

## Drug Courts: Outcomes

# Associations With Substance Abuse Treatment Completion Among Drug Court Participants

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*Subjects in the study included all participants (N = 573) in drug treatment court in a mid-sized U.S. city from 1996 through 2004. Administrative data from the drug court<sup>1</sup> included measures of demographics and socioeconomics, substance use, and criminal justice history. Stepwise multivariate logistic regression yielded a final model of failure to complete drug treatment.<sup>2</sup> Unemployment, lower educational attainment, and cocaine use disorders were associated with failure to complete treatment. The limitations of administrative data should be considered in the interpretation of results.*

**Keywords** Drug court; criminal justice; drug abuse; unemployment; cocaine; treatment adherence; addiction severity; treatment failure; case management

Many thanks to F. Javier Nieto for assistance with Spanish translation and to Beth Potter for assistance with French translation. This work was funded by the National Institutes of Health, National Institute on Drug Abuse, 1 K23 DA017283–01A1. The author also thanks the Dane County Drug Treatment Court and Dane County Mental Health, Treatment Alternatives Program for their support and collaboration.

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<sup>1</sup>The term *drug court*, which has become tradition-driven and bound, is misleading and can more accurately be considered to be a drug user treatment facilitating court. Inaccurate nosologies, whatever their underpinnings and stakeholders, do not increase the necessary quality and effectiveness of appropriate substance use intervention planning, implementation, or assessment. Editor's note.

<sup>2</sup>The term *drug treatment*, also tradition-bound, which is not pharmacotherapy or chemotherapy, is also misleading. Treatment can be briefly and usefully defined as a planned, goal directed, temporally structured change process, of necessary quality, appropriateness, and conditions (endogenous and exogenous), which is *bounded* (culture, place, time, etc.) and can be categorized into professional-based, tradition-based, mutual-help based (AA, NA, etc.) and self-help ("natural recovery") models. There are no unique models or techniques used with substance users—of whatever types and heterogeneities—which are not also used with non-substance users. In the West, with the relatively new ideology of "harm reduction" and the even newer quality of life (QoL) treatment-driven model, there are now a new set of goals in addition to those derived from/associated with the older tradition of abstinence-driven models. Editor's note.

## Introduction

*The Drug Treatment Court Context.* Since the inception of the first U.S. drug treatment court<sup>3</sup> in Dade County, Florida, in 1989, the modality has spread rapidly and widely (Harrison, Scarpitti, Amir, and Einstein, 2002). Drug treatment courts (DTCs), as an alternative to incarceration for offenders with substance use disorders, are now present in over 1800 county, tribal, and territorial jurisdictions in the United States (ONDCP 2006). Potentially eligible offenders may be referred by counsel for a substance use assessment by either a trained court staff member or clinical staff of a contracted community treatment facility. Traditionally, DTCs exclude high-level drug offenders (those involved in manufacture and/or distribution) and violent offenders from participation. If found to have a substance related disorder, the offender may elect to participate in drug user treatment court rather than submitting to typical adjudication. Participation in drug treatment court is voluntary, albeit coerced in the sense that successful completion may result in the reduction of sentence or dismissal of charges. While specific program components vary between jurisdictions, treatment contracts with DTC clients typically involve: (1) participation in community-based substance user treatment,<sup>4</sup> (2) individual case management, (3) regular urine drug screening, (4) a system of sanctions and rewards to motivate continued drug user treatment and drug court program compliance, and (5) regularly scheduled contact with the Drug Court Judge for assessment of progress and program compliance, imposition of sanctions, and determination of eligibility for graduation.

DTCs are similar to the criminal justice intervention programs that have recently been established in the United Kingdom. In 1998, Central Government announced schemes whereby drug users arrested for committing a drug-related crime could be referred to drug user treatment through an “arrest–referral scheme” (Ashton, 2001). An integral part of the scheme is that drug users have a choice either to access drug user treatment or take a custodial sentence. Integral to the treatment option is a “drug treatment testing order (DTTO)” whereby the user must undergo regular urine testing as part of the order. Failure to provide either a sample or urine samples showing the presence of illicit drugs can lead to the order being revoked.

