Assessing the Impact of Federal Support Court Using Propensity Score Analysis[1]

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FEDERAL AND STATE correctional populations, and particularly the number of individuals incarcerated or supervised for drug-related offenses, are a nationwide concern. At the federal level, recent data indicate there are over 222,000 individuals held in secure confinement, with nearly 162,000 sentenced to the Federal Bureau of Prisons and the other 60,000 being housed in pretrial detention (Motivans, 2021). Of the Federal Bureau of Prison population, nearly half (48 percent) exhibited a drug charge for their most serious offense. In comparison, about 6 percent were imprisoned for violent offenses, about 5 percent were incarcerated for property crimes, and around 18 percent were in federal prison for weapons crimes. In addition to the incarcerated population, the total number of adults under federal supervision in the community stands at 150,000 (Motivans, 2021). Of these individuals, about 15,500 (or 10 percent) are on federal probation, while approximately 111,000 (74 percent) are on supervised release following a period of incarceration. As with federal incarceration, nearly half of adults under federal supervision were convicted of a drug crime as their most serious offense.

The recidivism of known offenders also has come to the forefront in discussions of criminal justice policy and reform (Johnson, 2017). Overall, research indicates persistently high recidivism rates among known offenders. To illustrate, one study tracked over 25,000 federal offenders over an 8-year period, beginning in 2005 (Hunt & Dumville, 2016). About half were rearrested, almost one-third were reconvicted, and one-quarter were reincarcerated. Of those individuals who reoffended, most did so within the first 2 years of release (the median time to rearrest was 21 months). Those who were released from incarceration had a rearrest rate of 52 percent, while those given a probationary sentence had a rearrest rate of 35 percent. Moreover, it is safe to say that many other inmates and supervised individuals present a history of drug and alcohol problems, regardless of their official criminal record (SAMHSA, 2014). Research also indicates that drug and alcohol use and abuse are likely factors in repeat offending (Banks & Gottfredson, 2004, Mumola & Karberg, 2006). For example, a 2016 Survey of Prison Inmates survey found that nearly 4 in 10 state prisoners and 3 in 10 federal prisoners reported using drugs at the time of their offense; similarly, 31 percent of state prisoners and 25 percent of federal prisoners reported drinking alcohol at the time of their offense (Bureau of Justice Statistics, 2021).

In modern times, these research findings have contributed to various legislative efforts and programs directed at justice-involved individuals exhibiting drug and alcohol problems. The current study evaluates one federal initiative to provide support and structure to individuals in the criminal justice system who struggle with these issues. Specifically, this evaluation examined a federal Support Court created in 2009 by the United States District Court for the District of Connecticut. This specialty court operates in three locations: Bridgeport, Hartford, and New Haven. Propensity score analysis was employed to closely match individuals in treatment and control groups, to compare their recidivism outcomes across three measures: arrest, drug test failure, and revocation.

Literature Review

In an effort to respond more effectively to criminal offenders with drug and alcohol problems, the first drug court in the United States was established in Miami, FL, in 1989 (Goldkamp et al., 2001). Over the next two decades, drug courts were implemented in all 50 states (Finigan et al., 2007). Among the more than 3,000 drug courts operating in the U.S. today, roughly half are adult drug courts (Marlowe et al., 2016). Annual enrollments in these courts have been estimated at around 55,000 individuals (Bhati et al., 2008).

In general, drug courts were designed to put treatment and rehabilitation ahead of punishment. In contrast to a traditional

administrative court process that prioritizes adjudication and the role of the judge in resolving a legal outcome, drug courts adhere to a collaborative process, whereby the judge coaches a treatment team to work on alternative legal resolutions favoring therapeutic results. For most drug courts, the target population includes offenders charged with a substance-involved offense (Mitchell et al., 2012a). This usually includes drug charges, but may include other non-violent offenses committed by defendants with substance abuse issues (Peters & Murrin, 2000). Screening criteria vary between drug courts and depend on local policies, but most include some measure of the individual's motivation for treatment, in addition to considerations of the person's criminal and substance use histories (Evans et al., 2014).

