returned to prison for any reason within three years post−prison release; missing = less than three years from prison release to last follow−up date
Employment	
Post−Prison Employment	0 = No employment during first full quarter after prison release; 1 Employed during first full quarter after prison release

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Table 3. Results of Randomized Experimental Design Study of Prison−Based Substance Abuse Treatment Programming on Arrest for Any Crime: t−tests of Means Models

	Treatment		Control		Mean Difference
	Mean	N	Mean	N	
Arrest for any crime within one year					
Completed any SAP	0.315	959	0.388	4,551	-0.073***
Completed Modality 1	0.349	661	0.388	4,551	-0.039†
Completed Modality 2	0.271	166	0.388	4,551	-0.117**
Completed Modality 3	0.195	118	0.388	4,551	-0.193***
Completed Modality 4	0.186	59	0.388	4,551	-0.202***
Arrest for any crime within two years					
Completed any SAP	0.493	915	0.552	4,452	-0.059**
Completed Modality 1	0.520	637	0.552	4,452	-0.032
Completed Modality 2	0.494	156	0.552	4,452	-0.058
Completed Modality 3	0.363	113	0.552	4,452	-0.189***
Completed Modality 4	0.300	50	0.552	4,452	-0.252***
Arrest for any crime within three years					
Completed any SAP	0.614	837	0.649	4,267	-0.035†
Completed Modality 1	0.625	594	0.649	4,267	-0.025
Completed Modality 2	0.627	142	0.649	4,267	-0.022
Completed Modality 3	0.526	97	0.649	4,267	-0.123*
Completed Modality 4	0.487	37	0.649	4,267	-0.163*

†p<.10, *p<.05, **p<.01, ***p<.001

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Table 4. Results of Randomized Experimental Design Study of Prison−Based Substance Abuse Treatment Programming on Arrest for a Felony: t−tests of Means Models

	Treatment		Control		Mean Difference
	Mean	N	Mean	N	
Arrest for a felony within one year					
Completed any SAP	0.255	959	0.312	4,551	-0.057***
Completed Modality 1	0.289	661	0.312	4,551	-0.023
Completed Modality 2	0.193	166	0.312	4,551	-0.120***
Completed Modality 3	0.153	118	0.312	4,551	-0.160***
Completed Modality 4	0.186	59	0.312	4,551	-0.126*
Arrest for a felony within two years					
Completed any SAP	0.388	896	0.460	4,412	-0.072***
Completed Modality 1	0.417	623	0.460	4,412	-0.043*
Completed Modality 2	0.370	154	0.460	4,412	-0.090*
Completed Modality 3	0.243	111	0.460	4,412	-0.217***
Completed Modality 4	0.255	47	0.460	4,412	-0.205**
Arrest for a felony within three years					
Completed any SAP	0.490	765	0.544	4,071	-0.053**
Completed Modality 1	0.509	546	0.544	4,071	-0.034
Completed Modality 2	0.489	131	0.544	4,071	-0.055
Completed Modality 3	0.357	84	0.544	4,071	-0.187***
Completed Modality 4	0.345	29	0.544	4,071	-0.199*

*p<.05, **p<.01, ***p<.001

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Table 5. Results of Randomized Experimental Design Study of Prison−Based Substance Abuse Treatment Programming on Reconviction: t−tests of Means Models

	Treatment		Control		Mean Difference
	Mean	N	Mean	N	
Conviction within one year					
Completed any SAP	0.156	959	0.173	4,551	-0.017
Completed Modality 1	0.185	661	0.173	4,551	0.011
Completed Modality 2	0.096	166	0.173	4,551	-0.077**
Completed Modality 3	0.102	118	0.173	4,551	-0.072**
Completed Modality 4	0.051	59	0.173	4,551	-0.122***
Conviction within two years					
Completed any SAP	0.243	911	0.269	4,459	-0.026
Completed Modality 1	0.264	632	0.269	4,459	-0.004
Completed Modality 2	0.231	156	0.269	4,459	-0.038
Completed Modality 3	0.168	113	0.269	4,459	-0.101**
Completed Modality 4	0.098	51	0.269	4,459	-0.171***
Conviction within three years					
Completed any SAP	0.330	797	0.335	4,136	-0.005
Completed Modality 1	0.344	564	0.335	4,136	0.009
Completed Modality 2	0.338	139	0.335	4,136	0.003
Completed Modality 3	0.233	90	0.335	4,136	-0.102*
Completed Modality 4	0.118	34	0.335	4,136	-0.218***

*p<.05, **p<.01, ***p<.001

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Table 6. Results of Randomized Experimental Design Study of Prison−Based Substance Abuse Treatment Programming on Reimprisonment: t−tests of Means Models

	Treatment		Control		Mean Difference
	Mean	N	Mean	N	
Return to prison within one year					
Completed any SAP	0.077	959	0.069	4,551	0.008
Completed Modality 1	0.095	661	0.069	4,551	0.026*
Completed Modality 2	0.030	166	0.069	4,551	-0.039*
Completed Modality 3	0.025	118	0.069	4,551	-0.044**
Completed Modality 4	0.051	59	0.069	4,551	-0.019
Return to prison within two years					
Completed any SAP	0.150	959	0.148	4,551	0.002
Completed Modality 1	0.180	661	0.148	4,551	0.032*
Completed Modality 2	0.090	166	0.148	4,551	-0.058*
Completed Modality 3	0.059	118	0.148	4,551	-0.089***
Completed Modality 4	0.085	59	0.148	4,551	-0.063†
Return to prison within three years					
Completed any SAP	0.235	867	0.218	4,297	0.017
Completed Modality 1	0.267	603	0.218	4,297	0.049*
Completed Modality 2	0.179	151	0.218	4,297	-0.039
Completed Modality 3	0.130	108	0.218	4,297	-0.088**
Completed Modality 4	0.119	42	0.218	4,297	-0.099

†p<.10, *p<.05, **p<.01, ***p<.001

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Table 7. Results of Randomized Experimental Design Study of Prison−Based Substance Abuse Treatment Programming on Employment within the First Quarter after Release from Prison: t−tests of Means Models

	Treatment		Control		Mean Difference
	Mean	N	Mean	N	
Employed within first quarter after release					
Completed any SAP	0.346	959	0.331	4,551	0.015
Completed Modality 1	0.325	661	0.331	4,551	- 0.006
Completed Modality 2	0.295	166	0.331	4,551	- 0.036
Completed Modality 3	0.576	118	0.331	4,551	0.245***
Completed Modality 4	0.254	59	0.331	4,551	- 0.077