### *Previous Research Involving Drug User Treatment Courts*

Although DTCs as alternatives to incarceration have spread quickly and widely throughout the United States, further research is needed to rigorously examine effectiveness as well as to characterize the populations being served and their specific treatment and case management needs. Program evaluations, utilizing aggregate level data on DTC participants and nonparticipants at the county level in a variety of jurisdictions, indicate that drug court participation is associated with reduced recidivism and drug use among substance-involved offenders (Belenko, 2001; Brewster, 2001; Carey and Marchand, 2005a; Fielding et al., 2002; Goldkamp and Weiland, 1993; Granfield et al., 1998; Guydish et al., 2001; Johnson

<sup>3</sup>The reader is asked to consider that the terms *drug court* and *drug treatment courts*, which have become tradition-driven and bound, are misleading and can more accurately be considered to be drug user treatment facilitating courts. These courts represent a range of specialized courts in which *drug users*, who represent a heterogeneous and not a homogeneous population, and not *drugs*, are given the opportunity for treatment under certain conditions and are diverted from the criminal justice system. Inaccurate nosologies, whatever their underpinnings and stakeholders, do not increase the necessary quality and effectiveness of appropriate substance use intervention planning, implementation, or assessment. Editor’s note.

<sup>4</sup>See footnote 2.

and Latessa, 1997; Listwan et al., 2001; Marchand et al., 2006). *Though encouraging, such aggregate level data fail to take into account a number of critical factors such as selection bias and potentially confounding or modifying factors (e.g., substance use history, prior treatment contacts, criminal justice history, socioeconomic factors, social support, type of treatment received, and other conditions of supervision in drug treatment court) leading to the reductions in recidivism and substance use for DTC participants.* One experimental study overcame these limitations by randomizing 235 drug arrestees to a DTC or to traditional adjudication through the courts (resulting in incarceration and/or probation) and following the subjects prospectively for 24 months (Gottfredson et al., 2003). DTC participants had a lower likelihood of rearrest (66.2% versus 81.3%,  $p < .05$ ) and a lower number of average rearrests (1.6 versus 2.3,  $p < .05$ ). While the authors presented demographic and substance use information in aggregate for each experimental condition, they did not undertake statistical modeling to account for the potential effects of these covariates. Randomization may be assumed to balance these covariates between treatment arms for the purposes of an effectiveness study. However, a more detailed examination of these covariates and their associations with treatment adherence could prove quite useful in matching clients to optimal services.

Optimal treatment and supervisory conditions remain understudied. Findings from community-based, treatment-seeking populations may not apply to DTC participants, and, in fact, there are indications that the population of DTC clients presents characteristics and treatment needs distinct from the more general population of treatment-seeking adults. For example, in comparison to individuals in noncoerced treatment in the community, drug court participants tend to have greater psychiatric comorbidity (Marquart et al., 1997) and tend to remain in treatment for longer periods of time (Belenko, 2001). The latter is likely due in part to the unique coercive nature of DTCs.

In a study examining case management effects upon drug court outcomes, Marlowe et al. (2003) randomized 197 drug court participants to different frequencies of judicial contact during drug court participation: biweekly or as needed in response to poor performance. This DTC supervisory condition did not affect rates of illegal activity or frequency of substance use. However, subgroups with specific mental health diagnoses (antisocial personality disorder) did appear to benefit from increased supervision, providing the first indication from a rigorously conducted study of the potential importance of matching clients to supervisory conditions.

Findings in the existing literature conflict as to how DTC participants may differ in terms of their treatment and supervisory needs. A limited number of studies examining gender as a predictor of treatment completion have found that women and men are likely to face different issues upon entry to treatment. Women tend to exhibit more employment problems, lower income, greater desire for treatment, and more frequently report cocaine as their primary drug (Butzin et al., 2002a; Peters et al., 1999; Schiff and Terry, 1997; Webster et al., 2006). Gender, however, has not consistently been associated with treatment retention or outcome in these studies. Older age tends to predict successful completion of treatment among drug court participants (Butzin et al., 2002b; Peters et al., 1999; Saum et al., 2001).

Studies examining ethnicity vary widely in their findings. Some studies find lower rates of DTC completion for nonwhites (Brewster, 2001; Butzin et al., 2002b; Dannerbeck et al., 2006; Sechrest and Schicor, 2001; Schiff and Terry, 1997) while other studies find no significant difference (Logan et al., 2000; Saum et al., 2001). The nature of these associations is unclear due to the fact that many studies fail to address potential confounding factors such as employment status and educational attainment).