Concerning effectiveness, adult drug courts have been shown to reduce 2-year rearrest rates by an average of 8 percent to 14 percent (Marlowe et al., 2016), although some studies show rates of recidivism reduction as high as 35 percent to 80 percent (Carey et al., 2012; Lowenkamp et al., 2005; Shaffer, 2011). Most drug court studies assess recidivism 1 or 2 years after program participation. However, some meta-analyses (Mitchell et al., 2012a, 2012b) and randomized control trials (Gottfredson et al., 2005, 2006) have shown that the positive effects of adult drug courts on recidivism may last for 3 years after program completion. In fact, one study reported effects on recidivism lasting a remarkable 14 years (Finigan et al., 2007). Overall, the results of a 2012 meta-analysis of 154 drug courts (92 evaluations of adult drug courts, 34 of juvenile drug courts, and 28 of DWI drug courts) revealed that drug court participants consistently have lower recidivism rates than non-participants, with an average difference in recidivism of 50 percent for non-participants and 38 percent for participants (Mitchell et al., 2012b).

Numerous individual studies and meta-analyses also show that adult drug court is highly cost effective (Drake, 2012; Mayfield et al., 2013; Rossman et al., 2011). Studies on cost effectiveness generally report a 200-400 percent return on investment. Specifically, for every dollar spent, an average of $2 to $4 in future court and related costs is saved, or somewhere between $3,000–$22,000 net economic savings per participant (Marlowe et al., 2016).

The federal government also has demonstrated strong support for the drug court model, primarily through financial support of drug court programs, research, and other initiatives. For example, each year the Bureau of Justice Assistance (BJA) and the Substance Abuse and Mental Health Administration (SAMHSA) distribute grants to states and localities to support the creation and enhancement of drug courts. In fiscal year 2017, over $100 million in federal funding was appropriated for drug courts (Sacco, 2018). Additionally, in 2017 the President's Commission on Combating Drug Addiction and the Opioid Crisis also recommended that the DOJ establish a federal drug court in every federal judicial district. Relatedly, enacted in 2016, Section 14003 of the 21st Century Cures Act (the Cures Act; P.L. 114-255) required the DOJ to establish a pilot program to determine the effectiveness of federal drug courts and mental health courts. More recently, the Biden administration publicly committed to end all incarceration for drug use alone and divert these individuals to drug courts and other treatment (Lekhtman, 2020), and to expand available funding for federal, state, and local drug courts (JoeBiden.com, 2021).

Despite existing research findings and governmental support for drug courts, little empirical research exists that focuses on federal drug courts. A quasi-experimental process and impact evaluation was completed in 2009, which examined the Federal District Court of Massachusetts Court Assisted Recovery Effort (CARE; Farrell & Wunderlich, 2009). This program used a modified drug court model to provide enhanced supervision to 46 offenders (divided into three separate groups), while addressing the problems that accompanied their addiction. Results from the study, in which CARE participants were compared with 68 similar individuals under regular supervision, revealed that CARE participants were more successful than non-participants during a 12-month follow-up (success was measured as a combination of no new charges, employed, and no positive drug tests). Specifically, the odds of success for CARE participants were 2.6 times greater than for comparison group members. However, these findings should be treated with caution, as there were a small number of participants in the treatment and control groups, and the study only covered a 12-month follow-up period for each of the groups. In addition, other experimental and quasi-experimental research on specialized federal court programs has revealed limited and mixed evidence of beneficial effects on supervision outcomes and recidivism (Crow & Smykla, 2021; Meierhoefer & Breen, 2013; Rauma, 2016; Taylor, 2013). Accordingly, there remains considerable need for further evaluation of federal drug courts and other specialized court programs. The current study aims to address this gap in the literature.