***p<.001

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Table 8. Effect of Length of Time in Treatment for Prison−Based Substance Abuse Treatment Programming on Recidivism: Cox Proportional Hazard Regression Models

	N	β	Standard Error	Hazard Ratio
Any Substance Abuse Treatment				
Arrest for any crime – Anytime	813	0.001	0.011	1.001
Arrest for a felony – Anytime	704	−0.009	0.013	0.991
Conviction – Anytime	453	−0.038†	0.019	0.963
Return to prison – Anytime	447	−0.014	0.017	0.986
Modality 1				
Arrest for any crime – Anytime	532	−0.025	0.073	0.976
Arrest for a felony – Anytime	472	−0.024	0.079	0.976
Conviction – Anytime	314	−0.127	0.097	0.880
Return to prison – Anytime	328	0.093	0.095	1.098
Modality 2				
Arrest for any crime – Anytime	112	0.010	0.126	1.011
Arrest for a felony – Anytime	89	−0.015	0.138	0.985
Conviction – Anytime	59	−0.006	0.179	0.994
Return to prison – Anytime	48	0.073	0.187	1.076
Modality 3				
Arrest for any crime – Anytime	140	0.244*	0.101	1.277
Arrest for a felony – Anytime	121	0.100	0.108	1.105
Conviction – Anytime	74	0.081	0.138	1.084
Return to prison – Anytime	56	0.306†	0.167	1.359
Modality 4				
Arrest for any crime – Anytime	54	0.042	0.031	1.043
Arrest for a felony – Anytime	41	0.027	0.037	1.027
Conviction – Anytime	17	0.049	0.072	1.050
Return to prison – Anytime	22	0.040	0.051	1.041

†p<.10, *p<.05

Total Observations = Any SAP: 1,400; Modality 1: 858; Modality 2: 194; Modality 3: 270; Modality 4: 143
S.E. = Standard Error

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Table 9. Effect of Length of Time in Treatment for Substance Abuse Programming Modality 1 on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	−0.103	0.903	184.660***	0.267	858
Two Years	−0.147	0.863	215.967***	0.309	819
Three Years	0.014	1.014	180.559***	0.309	693
Arrest for a felony (excluding technical violations)					
One Year	−0.047	0.954	144.222***	0.221	858
Two Years	−0.050	0.951	163.974***	0.245	813
Three Years	0.019	1.019	143.644***	0.250	693
Conviction					
One Year	−0.256	0.774	133.167***	0.234	858
Two Years	−0.297*	0.743	137.405***	0.224	813
Three Years	−0.121	0.886	131.925***	0.232	715
Return to Prison					
One Year	0.071	1.073	76.618***	0.192	858
Two Years	−0.145	0.865	110.316***	0.201	858
Three Years	0.078	1.081	107.052***	0.192	771
Post−prison employment					
Employed within the first quarter	−0.046	0.955	239.936***	0.345	858

* p<.05, ***p<.001

O.R. = Odds Ratio

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Table 10. Effect of Recency of Treatment Relative to Release from Incarceration for Any Substance Abuse Programming for Inmates Randomly Assigned to Treatment on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	0.009	1.009	254.237***	0.234	1,402
Two Years	0.008	1.008	296.313***	0.267	1,327
Three Years	0.012	1.012	240.183***	0.266	1,085
Arrest for a felony (excluding technical violations)					
One Year	0.004	1.004	211.545***	0.207	1,402
Two Years	0.008	1.008	242.066***	0.227	1,320
Three Years	0.005	1.005	211.970***	0.237	1,085
Conviction					
One Year	0.004	1.004	178.715***	0.210	1,402
Two Years	0.002	1.002	203.637***	0.213	1,325
Three Years	0.002	1.002	190.223***	0.216	1,131
Return to Prison					
One Year	0.005	1.005	93.344***	0.163	1,402
Two Years	0.008	1.008	152.058***	0.186	1,402
Three Years	0.010	1.010	173.403***	0.202	1,249
Post−prison employment					
Employed within the first quarter	0.019*	1.019	513.377***	0.422	1,402

* p<.05, ***p<.001

O.R. = Odds Ratio

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Table 11. Effect of Recency of Treatment Relative to Release from Incarceration for Substance Abuse Programming Modality 1 on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	0.026*	1.026	182.341***	0.267	859
Two Years	0.029*	1.030	216.338***	0.310	820
Three Years	0.031†	1.031	180.357***	0.309	694
Arrest for a felony (excluding technical violations)					
One Year	0.018	1.018	140.487***	0.215	859
Two Years	0.026*	1.027	163.262***	0.244	814
Three Years	0.022	1.022	142.369***	0.247	694
Conviction					
One Year	0.011	1.011	126.450***	0.222	859
Two Years	0.002	1.002	127.780***	0.209	814
Three Years	0.017	1.017	129.306***	0.227	716
Return to Prison					
One Year	0.008	1.008	76.238***	0.191	859
Two Years	0.012	1.012	111.273***	0.202	859
Three Years	0.021	1.021	107.569***	0.192	772
Post−prison employment					
Employed within the first quarter	0.041**	1.041	237.656***	0.342	859

†p<.10, * p<.05, **p<.01, ***p<.001

O.R. = Odds Ratio

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Table 12. Effect of Completion of Any Prison−Based Substance Abuse Treatment on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	−0.029	0.971	1,678.894***	0.193	11,005
Two Years	0.002	1.002	1,762.937***	0.203	10,730
Three Years	0.002	1.002	1,626.522***	0.212	9,629
Arrest for a felony (excluding technical violations)					
One Year	−0.017	0.983	1,314.890***	0.159	11,005
Two Years	−0.066	0.936	1,526.156***	0.178	10,714
Three Years	0.001	1.001	1,423.087***	0.184	9,629
Conviction					
One Year	0.018	1.019	917.506***	0.132	11,005
Two Years	−0.007	0.994	1,093.254***	0.141	10,735
Three Years	0.155*	1.167	1,124.235***	0.150	9,825
Return to Prison					
One Year	−0.012	0.989	574.676***	0.126	11,005
Two Years	−0.065	0.937	803.277***	0.122	11,005
Three Years	0.006	1.006	925.731***	0.131	10,336
Post−prison employment					
Employed within the first quarter	0.158*	1.171	2,785.109***	0.312	11,005