Early findings indicate that a drug court participant's substance of abuse<sup>5</sup> may be an important modifier of retention in and response to treatment. Having a primary problem with cannabis, as opposed to "harder drugs" such as cocaine, other stimulants, or opioids, was predictive of a greater likelihood of treatment completion in one study (Sechrest and Schicor, 2001). The same study found a greater likelihood of expulsion from drug court for individuals charged with drug distribution as opposed to possession charges. Cocaine use has been implicated in drug court samples as a substance of greater risk predicted in terms of a lower likelihood of successful program completion (Miller and Shutt, 2001).

Although early indications in the literature are that individual historical factors predict service needs during drug court participation, results are conflicting and relatively sparse. Further study is clearly needed. Given potentially critical differences between the general adult treatment-seeking population and DTC participants and given gaps in previous literature regarding DTC participants, research characterizing this specific target population is warranted for purposes of attaining a clear understanding of service needs and DTC outcomes.

Through an examination of a complete and relatively large DTC population (all participants in a single drug court from 1996 to 2004,  $N = 573$ ), this study seeks to contribute to the scientific literature on substance user treatment completion and associated factors among drug court participants. We hypothesize that following specific historical factors will relate to failure to complete substance user treatment during drug court participation:

1. Unemployed status
2. Lower educational attainment
3. Divorced/separated marital status
4. Legal history (number of prior arrests, incarcerations)

Such historical factors may need to be taken into account when assigning potential drug court participants to supervisory and treatment conditions.

## Materials and Methods

This study was approved by the University of Wisconsin's Health Sciences Institutional Review Board (IRB). Since de-identified data were used and the study would not be feasible otherwise, the IRB deemed that a waiver of informed consent was warranted.

The data for this study are derived from administrative information collected by a single DTC in a Midwestern U.S. state from 1996 to 2004. The DTC for this study was established in 1996. A single drug court judge presided over all cases during the years in question (1996–2004). Although abstinence from illicit substances is a goal, and contracting community treatment facilities are abstinence-based in philosophy, participants may not receive sanction due to a single positive urine drug screen, if they are making progress in other areas such as attendance to treatment visits, education, or employment. In this sense, the DTC could be considered more closely affiliated with harm reduction than abstinence-based philosophies.

Clinical and other data are collected by staff of the county's mental health center with graduate-level education in counseling and/or social work. On the basis of this assessment, the participant is then referred to the appropriate level of care for substance user treatment based upon the Patient Placement Criteria of the American Society of Addiction

<sup>5</sup>The journal's style utilizes the category *substance abuse* as a diagnostic category. Substances are used or misused; living organisms are and can be *abused*. Editor's note.

Medicine (1991). Stand-alone, community-based treatment facilities providing the appropriate respective levels of care contract with the court for providing treatment to drug court participants. The contract for treatment and DTC participation is with the individual offender; thus, significant others and other close personal contacts do not explicitly participate in treatment, though appearances before the Drug Court Judge are public and are frequently attended by family and friends.

The baseline interview collects demographic information, socioeconomic information, data on household structure, criminal history, and drug use history. Data from the DTC program database track the progress of participants through drug court. Interview items and the structure of their responses parallel items included in the Addiction Severity Index (McLellan et al., 1992). Available variables are as follows:

### ***Independent Variables (Participant Characteristics)***

*Source: Screening Questionnaire: Self report*

- Gender: Male/female
- Age: in years
- Race: self-identified as Caucasian, African American, Hispanic, Asian, and Native American
- Marital status: self-identified
- Living situation: spouse, spouse and children, parents, other family, alone, friends/roommates, unstable housing
- Employment status: as described by participant—full time, part time, student, unemployed
- Educational attainment: in years
- Criminal history: prior misdemeanors/felonies, jail/prison sentences, probation, parole
- Presence/absence of mental health diagnosis. (Participants with complicated psychiatric co-morbidity, such as psychoses or uncontrolled bipolar spectrum disorder, do not participate in DTC and are referred to more regimented specialist mental health care.)

*Source: Open-ended Interview With Program Staff*

- Diagnosis of drug use disorder based on DSM IV (APA, 1994) criteria applied by program staff to information provided by participant
- Drug use history: onset of drug use, substance used, frequency and amount of use, prior treatment contacts (inpatient, outpatient, group self-help).

*Source: DTC Program Database*

- Criminal charges: for which participant referred to the DTC:

Possession of – Controlled Substance – Drug Paraphernalia  
 Prescription fraud – Drug related theft- Drug related burglary  
 Possession with intent to deliver – Manufacturing THC  
 Disorderly conduct – Delivery – Bail jumping – OMVWOC.