The Program

The current study entailed an evaluation of one federal initiative to provide support and structure to individuals in the criminal justice system who struggle with drug and alcohol issues. Specifically, this research examined the federal Support Court created by the United States District Court for the District of Connecticut. The specialized drug court originated in 2009 and currently operates in three locations: Bridgeport, Hartford, and New Haven. Each divisional court is capped at 16 participants at any point in time. Support Court participants include individuals in the pretrial or pre-sentencing stage of court processing, as well as those who have been convicted and sentenced. The target population includes individuals who are struggling with substance abuse, who are at heightened risk for drug/alcohol use relapse, or whose past or current criminal conduct is attributed reasonably to drug and alcohol addiction (Connecticut Support Court Policies and Procedures Manual, 2016). Disqualifying criteria include individuals with mental health problems or serious medical issues as well as those with histories of sex-related crimes, arson, serious firearm charges, violent crime, or any pending state felony charges.

Initial research activities centered on conducting a process evaluation of Support Court operations and services, along with a descriptive assessment of various participant outcomes (Dule et al., 2021). Current analyses were based on comparing recidivism measures of Support Court participants with similar federal justice-involved individuals who did not participate in Support Court. The comparison group members experienced post-conviction supervision in the United States District Court for the District of Connecticut at some time during the period of 2010 through the first 6 months of 2018, and they had drug and alcohol treatment ordered as part of their supervision conditions. However, they did not experience Support Court during their pretrial services or post-conviction supervision periods. In general, the 232 individuals in this non-Support Court group were compared to the 182 Support Court participants from 2009 to 2017 who had

progressed to post-conviction supervision by the start of 2018 (i.e., recidivism was assessed during the post-conviction supervision period for both groups). Three outcome measures were assessed (arrest, drug test failure, and revocation of supervision) via data contained in PACTS, the federal Probation and Pretrial Services Automated Tracking System.

Analytic Strategy

Following initial examination of the entire treatment and comparison groups, propensity score analysis was employed to closely match individuals from each group and assess their recidivism outcomes. Propensity scores offer a statistical alternative to account for confounding factors when random assignment to a treatment condition is not possible (Beal & Kupzyk, 2014). This constitutes a quasi-experimental approach that allows "treatment" participants to be matched with comparison group members on a number of variables, through using a single measure known as the propensity score (Apel & Sweeten, 2010; Beal & Kupzyk, 2014; Rosenbaum & Rubin, 1983). In the current study, the propensity score represents the probability or likelihood of a federal court participant being selected for Support Court. In the absence of a randomized experiment (i.e., random assignment to treatment and control groups), propensity score analysis allows for the estimation of a "treatment effect" while taking into account a variety of possible confounding factors that make the treatment and comparison groups different.

In the current study, propensity score matching was used to create two groups that were statistically equivalent on measured demographic and legal variables (Apel & Sweeten, 2010; Beal & Kupzyk, 2014; Rosenbaum & Rubin, 1983). The first step in this process was to estimate a logistic regression equation that predicted group membership in Support Court (yes or no). This model contained 22 independent variables, of which 7 were significant predictors (p < .05) of Support Court membership: Sex of participant, number of prior arrests, total offense level from federal sentencing guidelines, married or cohabitating, prior criminal patterns and violence, age at which drug use began, and prior hard drug use. Predicted probabilities of Support Court membership (i.e., propensity scores) for each of the individuals in both groups subsequently were used to closely match Support Court participants with similar comparison group members.

Using one-to-one matching procedures with a caliper width of 0.025 for the matched propensity scores, 116 Support Court participants were closely matched with 116 comparison group members. This technique was used to produce individually matched subjects in the treatment and comparison groups, whereby each pair of matched subjects had nearly identical propensity scores. One-to-one matching generally is considered to be the best method of propensity score analysis for producing two groups that are statistically equivalent, thereby approximating a randomized experimental design (Apel & Sweeten, 2010; Beal & Kupzyk, 2014; Rosenbaum & Rubin, 1983).