* p<.05, ***p<.001

O.R. = Odds Ratio

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Table 13. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 2 on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	B	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	−0.245	0.783	1,501.313***	0.190	9,948
Two Years	0.167	1.181	1,563.795***	0.199	9,730
Three Years	0.259	1.296	1,478.694***	0.211	8,813
Arrest for a felony (excluding technical violations)					
One Year	−0.342†	0.711	1,184.363***	0.158	9,948
Two Years	−0.069	0.933	1,364.194***	0.175	9,721
Three Years	0.045	1.046	1,305.320***	0.184	8,813
Conviction					
One Year	−0.505†	0.550	807.649***	0.129	9,948
Two Years	0.041	1.041	958.159***	0.136	9,737
Three Years	0.328†	1.388	1,020.572***	0.149	8,976
Return to Prison					
One Year	−0.759†	0.468	519.237***	0.127	9,948
Two Years	−0.528†	0.590	713.044***	0.120	9,948
Three Years	−0.237	0.789	826.884***	0.128	9,399
Post−prison employment					
Employed within the first quarter	−0.063	0.939	2,450.320***	0.305	9,948

†p<.10, ***p<.001

O.R. = Odds Ratio

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Table 14. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 3 on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	−0.033	0.968	1,497.974***	0.189	9,987
Two Years	−0.099	0.906	1,568.008***	0.198	9,769
Three Years	0.045	1.046	1,467.021***	0.209	8,832
Arrest for a felony (excluding technical violations)					
One Year	−0.026	0.974	1,170.629***	0.156	9,987
Two Years	−0.203	0.816	1,374.126***	0.176	9,759
Three Years	0.086	1.090	1,286.652***	0.181	8,832
Conviction					
One Year	−0.062	0.940	798.133***	0.127	9,987
Two Years	−0.261	0.770	953.011***	0.135	9,778
Three Years	0.040	1.041	991.654***	0.145	8,998
Return to Prison					
One Year	−0.600	0.549	527.872***	0.129	9,987
Two Years	−0.614*	0.541	730.327***	0.122	9,987
Three Years	−0.399†	0.671	836.777***	0.130	9,432
Post−prison employment					
Employed within the first quarter	0.960***	2.610	2,534.216***	0.312	9,987

†p<.10, * p<.05, ***p<.001

O.R. = Odds Ratio

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Table 15. Effect of Completion of Any Prison−Based Substance Abuse Treatment on Recidivism and Employment: Propensity Score Matching Models (Matched Covariates Not Presented)

	Unmatched Sample				Matched Sample				
	Any SAP	No SAP	*t*−value	n	Any SAP	No SAP	Diff.	*t*−value	n
Recidivism Measure									
Arrest for any crime (excluding technical violations)									
One Year	0.314	0.384	-4.86	11,005	0.315	0.325	-0.010	-0.52	10,992
Two Years	0.489	0.548	-3.83	10,730	0.490	0.529	-0.039	-1.87	10,721
Three Years	0.575	0.629	-3.28	9,629	0.576	0.587	-0.011	-0.51	9,628
Arrest for a felony (excluding technical violations)									
One Year	0.256	0.310	-3.89	11,005	0.258	0.267	-0.008	-0.46	10,992
Two Years	0.398	0.461	-4.03	10,714	0.400	0.449	-.049***	-2.40	10,705
Three Years	0.492	0.539	-2.76	9,629	0.493	0.506	-0.013	-0.55	9,628
Conviction									
One Year	0.154	0.178	-2.06	11,005	0.156	0.158	-0.002	-0.17	10,992
Two Years	0.240	0.273	-2.45	10,735	0.242	0.239	0.003	0.15	10,727
Three Years	0.331	0.334	-0.21	9,825	0.331	0.307	0.024	1.15	9,822
Return to Prison									
One Year	0.073	0.071	0.15	11,005	0.072	0.073	-0.002	-0.16	10,992
Two Years	0.142	0.156	-1.33	11,005	0.142	0.165	-0.023	-1.57	10,992
Three Years	0.218	0.227	-0.63	10,336	0.219	0.235	-0.015	-0.87	10,332
Post−prison employment									
Employed within the first quarter	0.345	0.322	1.65	11,005	0.346	0.329	0.017	0.90	10,992

* p < .05; ** p < .01; *** p < .001

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Table 16. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 2 on Recidivism and Employment: Propensity Score Matching Models (Matched Covariates Not Presented)

	Unmatched Sample				Matched Sample				
	Any SAP	No SAP	*t*−value	n	Any SAP	No SAP	Diff.	*t*−value	n
Recidivism Measure									
Arrest for any crime (excluding technical violations)									
One Year	0.262	0.385	-3.38	9,948	0.267	0.283	-0.017	-0.35	9,945
Two Years	0.488	0.548	-1.55	9,730	0.491	0.479	0.012	0.22	9,727
Three Years	0.583	0.629	-1.13	8,813	0.587	0.517	0.070	1.19	8,812
Arrest for a felony (excluding technical violations)									
One Year	0.191	0.310	-3.46	9,948	0.194	0.233	-0.039	-0.90	9,945
Two Years	0.372	0.460	-2.31	9,721	0.373	0.414	-0.041	-0.78	9,718
Three Years	0.472	0.540	-1.61	8,813	0.476	0.434	0.042	0.71	8,812
Conviction									
One Year	0.098	0.177	-2.79	9,948	0.100	0.167	-0.067	-1.86	9,945
Two Years	0.238	0.274	-1.03	9,737	0.243	0.207	0.036	0.78	9,734
Three Years	0.342	0.334	0.21	8,976	0.347	0.253	0.093	1.77	8,974
Return to Prison									
One Year	0.033	0.071	-2.02	9,948	0.033	0.100	-0.067***	-2.55	9,945
Two Years	0.087	0.156	-2.56	9,948	0.089	0.167	-0.077***	-2.22	9,945
Three Years	0.175	0.227	-1.59	9,399	0.176	0.170	0.006	0.15	9,398
Post−prison employment									
Employed within the first quarter	0.295	0.322	-0.79	9,948	0.3	0.35	-0.05	-1.01	9,945

* p < .05; ** p < .01; *** p < .001

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Table 17. Comparison of Methods – Significance Level and Direction for Recidivism and Employment Findings: Completion of Any Type of Prison−Based Substance Abuse Treatment Programming Compared to Inmates That Received No Substance Abuse Treatment

	t−test of Means		Survival		Logistic Regression		Precision Matching		PSM	
	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value
Recidivism Measure										
Arrest for any crime (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	***			−	n.s.	−	n.s.	−	n.s.
Two Years	−	**			+	n.s.	−	n.s.	−	n.s.
Three Years	−	†			+	n.s.	−	n.s.	−	n.s.
Arrest for a felony (excluding technical violations)										
Anytime										
One Year	−	***	−	n.s.	−	n.s.	−	n.s.	−	n.s.
Two Years	−	***			−	n.s.	−	n.s.	−	***
Three Years	−	**			+	n.s.	−	*	−	n.s.
Conviction										
Anytime			+	n.s.						
One Year	−	n.s.			+	n.s.	+	n.s.	−	*
Two Years	−	n.s.			−	n.s.	+	n.s.	+	n.s.
Three Years	−	n.s.			+	*	+	n.s.	+	n.s.
Return to Prison										
Anytime										
One Year	+	n.s.	+	n.s.	−	n.s.	+	n.s.	−	n.s.
Two Years	+	n.s.			−	n.s.	+	n.s.	−	n.s.
Three Years	+	n.s.			+	n.s.	+	n.s.	−	n.s.
Post−prison employment										
Employed within the first quarter	+	n.s.			+	*	−	n.s.	+	n.s.