***Intermediary Variables (Treatment/Case Management Factors)***

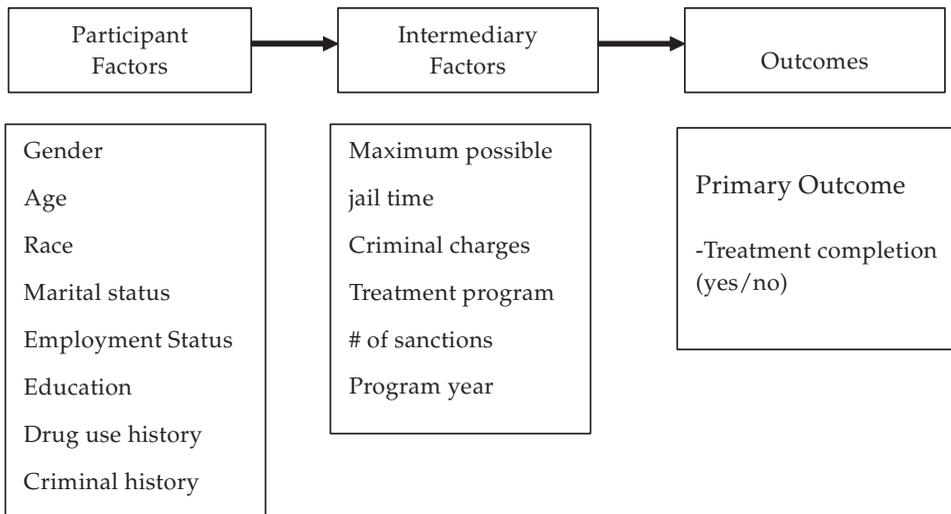
*Source: DTC Program Database*

- Incentive to complete program: (1) dismissal of charges, (2) reduction of severity of charges, (3) reduction of severity of penalty for charges
- Type of charges to be dismissed as a result of (plea bargain) (see charges listed above)
- Maximum possible jail penalty
- Number of sanctions administered during participation
- Treatment program: categorical variable representing the community-based substance abuse treatment program to which the participant was referred.
  1. Weekly outpatient drug counseling
  2. Intensive outpatient program treating substance use disorders (three hours per day of group therapy on four days of each week)
  3. Residential program providing substance abuse treatment
- Year when entered the treatment program.

Dummy variables were created for categorical variables for purposes of logistic regression analysis. Continuous variables were examined for distributional characteristics and, if severely nonnormal, transformed as appropriate to approximate normal distribution for purposes of initial bivariate associations and for regression modeling. Definitions of substance use variables were coded such that 0 indicated that the substance was not a primary substance of abuse/dependence for the participant, 1 indicated that the substance was a primary substance of abuse/dependence. The primary dependent variable was coded such that 1 indicated failure to complete treatment and 0 indicated successful completion of treatment, neutral termination, or transition to less restrictive case management and treatment plan.

Failure rather than success to complete treatment is chosen for reasons related to pertinent policy issues and the manner in which outcomes are generally framed in this and in similar populations in the United States:

1. Firstly, and most importantly, those failing to complete DTC programming are of particular policy interest to key stakeholders. Determining which subgroups may be most vulnerable to treatment failure may assist in identifying additional resources which might be brought to bear. Examples pending investigation at the current drug treatment court include culturally sensitive case management for African-American participants, specific job retraining programs, and opioid substitution treatment during DTC participation for appropriate offenders.
2. “Not failing” is not necessarily equivalent to “succeeding.” While the “not failing” group contains individuals who successfully complete substance user treatment, it also contains individuals who are “neutrally terminated.” This most commonly means that the individual has decided of their own accord to cease participation in the DTC and complete sentencing through the more traditional court system. A second common pathway for individuals “not failing” is transition to a different track in the corrections system where supervisory and treatment conditions are less restrictive, due to progress indicating that the more regimented management of DTC may not be warranted. Thus, treatment failure constitutes a less ambiguous outcome in the setting of this drug treatment court.



**Figure 1.** Theoretical Model guiding addition of variables to logistic regression model.

Statistical and theoretical considerations guided multivariate logistic regression modeling of significant associations between client characteristics and the binary outcome variable of treatment completion/failure. Univariate associations achieving statistical significance were first added to the model in a stepwise fashion for indicators of historical characteristics of the participant. After achieving a final model for the associations between participant factors and treatment completion, intermediary variables (treatment/case management factors) achieving significance were then added to achieve a final overall regression model. The theoretical model guiding the addition of variables for stepwise logistic regression is depicted graphically in Figure 1.

