Impact of jail sanctions during drug court participation upon substance abuse treatment completion

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Abstract

Aims—This study of participants in a U.S. drug treatment court describes the relationship between the imposition of short-term jail sanctions and substance abuse treatment drop-out, and examines offender characteristics moderating or modifying the impact of jail sanctions on treatment drop-out.

Methods—Data were derived from administrative information collected by the Dane County Wisconsin Drug Treatment Court from 1996–2004 on all 573 participants achieving a final disposition of treatment completion or failure during those program years. Iterative Cox proportional hazards models of time to treatment failure were created; jail sanctions during drug court participation were framed as time-dependent co-variates. A theoretical framework and specific statistical criteria guided construction of a final parsimonious model of time to treatment drop-out.

Findings—Treatment failure was associated with unemployment [hazard ratio (HR) in unemployed vs. employed = 1.41, p-value 0.0079], lower educational attainment (HR in high school non-graduate vs. graduate = 1.41, p = 0.02), and application of the first jail sanction (HR 2.71, p < 0.0001). The association between treatment failure and a first sanction was considerably stronger for sanctions administered earlier in participation (HR for sanction 1 at < 30 days 11.34, p-value 0.0002).

Conclusions—An initial jail sanction for non-adherence may be more likely to foster treatment compliance in less refractory individuals (i.e. those not already acclimated or socialized to incarceration or other corrections interventions). More stringent supervisory conditions and individualized services may be required to reintegrate such offenders and promote longer term public safety.

Introduction

A drug treatment court (DTC) is present in over 1800 county, tribal, and territorial jurisdictions in the United States, as an alternative to incarceration for drug dependent offenders.[1] While specific program components vary between jurisdictions, treatment contracts typically involve: participation in community-based substance abuse treatment, individual case management; regular urine drug screening; sanctions and rewards to motivate continued drug treatment and compliance; regularly scheduled contact with the Drug Court Judge for assessment of progress; imposition of sanctions; and regular assessment of eligibility for graduation.

The impact of during-program sanctioning to promote treatment participation remains under-investigated. Furthermore, whether participant characteristics may modify the impact of sanctions remains unstudied.

Coerced treatment may yield rates of retention equal to or higher than those in the general adult treatment population.[2–7] Studies have found that treatment reduces future recidivism and substance use at comparable rates in voluntary and in coerced treatment settings.[8]

Offender characteristics may moderate the effects of coerced treatment. Examples of likely moderators include age, gender, ethnicity, drug of choice, educational attainment, employment, prior treatment, and criminal history.[9–12] Those with longer, more serious substance use histories are also more likely to drop out. For offenders who complete treatment, poorer post-treatment outcomes appear more likely for those with more extensive prior criminal justice history,[9,12] and for those of African-American ethnicity.[9]

The first U.S. DTC was established in Dade County, Florida in 1989.[13–15] Subsequently, the threat of legal sanction has comprised a key component of the coercive power of DTCs to encourage drug-involved offenders to engage in substance abuse treatment and other case management services. A longer duration of substance abuse treatment is associated with improvements in outcomes, such as reducing ongoing substance use and future criminal behavior.[16–17] It also appears that the DTC system encourages treatment retention. Participants tend to complete substance abuse treatment at higher rates than typical probationers (60 percent vs. 30 percent treatment completion, respectively[18]).[18–20]

In addition to "front-end" leveraging using the threat of possible incarceration to encourage treatment initiation, judges may impose brief jail time to punish non-adherence to program requirements. While jail sanctions are universally available and routinely imposed in response to program violations, research is scant on the potential impact of jail sanctions during DTC participation.

One study demonstrated that the perception by DTC participants of a real threat of jail time may facilitate retention in treatment.[20] In another qualitative study, drug court participants reported that a judge who had the power to apply and who consistently applied sanctions fostered continued adherence.[21]

Marchand et al (2006) found that DTC non-graduates were more likely than graduates to receive jail sanctions and to have received more cumulative time (51 days vs 15 days, respectively) during drug court participation.[22] In another study examining two DTCs with disparate graduation rates, authors reported significantly greater likelihood and duration of jail sanctions for the court achieving the lower graduation rate.[23] In the same study, the offenders in the higher risk court appeared less frequently before the drug court judge; and, a greater number of appearances was associated with successful graduation. Appropriate involvement of the DTC judge and the prudent imposition of sanctions, therefore, may have

a significant impact upon the likelihood of treatment completion. Findings to guide optimal practice, however, are lacking.