†p<.10, *p<.05, **p<.01, ***p<.001, n.s. = Non-Significant

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Table 18. Comparison of Methods – Significance Level and Direction for Recidivism and Employment Findings: Completion of Prison−Based Substance Abuse Treatment Programming Modality 1 Compared to Inmates That Received No Substance Abuse Treatment

	t−test of Means		Survival		Logistic Regression		Precision Matching		PSM	
	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value
Recidivism Measure										
Arrest for any crime (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	†			−	n.s.	−	n.s.	−	n.s.
Two Years	−	n.s.			−	n.s.	−	n.s.	−	n.s.
Three Years	−	n.s.			−	n.s.	−	n.s.	−	n.s.
Arrest for a felony (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	n.s.			+	n.s.	−	n.s.	−	n.s.
Two Years	−	*			−	n.s.	+	n.s.	−	n.s.
Three Years	−	n.s.			−	n.s.	−	n.s.	−	n.s.
Conviction										
Anytime			+	n.s.						
One Year	+	n.s.			+	n.s.	+	n.s.	+	n.s.
Two Years	−	n.s.			+	n.s.	+	n.s.	+	n.s.
Three Years	+	n.s.			+	n.s.	+	n.s.	+	n.s.
Return to Prison										
Anytime			+	n.s.						
One Year	+	*			+	n.s.	+	n.s.	+	n.s.
Two Years	+	*			+	n.s.	+	n.s.	+	n.s.
Three Years	+	*			+	n.s.	+	n.s.	+	n.s.
Post−prison employment										
Employed within the first quarter	−	n.s.			−	n.s.	−	n.s.	+	n.s.

†p<.10, *p<.05, n.s. = Non-Significant

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Table 19. Comparison of Methods – Significance Level and Direction for Recidivism and Employment Findings: Completion of Prison−Based Substance Abuse Treatment Programming Modality 2 Compared to Inmates That Received No Substance Abuse Treatment

	t−test of Means		Survival		Logistic Regression		Precision Matching		PSM	
	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value
Recidivism Measure										
Arrest for any crime (excluding technical violations)										
Anytime			+	n.s.						
One Year	−	**			−	n.s.	−−−−−−	n.s.	−	n.s.
Two Years	−	n.s.			+	n.s.	−−−−−−	n.s.	+	n.s.
Three Years	−	n.s.			+	n.s.	−−−−−−	n.s.	+	n.s.
Arrest for a felony (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	***			−	†	−−−−−−	n.s.	−	n.s.
Two Years	−	*			−	n.s.	−−−−−−	n.s.	−	n.s.
Three Years	−	n.s.			+	n.s.	−−−−−−	n.s.	+	n.s.
Conviction										
Anytime			+	n.s.						
One Year	−	**			−	†	−−−−−−	n.s.	−	n.s.
Two Years	−	n.s.			+	n.s.	−−−−−−	n.s.	+	n.s.
Three Years	+	n.s.			+	†	−−−−−−	n.s.	+	n.s.
Return to Prison										
Anytime			−	n.s.						
One Year	−	*			−	†	−−−−−−	n.s.	−	***
Two Years	−	*			−	†	−−−−−−	n.s.	−	***
Three Years	−	n.s.			−	n.s.	−−−−−−	n.s.	+	n.s.
Post−prison employment										
Employed within the first quarter	−	n.s.			−	n.s.	−−−−−−	n.s.	−	n.s.

†p<.10, *p<.05, **p<.01, ***p<.001, n.s. = Non-Significant

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Table 20. Comparison of Methods – Significance Level and Direction for Recidivism and Employment Findings: Completion of Prison−Based Substance Abuse Treatment Programming Modality 3 Compared to Inmates That Received No Substance Abuse Treatment

	t−test of Means		Survival		Logistic Regression		Precision Matching		PSM	
	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value
Recidivism Measure										
Arrest for any crime (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	***			−	n.s.	−−−−−−	−−−−−−	+	n.s.
Two Years	−	***			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	*			+	n.s.	−−−−−−	−−−−−−	+	n.s.
Arrest for a felony (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	***			−	n.s.	−−−−−−	−−−−−−	+	n.s.
Two Years	−	***			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	***			+	n.s.	−−−−−−	−−−−−−	+	n.s.
Conviction										
Anytime			−	n.s.						
One Year	−	**			−	n.s.	−−−−−−	−−−−−−	+	n.s.
Two Years	−	**			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	*			+	n.s.	−−−−−−	−−−−−−	+	n.s.
Return to Prison										
Anytime			−	†						
One Year	−	**			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Two Years	−	***			−	*	−−−−−−	−−−−−−	−	n.s.
Three Years	−	**			−	†	−−−−−−	−−−−−−	−	n.s.
Post−prison employment										
Employed within the first quarter	+	***			+	***	−−−−−−	−−−−−−	+	n.s.

†p<.10, *p<.05, **p<.01, ***p<.001, n.s. = Non-Significant

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Table 21. Comparison of Methods – Significance Level and Direction for Recidivism and Employment Findings: Completion of Prison−Based Substance Abuse Treatment Programming Modality 4 Compared to Inmates That Received No Substance Abuse Treatment

	t−test of Means		Survival		Logistic Regression		Precision Matching		PSM	
	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value	Sign	p−value
Recidivism Measure										
Arrest for any crime (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	***			+	n.s.	−−−−−−	−−−−−−	+	n.s.
Two Years	−	***			+	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	*			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Arrest for a felony (excluding technical violations)										
Anytime			−	n.s.						
One Year	−	*			+	n.s.	−−−−−−	−−−−−−	+	n.s.
Two Years	−	**			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	*			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Conviction										
Anytime			−	n.s.						
One Year	−	***			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Two Years	−	***			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	***			−	n.s.	−−−−−−	−−−−−−	+	n.s.
Return to Prison										
Anytime			−	n.s.						
One Year	−	n.s.			+	n.s.	−−−−−−	−−−−−−	+	n.s.
Two Years	−	†			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Three Years	−	n.s.			−	n.s.	−−−−−−	−−−−−−	−	n.s.
Post−prison employment										
Employed within the first quarter	−	n.s.			+	n.s.	−−−−−−	−−−−−−	−	n.s.