## Results

Tables 1 and 2 include descriptive characteristics of the study population at the time of entry into the drug treatment court. The current sample is more predominantly Caucasian (79%) than some drug court samples (Banks and Gottfredson, 2003, 2004; Gottfredson and Exum, 2002; Gottfredson et al., 2003; Listwan et al., 2003), though predominantly Caucasian samples are common in the literature (Brewster, 2001; Carey and Marchand, 2005a, 2005b; Cresswell and Deschenes, 2001; Deschenes et al., 1995; Festinger et al., 2002; Marchand et al., 2006; Marlowe et al., 2005; Sechrest and Schicor, 2001). The percentage of clients who are male and the mean age of the sample align with the majority of study samples.

Table 3 includes information on current (at time of drug court entry) criminal charge and substance user treatment setting assignment. The criminal justice history and current charges for the current sample are comparable with those of other study samples, with drug-related crime present in the majority of offenders.

Assignment to a drug court treatment program took the place of maximum jail penalties ranging from <1 to 285 days (mean = 31.2, *SD* = 42.8). The majority of the study population was assigned to an outpatient treatment program (84.9%). A majority of the sample successfully completed the program ( $N = 322$ , 56.3%). This graduation rate was

**Table 1**  
Participant characteristics at program entry ( $N = 573$ ):  
demographics

	<i>N (%)</i>
Age	
18–20	162(28.3)
21–25	102(17.8)
26–30	82(14.3)
( $\bar{x} = 29.27, SD = 9.85$ )	
31–35	73(12.8)
36–40	63(11.0)
41–45	52(9.1)
Over 45	38(6.6)
Ethnicity	
Caucasian	454(79.4)
African-American	97(17.0)
Latino	17(3.0)
Asian/Pacific Islander	4(0.7)
Gender	
Male	383(67.0)
Female	189(33.0)
Marital status	
Never married	378(66.1)
Married	140(24.5)
Separated/Divorced	54(9.4)
Educational attainment	
< 12 years	155(27.1)
High school grad	288(50.3)
GED	63(11.0)
Associate's degree	33(5.8)
At least some college	33(5.8)
Employment status	
Unemployed	205(35.8)
Part-time	94(16.4)
Full-time	264(46.2)
Student	9(1.6)
Mental illness	
Yes	38(6.6)
No	535(93.4)

similar to those in other study samples (Belenko, 2001: 36%–60%, mean = 47%; GAO, 2005: 27%–66%, mean = 45%). Among those who dropped out before completion, number of days to drop-out varied widely (mean = 140.3,  $SD = 99.9$ ). Eleven percent of drop-outs occurred less than one month into the treatment.

Several indicators achieved or approached statistically significant association with failure to complete treatment on initial bivariate analyses. These factors are described in

**Table 2**  
Participant characteristics ( $N = 573$ ): legal and substance use history

	Mean ( <i>SD</i> )	Min/Max
Misdemeanor conviction <sup>#</sup>	1.35 (2.20)	0/26
Felony conviction <sup>#</sup>	0.28 (0.79)	0/6
Sentences jail <sup>#</sup>	0.40 (1.93)	0/30
Sentences prison <sup>#</sup>	0.04 (0.24)	0/3
Duration of substance use in years	10.35 (8.43)	< 1/36
Prior treatment <sup>#</sup>	0.97 (1.49)	0/12

Table 4. Covariates not attaining or approaching significance included program year, gender, age at the time of referral, marital status, presence/absence of mental illness, number of prior misdemeanors, frequency of use of primary substance, number of years of use, number of prior treatment contacts, presence/absence of children in the home, or a history of injecting drugs.

Failure to complete treatment was positively correlated with unemployment, lower educational attainment, history of prior offenses, and the presence of a cocaine use disorder (versus other substance use disorders). Nonwhite ethnicity attained marginal significance on bivariate correlations.