Results

The results presented in Tables 1 and 2 indicate the one-to-one matching procedure was successful in creating statistically equivalent treatment and comparison groups. Table 1 reveals the variables that were

significantly different, at the bivariate level, between the initial Support Court (n=182) and non-Support Court (n=232) group members. Following the propensity score matching procedure, the 116 Support Court participants and 116 comparison group members were not significantly different in their average propensity scores (i.e., the probability of being in Support Court), along with the other demographic and legal variables that were used to predict Support Court group membership (see Table 2). In other words, for the 232 matched individuals, there were no significant differences between the Support Court participants and comparison group members in terms of their demographic characteristics, legal variables, and propensity scores.

Next, various measures of recidivism were reassessed for the 232 matched individuals. As revealed in Table 3, based on a chi-square analysis of the 116 Support Court participants and 116 comparison group members, during

TABLE 1
Pre-Matching Baseline Statistics (N=414)

Variable	Non-SC Comparison Group (Mean or %)	SC Treatment Group (Mean or %)
Sex of participant	Males: 96%; Females: 4%	Males: 80%; Females: 20% ***
African American Non-Hispanic	50%	43%
Hispanic	33%	27%
Age at post-conviction supervision	36.36	36.71
Number prior arrests	6.66	5.42 *
RPI score	4.59	4.27
Hartford participant	41%	37%
New Haven participant	31%	27%
Guideline prison minimum	87.92	72.75
Guideline TSR minimum	40.89	35.22
Total offense level from guidelines	23.30	20.69 **
Criminal history points from guidelines	7.77	6.46
Convicted of a drug charge	77%	75%
Post-conviction supervision time in months	28.54	30.89
Divorced or Separated	11%	15%
Married or Cohabitating	19%	25% *
Medical Issue or Disorder	34%	36%
High School Diploma or GED	53%	49%
Above High School Diploma or GED	13%	19%
Prior Criminal Patterns and Violence (CPV) total score	2.05	1.29 **
Age drug use began	15.70	14.65 *
Prior Hard Drug Use	68%	82% **

Note: Sample sizes: Non-Support Court group = 232; Support Court group = 182
* p < .05; ** p < .01; *** p < .001

the post-conviction supervision period the Support Court participants:

- Were *insignificantly* more likely to have their supervision revoked (22 percent versus 13 percent; p = .082), primarily due to being *insignificantly* more likely to be revoked on technical violations (13 percent versus 5 percent; p = .109).
- Were significantly less likely to fail a drug test (42 percent versus 56 percent; p < .05).
- Were significantly less likely to be arrested (33 percent versus 47 percent; p < .05).

Further analyses of arrest data considered time to rearrest, or whether Support Court participants experienced significantly longer times to rearrest, as compared to matched non-participants. The results of a Kaplan-Meier survival analysis (see Figure 1, next page) and a Cox regression model (see Table 4, next page) indicated that Support Court participants did in fact experience significantly longer survival times (i.e., a lower hazard rate, associated with longer times to rearrest). More specifically, the hazard ratio from the Cox regression model indicated that being in Support Court lowered the hazard of rearrest by about 44 percent (p < .01). In addition, further Cox regression analysis revealed that participating in Support Court had a significantly increasing effect on reducing the hazard of rearrest over time (p = .01). This is depicted visually in the Kaplan Meier analysis (see Figure 1), which shows the two groups initially had similar hazard rates for about 24 weeks (or 6 months), after which the comparison group experienced a significantly greater hazard rate over time.