†p<.10, *p<.05, **p<.01, ***p<.001, n.s. = Non-Significant

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Appendix 1. Descriptive Statistics – Recidivism and Post−Prison Employment Outcome Variables for Inmates that Completed Prison−Based Substance Abuse Treatment Programming and Inmates That Did Not Receive Substance Abuse Programming

	Any SAP		Modality 1		Modality 2		Modality 3		Modality 4		No SAP
	n=1,240		n=781		n=183		n=222		n=111		n=9,765
	Mean	Mean Difference	Mean	Mean Difference	Mean	Mean Difference	Mean	Mean Difference	Mean	Mean Difference	Mean
Dependent Variables (1= Yes, 0= No)											
Arrest for any felony or misdemeanor (excluding technical violations)											
Anytime	0.590	0.091***	0.620	0.062**	0.601	0.081*	0.532	0.150***	0.378	0.303***	0.682
One year	0.314	0.071***	0.352	0.033†	0.262	0.122***	0.252	0.132***	0.180	0.205***	0.385
Two years	0.489	0.059***	0.522	0.026	0.488	0.060	0.403	0.145***	0.340	0.208***	0.548
Three years	0.575	0.054***	0.588	0.041*	0.583	0.046	0.528	0.101**	0.407	0.222***	0.629
Arrest for any felony (excluding technical violations)											
Anytime	0.510	0.091***	0.549	0.051**	0.481	0.119**	0.450	0.150***	0.297	0.303***	0.600
One year	0.256	0.054***	0.293	0.017	0.191	0.119***	0.207	0.103***	0.162	0.148***	0.310
Two years	0.398	0.062***	0.434	0.026	0.372	0.089*	0.314	0.146***	0.280	0.181***	0.461
Three years	0.493	0.047**	0.514	0.026	0.472	0.067	0.460	0.079*	0.315	0.225***	0.540
Conviction											
Anytime	0.330	0.050***	0.362	0.017	0.322	0.057	0.279	0.100**	0.135	0.245***	0.380
One year	0.154	0.024*	0.186	−0.008	0.098	0.079***	0.117	0.061**	0.054	0.124***	0.178
Two years	0.240	0.034*	0.274	0.000	0.238	0.035	0.169	0.105***	0.113	0.160***	0.274
Three years	0.331	0.003	0.351	−0.017	0.342	−0.008	0.270	0.064†	0.164	0.170***	0.334
Return to Prison											
Anytime	0.325	0.050***	0.376	−0.001	0.257	0.119***	0.221	0.155***	0.180	0.195***	0.375
One year	0.073	−0.001	0.088	−0.017	0.033	0.039**	0.036	0.035**	0.072	−0.001	0.071
Two years	0.142	0.015	0.174	−0.018	0.087	0.069**	0.077	0.080***	0.099	0.057*	0.157
Three years	0.218	0.008	0.255	−0.028†	0.175	0.052	0.136	0.091***	0.136	0.091*	0.227
Post−prison employment											
Within first quarter	0.346	−0.023†	0.307	0.015	0.295	0.028	0.545	−0.222***	0.297	0.025	0.323

†p<.10, *p<.05, **p<.01, ***p<.001

Mean differences are calculated for each substance abuse group compared to those who had no substance abuse treatment.

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Appendix 2. Descriptive Statistics – Control Variables for Inmates that Completed Prison−Based Substance Abuse Treatment Programming and Inmates That Did Not Receive Substance Abuse Programming