Measures of addiction severity are (1) frequency of use, (2) duration of regular use, (3) number of prior contacts for substance abuse treatment, and (4) setting of prior treatment (number residential, number outpatient). None of these markers bore a statistically significant relationship to treatment failure. Willingness to inject drugs might also be perceived as an indication of greater addiction severity and, hence, a potential predictor of a greater likelihood to fail to complete treatment. The current study failed to demonstrate such a relationship between injection use (yes/no) and treatment completion ( $p = 0.206$ ). The limited number of injection users in this study ( $n = 25$ ) may limit power to detect such

**Table 3**  
Criminal charge, treatment assignment at entry to drug court

	<i>N</i> (%)
Initial charge ( $N = 355$ )	
Possession of a controlled substance	240(67.6)
Possession with intent to deliver	35(9.9)
Possession of drug paraphernalia	17(4.8)
Fraud/prescription	38(10.7)
Acquisitive crime	10(2.8)
Other	15(4.2)
Treatment program, type	
Outpatient treatment	486(84.9)
Day treatment	30(5.2)
Residential treatment	55(9.6)
Missing	1(0.2)

**Table 4**

Statistically significant bivariate correlations with treatment completion (0 = successful completion, 1 = failure to complete)

Covariate	Spearman's rho	P value
Highest grade completed	-0.125	= 0.003
First offense (y = 1, n = 0)	-0.079	= 0.025
Prior felony? (y = 1, n = 0)	0.087	= 0.037
Number of negative UDS	-0.644	< 0.0001
White (0)/nonwhite (1) race	0.082	= 0.05
Cocaine use disorder vs. other SUD	0.156	< 0.0001
Employed (0) /unemployed (1)	0.172	< 0.0001

Note. UDS = urine drug screens. SUD = substance use disorder.

a relationship, however. Of interest, other markers of addiction severity bore relationship to injection use history. Bivariate analyses demonstrated significant positive correlations between injection drug use and (1) frequency of use, (2) duration of regular use, and (3) number of prior contacts for AODA treatment. White participants were more likely than nonwhite participants to inject drugs.

Table 5 provides information regarding the overall final logistic regression model. Age, gender, ethnicity, and treatment modality were retained as control variables.

## Discussion

The main findings of this study in a population of all prior participants in a single drug court were associations between failure to complete court-mandated substance user treatment and (1) unemployed status, (2) lower educational attainment, and (3) the presence of a cocaine use disorder.

**Table 5**

Final multivariate logistic regression model

Predictor	Exp $\beta$ = AOR	95% CI
Age	0.992	0.973, 1.01
Gender	1.16	0.784, 1.72
White (0) vs. nonwhite (1)	1.35	0.881, 2.06
<b>Employed (0) vs. unemployed (1)</b>	<b>1.88</b>	<b>1.29, 2.74</b>
<b>Highest grade attained in school</b>	<b>0.908</b>	<b>0.833, 0.990</b>
Treatment setting	1.01	0.452, 2.23
<b>Cocaine use disorder</b>	<b>2.17</b>	<b>1.36, 3.48</b>

Note. Age, gender, and treatment setting (residential vs. outpatient) retained for purposes of statistical control. AOR = adjusted odds ratio. Treatment settings included weekly outpatient, intensive outpatient (3 hours 4 times per week), or residential treatment.

Lines in boldface type indicate variables of statistical significance.

Associations for unemployed status and lower educational attainment were hypothesized by this study and were not unanticipated given similar such findings in the literature (Sechrest and Schicor, 2001). Additionally, unemployed status has been predictive of recidivism after graduation from drug court (Sung et al., 2004; Sung and Belenko, 2005). In one prospective study, a specific employment intervention was found to positively affect legitimate income among drug court participants followed over a 12-month course (Leukefeld et al., 2007). Specific employment interventions are an area in need of further research in the drug offending population.

Previous findings of an association between cocaine use disorders and impulsivity provide a potential explanation for greater likelihood of treatment failure among cocaine using correctional clients. Neuroanatomically, cocaine acts upon mesolimbic and mesocortical areas, which are important in the regulation of impulsive and/or violent behaviors (Goeders and Smith, 1983; Yudofsky and Silver, 1993). Imaging studies conducted both on nondependent individuals after administration of cocaine and on cocaine-dependent individuals provide some evidence of this possibility. Imaging studies in non-dependent individuals after administration of cocaine have demonstrated metabolic alterations in cortical areas, such as the lateral orbitofrontal gyrus, responsible for behavioral regulation and impulse control (Goldstein et al., 2005; Moeller et al., 2005; Volkow et al., 1993). Increased metabolism in cortical areas associated with motivation and emotional reactivity have also been associated with intense desire to obtain cocaine in cocaine-dependent subjects (Volkow et al., 2005, 2006). Increased uptake of dopamine in the dorsal striatum in cocaine-dependent individuals has also been associated with more severe withdrawal symptoms and addiction severity, known, in turn, to predict treatment outcomes (Volkow et al., 2006).