In a randomized trial of drug treatment court vs. typical adjudication, a proxy for the threat of sanctioning (appearances before the drug court judge) did not result in improvements in program completion.[24] Subgroup analysis in the same study, however, indicated that particular high risk groups may benefit from more intense supervision and the implied threat of incarceration.[25]

Research, in summary, appears to show that the threat of jail sanctions may be an important component of the effectiveness of DTCs. However, effectiveness may be moderated by client characteristics, and by level of involvement of the judge and other components of DTC structure. Moderating and potentially confounding factors have not yet been thoroughly investigated.

An interesting framework for the potential response of offenders to the imposition of jail sanctions is provided by *conditional deterrence theory.* This theory holds that the deterrent effect of criminal justice sanctions depends, in part, upon the degree to which an offender is more integrally tied to conventional vs. criminally involved social networks. [26–28] Under this theory, individuals with more extensive criminal histories (i.e. those who have "acclimated" to criminal justice sanctions) are less likely to modify behavior in response to sanctioning. Conversely, individuals who have stronger ties to conventional community are more likely to change behavior in the desired direction in response to criminal sanctions.

The current study seeks to clarify the relationship between imposition of jail sanctions and time to treatment drop-out and to examine the effect of moderating offender characteristics for a sample of DTC participants. The following hypotheses were proposed: 1) Unemployed individuals will be more likely than employed individuals to drop out of treatment in response to jail sanctions;2) Participants with less educational attainment will more likely fail to complete substance abuse treatment after jail sanction; 3) Markers of greater substance involvement will be associated with greater hazard of treatment failure; 4) A history of greater criminal justice involvement will predict treatment drop-out in response to jail sanctioning.

Methods

Participants and Setting

The current study was approved by the University of Wisconsin's Health Sciences Institutional Review Board (IRB). Data for this study are derived from administrative data collected by the Dane County Drug Treatment Court (Dane County DTC) from 1996–2004 on all 573 participants achieving a final disposition of treatment completion or failure during those program years. The DTC for the current study was established in 1996. A single drug court judge presided over all cases during the years under study (1996–2004).

Clinical and other data are collected by staff of the county's mental health center with graduate-level education (master's degree) in counseling and/or social work. On the basis of this assessment, the participant is then referred to indicated substance abuse treatment.[29]

The baseline interview collects demographic, socioeconomic and social support information as well as criminal history and drug use history. Data from the DTC program database tracks the progress of participants through drug court. Interview items for substance use and the structure of their responses parallel items included in the Addiction Severity Index.[30] The presence/absence of mental illness was assessed via participant interview by the

aforementioned mental health professionals. Data regarding severity and specific diagnoses is not rigorously tracked. Severe psychotic mental illness, however, comprises an exclusionary criterion for drug court participation.

The primary dependent variable was coded such that 1 = failure to complete treatment and 0 = non-failure (i.e. successful completion of treatment, neutral termination, or transition to less restrictive case management and treatment plan). Dummy variables were created for other categorical indicators with more than 2 levels.

The event "failure to complete treatment" was operationally defined as: (1) Submission of 3 consecutive urine drug screens positive for illicit substances or failure to submit a urine for drug testing on 3 consecutive occasions. Early in participation, testing is conducted randomly on a weekly basis. As participants stabilize, urine testing is conducted on an as-needed basis as indicated by subject adherence to drug court programming. (2) Commission of a new crime resulting in new charges. (3) Absconding to another jurisdiction necessitating issuance of an arrest warrant

Failure to complete treatment, rather than success, is chosen for reasons related to pertinent policy issues and to the way in which outcomes are generally framed in similar populations in the U.S. First, those failing to complete DTC programming are of particular policy interest. Determining which subgroups may be most vulnerable to treatment failure may assist in identifying additional resource needs. Second, "not failing" is not necessarily equivalent to "succeeding." While "not failing" describes individuals who successfully complete substance abuse treatment, it also describes individuals who are "neutrally terminated." This means that the individual has decided of their own accord and with the express knowledge of the court to cease participation in the DTC and complete sentencing through the more traditional court system.