	Any SAP n=1,240		Modality 1 n=781		Modality 2 n=183		Modality 3 n=222		Modality 4 n=111		No SAP n=9,765
	Mean	Mean Dif.	Mean	Mean Dif.	Mean	Mean Dif.	Mean	Mean Dif.	Mean	Mean Dif.	Mean
Sex (1=Male, 0=Female)	0.782	0.064***	0.778	0.068***	0.798	0.048†	0.820	0.026	0.676	0.171***	0.846
Race/Ethnicity											
White (1=White/non−Hispanic, 0=Non−White)	0.590	−0.050***	0.562	−0.022	0.683	−0.143***	0.590	−0.050	0.676	−0.136**	0.540
Black (1=Black/non−Hispanic, 0=White)	0.350	0.052***	0.378	0.024	0.279	0.123***	0.356	0.046	0.234	0.168***	0.402
Hispanic (1=Hispanic, 0=Black/non−Hispanic or White/non−Hispanic)	0.060	−0.002	0.060	−0.002	0.038	0.020	0.054	0.004	0.090	−0.032	0.058
Age at prison release (in years)	38.045	−1.152***	37.807	−0.914*	41.355	−4.462***	35.748	1.145†	38.523	−1.630†	36.893
Education Tested Grade Level	7.809	−0.649***	7.606	−0.446***	8.078	−0.918***	8.206	−1.046***	8.338	−1.178***	7.160
Custody Level at Release from Prison											
Close	0.074	0.036***	0.113	−0.002	0.016	−0.185***	0.014	0.097***	0.009	0.101***	0.110
Medium/Minimum	0.547	0.151***	0.661	0.037*	0.607	0.091**	0.176	0.522***	0.243	0.454***	0.697
Community	0.379	−0.187***	0.227	−0.034*	0.377	0.094***	0.811	−0.618***	0.748	−0.555***	0.193
Psychiatric Diagnosis at prison release (1=Yes 0=No)	0.160	0.028*	0.166	0.022	0.246	−0.058†	0.063	0.125***	0.135	0.053	0.188
Employment prior to prison admission	0.368	0.065***	0.380	0.053**	0.355	0.078*	0.360	0.073*	0.216	0.217***	0.433
Number of tattoos	3.165	0.103	3.344	−0.076	2.934	0.334	3.176	0.093	1.811	1.458***	3.269
Primary Offense											
Murder/Manslaughter	0.015	−0.013***	0.010	−0.007*	0.033	−0.030*	0.005	−0.002	0.063	−0.060*	0.003
Sex offenses	0.014	0.005	0.019	−0.001	0.011	0.008	0.005	0.014**	0.000	0.019***	0.019
Robbery	0.040	0.002	0.049	−0.007	0.022	0.020†	0.036	0.006	0.018	0.024†	0.042
Other violent offenses	0.109	0.019*	0.117	0.012	0.098	0.030	0.081	0.047*	0.126	0.002	0.128
Burglary	0.145	−0.012	0.143	−0.010	0.153	−0.020	0.171	−0.038	0.108	0.025	0.133
Property offenses	0.144	0.040***	0.151	0.034*	0.098	0.086***	0.162	0.023	0.135	0.050	0.185
Drugs	0.353	−0.015	0.324	0.014	0.333	0.005	0.441	−0.104**	0.414	−0.077†	0.338
Weapons offenses	0.027	−0.001	0.024	0.002	0.022	0.004	0.036	−0.010	0.036	−0.010	0.026
Other	0.152	−0.025*	0.163	−0.036**	0.230	−0.103**	0.063	0.064***	0.099	0.028	0.127
Number of prior burglary offenses	0.398	−0.016	0.423	−0.040	0.290	0.093†	0.450	−0.068	0.360	0.022	0.382
Number of prior theft offenses	1.050	−0.078	1.056	−0.085	1.044	−0.072	1.207	−0.235	1.342	−0.371	0.972
Number of prior arrests	15.433	−0.088	16.469	−1.123**	18.093	−2.748**	10.977	4.368***	10.946	4.400***	15.345
Number of prior prison commitments[1]	0.730	−0.067*	0.845	−0.182***	0.765	−0.102	0.446	0.217***	0.261	0.402***	0.663
Time served in prison (in months)	24.925	−8.502***	23.269	−6.846***	25.705	−9.282***	26.302	−9.879***	37.063	−20.640***	16.423
One or more DRs within 365 days of release (1=Yes, 0=No)	0.281	0.070***	0.333	0.018	0.208	0.143***	0.180	0.171***	0.189	0.162***	0.351
Total number of DRs per month	0.047	0.035***	0.059	0.023***	0.032	0.050***	0.024	0.058***	0.021	0.061***	0.082
Number of visits per month	0.479	−0.208***	0.422	−0.151***	0.615	−0.344***	0.453	−0.183***	0.799	−0.529***	0.271
Post−prison supervision (1=Yes, 0=No)	0.324	−0.030*	0.327	−0.032†	0.339	−0.045	0.306	−0.012	0.369	−0.075†	0.294
Year of Release from Prison											
2006	0.015	0.054***	0.022	0.047***	0.005	0.064***	0.005	0.065***	0.000	0.069***	0.069
2007	0.165	0.106***	0.211	0.060***	0.148	0.124***	0.072	0.199***	0.000	0.272***	0.272
2008	0.256	0.032*	0.275	0.014	0.197	0.092**	0.266	0.023	0.108	0.181***	0.289
2009	0.260	−0.040**	0.238	−0.018	0.339	−0.119***	0.297	−0.077*	0.207	0.013	0.220
2010	0.191	−0.096***	0.150	−0.054***	0.213	−0.118***	0.257	−0.161***	0.414	−0.319***	0.096
2011	0.112	−0.057***	0.104	−0.049***	0.098	−0.044†	0.104	−0.049*	0.270	−0.215***	0.055

†p<.10, *p<.05, **p<.01, ***p<.001

[1] Truncated where 3= 4 or more prior commitments.

Mean differences are calculated for each substance abuse group compared to those who had no substance abuse treatment.

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Appendix 3. Effect of Length of Time in Treatment for Prison−Based Substance Abuse Treatment Programming on Recidivism: Cox Proportional Hazard Regression Models

	N	β	Standard Error	Hazard Ratio
Any Substance Abuse Treatment				
Arrest for any crime – Anytime	813	0.001	0.011	1.001
Arrest for a felony – Anytime	704	−0.009	0.013	0.991
Conviction – Anytime	453	−0.038†	0.019	0.963
Return to prison – Anytime	447	−0.014	0.017	0.986
Modality 1				
Arrest for any crime – Anytime	532	−0.025	0.073	0.976
Arrest for a felony – Anytime	472	−0.024	0.079	0.976
Conviction – Anytime	314	−0.127	0.097	0.880
Return to prison – Anytime	328	0.093	0.095	1.098
Modality 2				
Arrest for any crime – Anytime	112	0.010	0.126	1.011
Arrest for a felony – Anytime	89	−0.015	0.138	0.985
Conviction – Anytime	59	−0.006	0.179	0.994
Return to prison – Anytime	48	0.073	0.187	1.076
Modality 3				
Arrest for any crime – Anytime	140	0.244*	0.101	1.277
Arrest for a felony – Anytime	121	0.100	0.108	1.105
Conviction – Anytime	74	0.081	0.138	1.084
Return to prison – Anytime	56	0.306†	0.167	1.359
Modality 4				
Arrest for any crime – Anytime	54	0.042	0.031	1.043
Arrest for a felony – Anytime	41	0.027	0.037	1.027
Conviction – Anytime	17	0.049	0.072	1.050
Return to prison – Anytime	22	0.040	0.051	1.041

†p<.10, *p<.05

Total Observations = Any SAP: 1,400; Modality 1: 858; Modality 2: 194; Modality 3: 270; Modality 4: 143
S.E. = Standard Error

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Appendix 4. Effect of Length of Time in Treatment for Any Substance Abuse Programming on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	0.021	1.021	253.310***	0.234	1,400
Two Years	0.005	1.005	295.216***	0.266	1,325
Three Years	−0.007	0.993	239.266***	0.266	1,083
Arrest for a felony (excluding technical violations)					
One Year	0.016	1.016	210.619***	0.207	1,400
Two Years	0.006	1.006	240.727***	0.226	1,318
Three Years	−0.007	0.993	211.179***	0.236	1,083
Conviction					
One Year	−0.031	0.970	180.170***	0.212	1,400
Two Years	−0.016	0.984	204.401***	0.215	1,323
Three Years	−0.025	0.975	191.777***	0.218	1,129
Return to Prison					
One Year	0.012	1.012	93.559***	0.163	1,400
Two Years	−0.000	1.000	149.378***	0.184	1,400
Three Years	−0.016	0.984	171.692***	0.200	1,247
Post−prison employment					
Employed within the first quarter	0.015	1.015	508.277***	0.419	1,400

***p<.001

O.R. = Odds Ratio

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Appendix 5. Effect of Recency of Treatment Relative to Release from Incarceration for Completion of Any Prison−Based Substance Abuse Treatment Programming on Recidivism: Cox Proportional Hazard Regression Models