Cocaine use disorders have been associated with impulsive behavior, which would logically predispose to difficulty with treatment adherence and recidivism (Moeller et al., 2001). Association between high degrees of impulsivity and compulsive cocaine administration have been demonstrated in rat models (Belin et al., 2008; Dalley et al., 2007; Perry et al., 2005). Though early impulsivity has been associated with subsequent substance dependence generally, in dependent individuals, where specific substances have been investigated, cocaine as a drug of preference is more often associated with impulsive behaviors than other substances of abuse, such as heroin (Bornovalova et al., 2005; Hayaki et al., 2006; Lejuez et al., 2005; Verdejo-Garcia et al., 2007), MDMA (3,4-Methylene dioxymethamphetamine, also commonly known as "ecstasy") (Hanson et al., 2008; Hoshi et al., 2007), or alcohol (Velez-Blasini, 2008), though alcohol dependence has been associated with impulsive behavior in some study populations (Baltieri and de Andrade 2008; Carballo et al., 2006; Chen et al., 2007; Noel et al., 2007; Verdejo-Garcia et al., 2007). Although impulsive behaviors may be cocaine-induced (Yudofsky and Silver, 1993), there is also a high prevalence of inherent impulsivity and anti-social personality traits among cocaine-dependent individuals (Cacciola et al., 1995; Falck et al., 2004). Task-attention-based study, however, has indicated that cocaine dependence has an effect upon impulse control, which is independent of the effect of anti-social personality traits (Moeller et al., 2002). Additionally, more frequent use of larger amounts of cocaine has been associated with more severe withdrawal, less likelihood of treatment retention, and greater degrees of impulsivity (Moeller et al., 2001). These finding appear to generalize to individuals dependent upon methamphetamine, another stimulant of dependence (Hoffman et al., 2006; Semple et al., 2006). Thus, plausible mechanisms to explain the finding in the current study of a greater likelihood of failure to complete treatment for cocaine-dependent individuals are provided by previous studies involving (1) cocaine administration to the cocaine naïve, (2) imaging of cortical areas known to be associated with behavioral

regulation in cocaine-dependent individuals, (3) associations between impulsive behaviors and amounts of stimulant use, and (4) associations between impulsivity and treatment nonadherence.

Cortical dysfunction and impulsivity might also influence motivation to change. Desire to change has also been found to affect treatment completion rates; and cocaine users have also previously demonstrated lesser motivation to maintain complete abstinence (Patkar et al., 2004). Cocaine-related CNS damage leading to greater degrees of impulsivity, as well as associations with antisocial personality disorder and impulsive/aggressive personality, may lower or circumvent motivation to change. This potentially underlying mechanism of cocaine use leading to treatment failure is particularly important to consider in the correctional population in light of findings indicating that antisocial personality disorder is associated with greater levels of illegal activity following treatment (Cacciola et al., 1995). Additionally, cocaine-abusing individuals are more likely to report violent behavior occurring immediately following use (particularly in its crack form), including spousal and child abuse (Giannini et al., 1993). Other studies have found that cocaine use is often associated with other risk factors for criminality, including less education and social support, higher unemployment rates, concurrent alcohol consumption, and use of other illicit drugs (Braun et al., 1996). The current study controlled for the presence of unemployed status and for educational attainment, implying an effect for problem cocaine use which is independent of employment or education.

In any case, the interaction between cocaine use and impulsivity in the correctional population has implications for assessment and service provision in the setting of community supervision and warrants further investigation on the roots of this interaction and effective interventions to promote well-being and function in individuals suffering from this constellation of disordered neurobiology and behavior.

An important consideration as regards potential confounders among cocaine “abusing” or dependent individuals is mental illness presence and severity. While the presence/absence of previously diagnosed mental illness was assessed via interview with these subjects, a formal diagnostic interview was not undertaken. This lack of a detailed mental health assessment is the status quo in most correctional settings. This is likely an area of service need, as studies indicate that the prevalence of mental illness in substance abusing urban samples may be as high as 84% (Lehman et al., 1994). In drug court samples specifically, rates of mental illness have reached 20%–40% (Belenko, 2001).