An additional set of analyses considered whether there were differences in recidivism outcomes for successful Support Court participants (i.e., those who formally graduated or otherwise left Support Court successfully) and unsuccessful Support Court participants (i.e., those who were terminated or otherwise left Support Court unsuccessfully), as compared to members of the comparison group. As presented in Tables 5–7 (page 19), based on the matched treatment and comparison groups (N=232), odds ratios from the logistic regression models indicate:

- Unsuccessful Support Court participants were significantly more likely to have their supervision revoked (over 3 times more likely) compared to non-Support Court group members (p < .01).
- Successful Support Court participants were significantly less likely to fail a drug test (approximately 65 percent less likely) compared to non-Support Court group members (p < .01).
- Successful Support Court participants were significantly less likely to be arrested (approximately 61 percent less likely) compared to non-Support Court group members (p < .01).

Discussion and Conclusions

The current evaluation sought to assess the effect of federal Support Court on recidivism, by using a comparison group of individuals who had experienced post-conviction supervision in the United States District Court for the District of Connecticut during the same time period that Support Court was being offered. These individuals had some type of drug and alcohol treatment ordered as part of their post-conviction supervision conditions, but they did not experience Support Court during their pretrial services or post-conviction supervision periods. The 232 individuals in this group were compared to the 182 Support Court participants from

TABLE 2
Post-Matching Baseline Statistics (N=232)

Variable	Non-SC Comparison Group (Mean or %)	SC Treatment Group (Mean or %)
Predicted probability of being in Support Court	45.69%	47.26%
Sex of participant	Males: 92%; Females: 8%	Males: 89%; Females: 11%
African American Non-Hispanic	53%	45%
Hispanic	27%	34%
Age at post-conviction supervision	36.78	36.67
Number prior arrests	6.04	5.95
RPI score	4.53	4.35
Hartford participant	38%	39%
New Haven participant	25%	26%
Guideline prison minimum	83.91	83.58
Guideline TSR minimum	36.93	37.26
Total offense level from guidelines	22.35	22.02
Criminal history points from guidelines	7.57	6.92
Convicted of a drug charge	76%	76%
Post-conviction supervision time in months	30.42	30.68
Divorced or Separated	15%	10%
Married or Cohabitating	24%	22%
Medical Issue or Disorder	33%	32%
High School Diploma or GED	53%	55%
Above High School Diploma or GED	13%	16%
Prior Criminal Patterns and Violence (CPV) total score	1.62	1.5
Age drug use began	14.68	14.91
Prior Hard Drug Use	72%	77%

Note: Sample sizes: Non-Support Court group = 116; Support Court group = 116
All differences between groups were statistically insignificant (p > .05)

TABLE 3
Recidivism Results (N=232)

Variable	Non-SC (Control) n = 116	SC (Treatment) n =116	P-Value
Post-Conviction Revocation	12.9%	21.6%	.082
Post-Conviction Failed Drug Test	56.0%	42.2%	.036
Post-Conviction Arrest	47.4%	32.8%	.023

2009 to 2017 who had progressed to post-conviction supervision by the start of 2018.

Following an initial examination of the entire two groups, propensity score analysis was employed to closely match 116 individuals from each group and compare their recidivism outcomes. Overall, the results were quite favorable for Support Court participants. Compared to the matched non-Support Court individuals (N=116), the Support Court participants (N=116) were significantly less likely to be arrested and significantly less likely to have failed a drug test, and they experienced significantly longer times to rearrest. Successful Support Court participants were also approximately 65 percent less likely to fail a drug test and approximately 61 percent less likely to be arrested than non-Support Court group members.

In contrast to these positive findings, Support Court members were more likely to have their supervision revoked (22 percent versus 13 percent; p = .082) as compared to the matched non-Support Court individuals, but this difference was not statistically significant. The findings concerning a greater likelihood of revocation for Support Court participants, particularly for technical violations, is in line with prior research (Brewster, 2001; Gill, Hyatt, & Sherman, 2010; Hyatt & Barnes, 2017; Jalbert & Rhodes, 2012; Petersilia & Turner, 1993; Rodriguez & Webb, 2007; Sevigny et al., 2013). Overall, programs such as drug courts and intensive probation and parole, which increase supervision standards and the amount of contact with participants, typically uncover higher numbers of technical violations, thereby increasing the likelihood of revocation.