	N	β	Standard Error	Hazard Ratio
Any Substance Abuse Treatment				
Arrest for any crime – Anytime	531	0.011	0.007	1.011
Arrest for a felony – Anytime	458	0.008	0.008	1.008
Conviction – Anytime	298	0.012	0.011	1.012
Return to prison – Anytime	303	0.017†	0.010	1.017
Modality 1				
Arrest for any crime – Anytime	413	0.013	0.009	1.013
Arrest for a felony – Anytime	363	0.012	0.009	1.012
Conviction – Anytime	239	0.011	0.012	1.011
Return to prison – Anytime	252	0.018	0.011	1.018
Modality 2				
Arrest for any crime – Anytime	103	0.024	0.019	1.025
Arrest for a felony – Anytime	83	0.026	0.022	1.026
Conviction – Anytime	54	0.032	0.027	1.032
Return to prison – Anytime	45	0.048	0.035	1.049
Modality 3				
Arrest for any crime – Anytime	5	--------	--------	--------
Arrest for a felony – Anytime	4	--------	--------	--------
Conviction – Anytime	3	--------	--------	--------
Return to prison – Anytime	2	--------	--------	--------
Modality 4				
Arrest for any crime – Anytime	22	−0.065	0.082	0.937
Arrest for a felony – Anytime	20	−0.082	0.157	0.921
Conviction – Anytime	8	--------	--------	--------
Return to prison – Anytime	9	--------	--------	--------

*p<.05, **p<.01, ***p<.001

Total Observations = Any SAP: 873; Modality 1: 661; Modality 2: 166; Modality 3: 12; Modality 4: 59
S.E. = Standard Error

Areas without information represented analyses with too few cases to make the estimates stable.

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Appendix 6. Effect of Completion of Prison−Based Substance Abuse Treatment Programming on Recidivism: Cox Proportional Hazard Regression Models

	N	β	Standard Error	Hazard Ratio
Any Substance Abuse Treatment				
Arrest for any crime – Anytime	7,389	−0.030	0.041	0.971
Arrest for a felony – Anytime	6,493	−0.027	0.044	0.974
Conviction – Anytime	4,116	0.053	0.054	1.054
Return to prison – Anytime	4,068	0.005	0.055	1.005
Modality 1				
Arrest for any crime – Anytime	7,141	−0.043	0.048	0.958
Arrest for a felony – Anytime	6,290	−0.017	0.051	0.983
Conviction – Anytime	3,990	0.067	0.063	1.069
Return to prison – Anytime	3,959	0.074	0.062	1.077
Modality 2				
Arrest for any crime – Anytime	6,767	0.026	0.098	1.026
Arrest for a felony – Anytime	5,949	−0.060	0.109	0.942
Conviction – Anytime	3,766	0.087	0.133	1.091
Return to prison – Anytime	3,712	−0.222	0.148	0.801
Modality 3				
Arrest for any crime – Anytime	6,775	−0.054	0.096	0.947
Arrest for a felony – Anytime	5,961	−0.062	0.104	0.940
Conviction – Anytime	3,769	−0.006	0.133	0.994
Return to prison – Anytime	3,714	−0.274†	0.148	0.760
Modality 4				
Arrest for any crime – Anytime	6,699	−0.091	0.158	0.913
Arrest for a felony – Anytime	5,894	−0.142	0.178	0.868
Conviction – Anytime	3,722	−0.364	0.262	0.695
Return to prison – Anytime	3,685	−0.180	0.229	0.835

†p<.10

Total Observations = Any SAP: 11,005; Modality 1: 10,546; Modality 2: 9,948; Modality 3: 9,987; Modality 4: 9,876.
S.E. = Standard Error

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Appendix 7. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 1 on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	−0.010	0.990	1,586.669***	0.190	10,546
Two Years	−0.018	0.982	1,674.731***	0.201	10,303
Three Years	−0.073	0.929	1,564.598***	0.211	9,298
Arrest for a felony (excluding technical violations)					
One Year	0.025	1.025	1,238.847***	0.156	10,546
Two Years	−0.049	0.952	1,440.410***	0.175	10,288
Three Years	−0.029	0.971	1,360.115***	0.182	9,298
Conviction					
One Year	0.123	1.131	869.309***	0.130	10,546
Two Years	0.058	1.060	1,016.248***	0.136	10,303
Three Years	0.149	1.161	1,068.215***	0.148	9,473
Return to Prison					
One Year	0.118	1.125	569.673***	0.130	10,546
Two Years	0.076	1.079	774.901***	0.122	10,546
Three Years	0.118	1.125	893.454***	0.131	9,934
Post−prison employment					
Employed within the first quarter	−0.009	0.991	2,569.053***	0.302	10,546

***p<.001

O.R. = Odds Ratio

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Appendix 8. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 4 on Recidivism and Employment: Logistic Regression Models (Control Covariates Not Presented)

Recidivism Measure	β	O.R.	χ^2	R^2	N
Arrest for any crime (excluding technical violations)					
One Year	0.013	1.013	1,484.103***	0.190	9,876
Two Years	0.036	1.037	1,554.373***	0.199	9,652
Three Years	−0.038	0.962	1,460.022***	0.210	8,723
Arrest for a felony (excluding technical violations)					
One Year	0.122	1.130	1,162.000***	0.156	9,876
Two Years	−0.025	0.976	1,359.424***	0.176	9,642
Three Years	−0.164	0.849	1,287.697***	0.183	8,723
Conviction					
One Year	−0.521	0.594	801.438***	0.129	9,876
Two Years	−0.338	0.713	944.658***	0.135	9,662
Three Years	−0.220	0.803	994.105***	0.147	8,885
Return to Prison					
One Year	0.144	1.155	524.280***	0.129	9,876
Two Years	−0.221	0.802	715.657***	0.121	9,876
Three Years	−0.333	0.717	828.644***	0.130	9,314
Post−prison employment					
Employed within the first quarter	0.184	1.202	2,424.951***	0.304	9,876

***p<.001

O.R. = Odds Ratio

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Appendix 9. Effect of Completion of Any Prison−Based Substance Abuse Treatment on Recidivism and Employment: Precision Matching Models (Matched Covariates Not Presented)

	β	Odds Ratio	N
Recidivism Measure			
Arrest for any crime (excluding technical violations)			
One Year	-0.245	0.783	132
Two Years	-0.420	0.657	129
Three Years	-0.643	0.526	119
Arrest for a felony (excluding technical violations)			
One Year	0.021	1.022	132
Two Years	-0.123	0.885	129
Three Years	-0.082	0.922	119
Conviction			
One Year	0.026	1.026	132
Two Years	0.038	1.039	130
Three Years	0.325	1.384	121
Return to Prison			
One Year	-0.469	0.626	132
Two Years	-0.269	0.765	132
Three Years	-0.062	0.939	126
Post−prison employment			
Employed within the first quarter	0.492	1.635	132