### *Study's Limitations*

Limitations to the current results should be kept in mind. Since comparisons were internal (completers versus noncompleters), the current study does not specifically address the effectiveness of drug treatment court. Internal comparison, however, may be used to examine factors potentially warranting examination when assigning participants to treatment and case management conditions within a program. The use of administrative data is a potential concern for the study results. Interview for obtaining measure of several of the study covariates, however, has been widely used and validated in previous studies. In this study, measures of demographic and socioeconomic indicators are less likely to be open to such concerns. The lack of a specific validated measure of substance-dependence severity, such as the Addiction Severity Index (McLellan et al., 1992) or the Substance Dependence Severity Scale (Miele et al., 2001), may be a concern. The presence of multiple potential measures and the parallel nature of the assessments in the current study to validated measures may allay this concern to some degree. Measures on the ASI which are replicated by the interview conducted by drug court staff include employment status,

marital status, ethnicity, educational attainment, lifetime substance use, primary problematic substance, route of use, prior treatment contacts, and previous legal charges. The structure of data in the current study parallels the structure of these items on the ASI. Items not present in the current data that would be assessed by an instrument such as the ASI include withdrawal symptoms, consequences (medical, occupational, legal, social) of substance use and their severity, and rater confidence in the client's representation of information.

While treatment failure provides indirect information regarding engagement in treatment by the participant (failure to attend counseling visit, repeated continued substance use), specific process information regarding participant and therapist engagement was not collected as a part of the current study. This, in great part, is due to the fact that the organizations providing substance user treatment to participants are stand-alone organizations. This fact presents confidentiality issues separate from those addressed by ethics review for the methods in the current study, which used de-identified data provided by the court. The degree of participation and engagement in treatment, among other numerous indicators of treatment quality and engagement, is certainly a potentially important determinant of success and should be kept in mind while interpreting current results and for purposes of future study.

In summary, the current findings provide further support for the importance of unemployment, lower educational attainment, and cocaine dependence as factors likely complicating the treatment adherence of drug court clients. Given previous findings that treatment adherence tends to reduce recidivism and drug use among correctional populations manifesting substance use disorders, addressing these issues is of critical importance to reducing the individual and societal harms attributable to substance misuse (Banks and Gottfredson, 2003, 2004; Lurigio, 2000). The case management of community-supervised drug court clients should likely include educational interventions, vocational training, and job placement assistance. The current results also imply that cocaine-related disorders or associated factors may constitute important determinants of treatment adherence among correctional clients. However, as opposed to the findings for unemployment and educational attainment, these findings have yet to be replicated in other DTC settings with more diverse populations. Correctional clients with cocaine use disorders may comprise a subpopulation in need of more targeted assessment and specific services during participation in community-based supervision.

### ***Declaration of Interest***

The authors report no conflict of interest. The authors alone are responsible for the content and writing of this paper.

## **RÉSUMÉ**

Accomplir d' traitement d' un tribunal de drogue

Les sujets étaient tous les participants d'un tribunal de drogue illicite dans une cite moyenne aux Etas Unis dans 1996 à 2004. Les données administratifs du tribunal ont inclus les mesures de démographiques et socio-économiques, l'histoire de l'activité de drogue et l'histoire criminelle. La régression logistique multivariée par étapes a rapporté un modèle final de manqué d'accomplir le traitement. L'échec de traitement était associé avec le chômage, le bas attainment éducatif, l'utilisation de cocaïne. On doit considéré les limites du données administratifs dans l'interpretation des résultats. Le financement

etait fourni pour National Institutes of Health, National Institute on Drug Abuse (1 K23 DA017283-01).

## RESUMEN

Asociaciones con terminación del tratamiento del abuso de drogas en un tribunal de drogas. Los sujetos en este estudio fueron todos los participantes en un tribunal de drogas ( $n = 573$ ) en una ciudad de mediano tamaño de los Estados Unidos entre los años 1996 y 2004. Datos administrativos del tribunal incluían información demográfica, historia del uso de drogas, historia criminal, y estatus socioeconómico. Un análisis de regresión logística paso-a-paso con múltiples covariables reveló que el desempleo, el bajo nivel de educación, y el uso de cocaína estaban asociados con la falta de completar el tratamiento. En la interpretación de estos resultados se deben tener en cuenta las limitaciones relacionadas con el uso de datos administrativos. Este estudio estuvo financiado por el Instituto Nacional del Abuso de los Drogas.

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## Glossary

*Drug treatment court*: Alternative to incarceration for offenders with substance use disorders. Offenders typically engage in a contract with the court which, if successfully completed, may result in dismissal or reduction of charges and/or penalties.

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