Providing context for the current research, a 2013 meta-analysis of 19 studies investigating the effects of adult drug courts on incarceration outcomes found that drug courts significantly reduced sentences of incarceration for the precipitating offense, corresponding to a reduction in confinement from 50 percent to 42 percent for jail sentences and from 50 percent to 38 percent for prison sentences (Sevigny et al., 2013). Most of the programs in this meta-analysis operated on a strictly post-plea basis, although some enrolled only pre-plea defendants. This study also revealed that, on average, drug courts did not significantly reduce the total amount of time offenders spent behind bars, suggesting that benefits realized from a lower incarceration rate may be offset by longer periods of incarceration imposed on participants when they fail in the program

(Sevigny et al., 2013, p. 420). Although this specific finding was not investigated in the current research, future studies should expand on how to reduce revocation rates effectively and ultimately protect all participants from any collateral consequences generated by their involvement in the program (Dollar et al., 2018; Gibbs et al., 2019; Taylor, 2013).

Future drug court initiatives also should strive to embrace recognized "best practices," many of which have been established in state and local drug court evaluations. Programs that emphasize these strategies and techniques consistently demonstrate stronger positive effect sizes (Marlowe et al., 2016). For instance, over the past two decades, the National Association of Drug Court Professionals (2015) has worked with governmental agencies at the federal, state, and local levels to help guide improvements in drug court policies and practices. The following 10 Best Practice Standards were published first in 2013 (Vol. 1) and updated in 2015 (Vol. 2).

1. Use empirical evidence to guide decisions of drug court eligibility and exclusion criteria, as well as evidence-based assessment tools and procedures to determine which court-involved individuals should be admitted to drug court.

2. Provide equal access to drug court participation and systemic support for success to individuals who have historically experienced sustained discrimination.

3. Ensure that drug court judges are knowledgeable about current drug court laws and best practices.

4. Provide incentives and consequences that are predictable and fair.

5. Implement evidence-based interventions that are documented in treatment manuals.

6. Provide drug court participants with complementary treatment and social services for conditions that co-occur with substance use.

7. Implement accurate, timely, and comprehensive assessment of unauthorized substance use throughout individuals' participation in drug court programs.

8. Engage a dedicated multidisciplinary

FIGURE 1

Kaplan-Meier Survival Analysis Results (N=232)
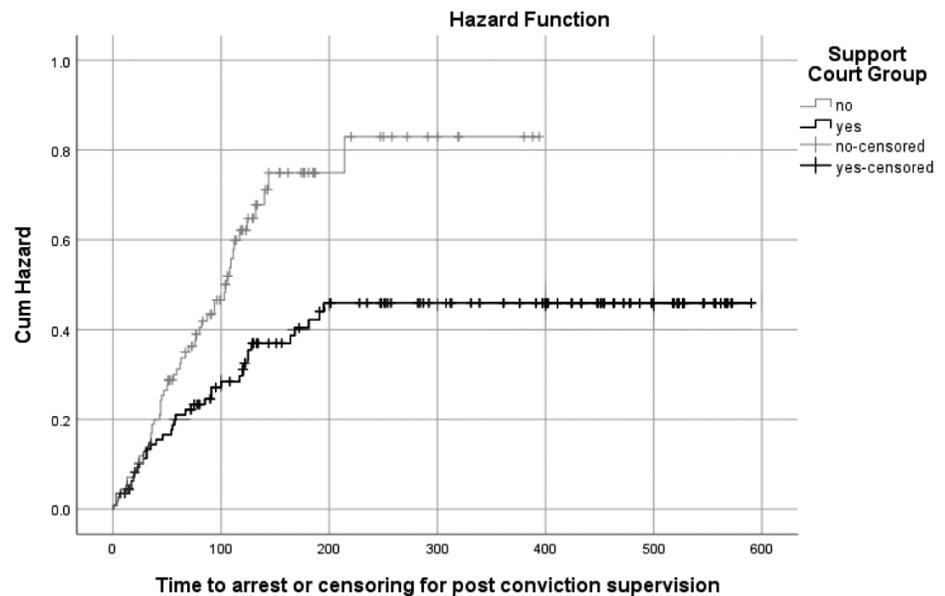
Note: Tests of equality of survival distributions for the two groups: Log-Rank (Mantel-Cox), p < .01; Breslow (Generalized Wilcoxon), p < .05; Tarone-Ware, p < .01.