*p<.05, **p<.01, ***p<.001

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Appendix 10. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 1 on Recidivism and Employment: Precision Matching Models (Matched Covariates Not Presented)

	β	Odds Ratio	N
Recidivism Measure			
Arrest for any crime (excluding technical violations)			
One Year	-0.462	0.630	105
Two Years	-0.584	0.558	102
Three Years	-0.903*	0.406	93
Arrest for a felony (excluding technical violations)			
One Year	0.155	1.167	105
Two Years	-0.014	0.986	102
Three Years	0.132	1.141	93
Conviction			
One Year	0.182	1.200	105
Two Years	0.191	1.210	103
Three Years	0.460	1.584	94
Return to Prison			
One Year	-0.431	0.650	105
Two Years	-0.110	0.896	105
Three Years	0.125	1.133	99
Post−prison employment			
Employed within the first quarter	0.416	1.516	105

*p<.05, **p<.01, ***p<.001

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Appendix 11. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 1 on Recidivism and Employment: Propensity Score Matching Models (Matched Covariates Not Presented)

	Unmatched Sample				Matched Sample				
	Any SAP	No SAP	*t*−value	n	Any SAP	No SAP	Diff.	*t*−value	n
Recidivism Measure									
Arrest for any crime (excluding technical violations)									
One Year	0.352	0.385	-1.80	10,546	0.352	0.383	-0.031	-1.26	10,546
Two Years	0.522	0.548	-1.36	10,303	0.522	0.530	-0.008	-0.31	10,303
Three Years	0.588	0.629	-2.04	9,298	0.588	0.610	-0.022	-0.81	9,298
Arrest for a felony (excluding technical violations)									
One Year	0.293	0.310	-1.00	10,546	0.293	0.307	-0.014	-0.61	10,546
Two Years	0.434	0.461	-1.38	10,288	0.434	0.460	-0.026	-0.99	10,288
Three Years	0.514	0.540	-1.26	9,298	0.514	0.526	-0.013	-0.45	9,298
Conviction									
One Year	0.186	0.178	0.56	10,546	0.186	0.166	0.019	1.00	10,546
Two Years	0.274	0.274	-0.01	10,303	0.274	0.265	0.009	0.41	10,302
Three Years	0.351	0.334	0.90	9,473	0.351	0.313	0.039	1.47	9,473
Return to Prison									
One Year	0.088	0.071	1.76	10,546	0.088	0.074	0.014	1.02	10,546
Two Years	0.174	0.156	1.30	10,546	0.174	0.156	0.018	0.95	10,546
Three Years	0.255	0.227	1.73	9,934	0.255	0.254	0.001	0.06	9,934
Post−prison employment									
Employed within the first quarter	0.307	0.322	-0.89	10,546	0.307	0.302	0.005	0.22	10,546

* p < .05; ** p < .01; *** p < .001

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Appendix 12. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 3 on Recidivism and Employment: Propensity Score Matching Models (Matched Covariates Not Presented)

	Unmatched Sample				Matched Sample				
	Any SAP	No SAP	*t*−value	n	Any SAP	No SAP	Diff.	*t*−value	n
Recidivism Measure									
Arrest for any crime (excluding technical violations)									
One Year	0.252	0.385	-4.02	9,987	0.252	0.234	0.018	0.44	9,987
Two Years	0.403	0.548	-4.19	9,769	0.403	0.488	-0.085	-1.77	9,769
Three Years	0.528	0.629	-2.66	8,813	0.527	0.521	0.006	0.11	8,813
Arrest for a felony (excluding technical violations)									
One Year	0.207	0.310	-3.29	9,987	0.207	0.203	0.005	0.12	9,987
Two Years	0.314	0.460	-4.21	9,759	0.314	0.362	-0.048	-1.03	9,759
Three Years	0.460	0.540	-2.03	8,813	0.460	0.460	0	0	8,813
Conviction									
One Year	0.117	0.178	-2.34	9,987	0.117	0.104	0.014	0.45	9,987
Two Years	0.169	0.274	-3.40	9,778	0.169	0.211	-0.042	-1.11	9,778
Three Years	0.270	0.335	-1.79	8,976	0.270	0.241	0.029	0.61	8,976
Return to Prison									
One Year	0.036	0.071	-2.03	9,987	0.036	0.045	-0.009	-0.48	9,987
Two Years	0.077	0.156	-3.26	9,987	0.077	0.117	-0.041	-1.44	9,987
Three Years	0.136	0.227	-3.05	9,410	0.136	0.177	-0.040	-1.11	9,410
Post−prison employment									
Employed within the first quarter	0.545	0.322	7.00	9,987	0.545	0.455	0.090	1.90	9,987

* p < .05; ** p < .01; *** p < .001

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Appendix 13. Effect of Completion of Prison−Based Substance Abuse Treatment Modality 4 on Recidivism and Employment: Propensity Score Matching Models (Matched Covariates Not Presented)

	Unmatched Sample				Matched Sample				
	Any SAP	No SAP	*t*−value	n	Any SAP	No SAP	Diff.	*t*−value	n
Recidivism Measure									
Arrest for any crime (excluding technical violations)									
One Year	0.180	0.390	-4.51	9,695	0.187	0.187	0	0.00	9,691
Two Years	0.340	0.552	-4.12	9,495	0.341	0.374	-0.033	-0.46	9,492
Three Years	0.407	0.620	-3.20	7,748	0.392	0.411	-0.020	-0.20	7,745
Arrest for a felony (excluding technical violations)									
One Year	0.162	0.312	-3.39	9,695	0.168	0.131	0.037	0.76	9,691
Two Years	0.280	0.461	-3.50	9,480	0.275	0.286	-0.011	-0.16	9,478
Three Years	0.315	0.528	-3.14	7,748	0.294	0.333	-0.039	-0.42	7,745
Conviction									
One Year	0.054	0.179	-3.43	9,695	0.056	0.084	-0.028	-0.80	9,691
Two Years	0.113	0.276	-3.57	9,499	0.117	0.170	-0.053	-1.04	9,496
Three Years	0.164	0.328	-2.73	7,886	0.155	0.103	0.052	0.83	7,883
Return to Prison									
One Year	0.072	0.070	0.08	9,695	0.075	0.075	0	0	9,691
Two Years	0.099	0.155	-1.61	9,695	0.103	0.140	-0.038	-0.83	9,691
Three Years	0.136	0.225	-1.93	9,167	0.139	0.215	-0.076	-1.25	9,165
Post−prison employment									
Employed within the first quarter	0.297	0.324	-0.59	9,695	0.299	0.327	-0.028	-0.44	9,691

* p < .05; ** p < .01; *** p < .001

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