TABLE 4

Cox Regression Survival Analysis Results (N=232)

Variable	B (SE)	Hazard Ratio Exp(B)	P-Value
Support Court Participation	-.576 (.214)	.562	.007

team of professionals to manage day-to-day drug court operations.

9. Serve as many eligible individuals as practicable, while maintaining continuous fidelity to best practice standards.

10. Routinely monitor the drug court's adherence to best practice standards and employ scientifically valid and reliable procedures to evaluate its effectiveness.

While the current study did not report on how well the United States District Court for the District of Connecticut Support Court adheres to best practices, this was assessed in a previous process evaluation (Dule et al., 2021), which uncovered strong adherence to NADCP best practices. Thus, it is important to recognize that the positive outcomes identified in the current evaluation likely are influenced by the Support Court's close adherence to recommended best-practices.

Finally, in interpreting and using the findings discussed above, it is also important to consider the various research limitations associated with this evaluation. First, although random assignment to experimental and control groups was not possible, access to extensive service record data helped to generate a strong quasi-experimental design with well-matched treatment and comparison groups. Nevertheless, it is possible that some key variables related to Support Court selection were not considered. Separately, due to the limited sample size, this study could not adequately assess how different aspects of the Support Court program (e.g., type of substance abuse treatment, drug testing procedures, court location, preferences of judge, incentives, and punishment) impacted the various outcome measures. Future research should expand on these components to help identify additional best practices for program success. Finally, it is important to note that recidivism measures were drawn from official data sources. Official data sources pertaining to offending do not fully capture actual rates of offending, as official measures are impacted by decisions to report, record, prosecute, and ultimately to convict (Lloyd et al., 1994).

Despite these limitations, the findings of the current research add to those of previous studies that found beneficial effects from drug court participation. Use of propensity score analysis strengthened the evaluation design and lowered concerns about confounding factors and selection bias. Future research should investigate the key factors that contribute to the success of participants in completing drug court programming, along with assessing general strategies and focused efforts to reduce the likelihood of revocation in programs that increase supervision intensity and tend to uncover greater technical violations (Dollar et al., 2018; Gibbs et al., 2019; Taylor, 2013).

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TABLE 5

Logistic Regression for Post-Conviction Revocation with Matched Support Court and Comparison Group Members (N=232)

Variable	B (SE)	Exp(B)	P-Value
Support Court Failure	1.188 (.393)	3.28	.003
Support Court Success	-.252 (.512)	.777	.622

Note: Reference group is the comparison group.

TABLE 6

Logistic Regression for Post-Conviction Failed Drug Test with Matched Support Court and Comparison Group Members (N=232)

Variable	B (SE)	Exp(B)	P-Value
Support Court Failure	-.104 (.323)	.901	.746
Support Court Success	-1.041 (.340)	.353	.002

Note: Reference group is the comparison group.

TABLE 7

Logistic Regression for Post-Conviction Arrest with Matched Support Court and Comparison Group Members (n=232)

Variable	B (SE)	Exp(B)	P-Value
Support Court Failure	-.316 (.327)	.729	.333
Support Court Success	-.950 (.353)	.387	.007

Note: Reference group is the comparison group.

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