To provide assurance that this framing of the dependent variable did not lead to results which would look dramatically different were "treatment completion" considered the event of interest, sensitivity analyses using alternate definitions of the outcome variable were undertaken and are discussed in detail below.

Under this framework for survival analysis, therefore, individuals completing treatment were treated as censored. These definitions thus led to 250 individuals experiencing an event (treatment failure) with 322 cases being censored (treatment completion, neutral termination, or transition to less restrictive supervisory conditions). (i.e. 44% of individuals failed to complete treatment or experienced the study "event;" 56% were censored, according to study definitions.)

Stepwise model building procedure

Sequential Cox proportional hazards models of time to treatment failure were created to arrive at a final parsimonious model, based upon theoretical issues and upon previous study findings in drug treatment court populations. Demographic and other pre-existing factors were first regressed on treatment failure vs. non-failure. Indicators were retained in the model unless the p-value for their respective coefficient exceeded 0.10. Age, gender, and ethnicity were retained in the final model for purposes of statistical control.

Case management factors, including the time-dependent covariate of jail sanctioning, were then examined for correlation with treatment failure (1) versus non-failure (0), and model building proceeded as described for participant pre-existing factors. The framework for variable addition is depicted in Figure 1.

Once arriving at a final model, sensitivity analyses were conducted to ascertain the potential impact of informative censoring on the results. In this way, potential biasing of results due to including neutral terminations as censored cases (i.e. as treatment non-failure) could be ascertained. Firstly, for the primary analysis already described, neutral terminations were framed as censored at the time they were lost to follow-up. Secondly, for the first sensitivity analysis, the main survival analysis was re-conducted reframing neutral terminations as failures, or 'events' rather than as censored observations. In the final step of the sensitivity analysis, neutral terminations were assumed to have a period of observation equal to that of the censored observation with the longest period of follow-up (547 days). Parameter estimates and standard errors for these three analyses (neutral termination = censored, neutral termination = treatment failure, neutral termination = censored at longest period of observation in the study) were not altered to a degree that would be concerning for bias caused by framing neutral terminations as "not failure."

Participant characteristics

The study sample (n = 573) is more predominantly Caucasian (79 percent, n = 454) than some drug court samples,[17,31–33] though predominantly Caucasian samples are common in the literature.[24,34–42] The mean age of the sample is 29. Sixty-seven percent (n = 383) of the sample is male; sixty-six percent (n = 378) is never-married; sixty-one percent (n = 351) graduated high school; and thirty-six percent (n = 205) is unemployed. The primary substance of abuse is cannabis for 36 percent (n = 195, alcohol for 32 percent (n = 176), cocaine for 17 percent (n = 94), and opiates for 15 percent (n = 80). The mean duration of use is 10.3 years, with a mean of 21 days of use in the last 30.

The primary outcome variable, time to treatment failure, was distributed as follows. Two-hundred-fifty of 572 cases resulted in failure to complete treatment (one individual was eliminated from the analysis due to missing demographic data). The mean time to failure was 213 days with a standard deviation of 105. The median for time to failure was 259 days.

Application of jail sanctions was distributed as follows. The mean time to first sanction was 89 days and 107 participants received at least one sanction. The mean time to a second sanction was 134 days and 38 participants received at least 2 sanctions.

Results

The initial Cox proportional hazards model examining participant characteristics at entry and their relationship to treatment completion demonstrated that unemployed status increased the hazard of treatment failure by 56% (Hazard ratio 1.56). Educational attainment less than high school graduation or equivalency also increased failure hazard [hazard ratio (HR) 1.31], but did not attain statistical significance. The p-value was < 0.1 (p = 0.067), however, so educational attainment was retained in further models.

The subsequent model, which added indicators of dependence and treatment history to the initial model found only the presence/absence of multiple substance use disorders to have statistically significant predictive value for time to treatment failure (HR 1.48, p = 0.037).

The next Cox proportional hazards model added jail sanctions as time-dependent covariates. This model demonstrated persistent significant predictive effects for unemployed vs employed status (hazard ratio 1.50, p-value= 0.005), for education less than high school vs high school graduation or greater attainment (HR 1.41, p = 0.024), and for the presence of multiple substance use disorders (HR 1.47, p = 0.029). The application of a first jail sanction achieved significant predictive value (HR 2.71, p < 0.001) for increased failure hazard, but further jail sanctioning (sanction numbers 2–4) did not achieve significance.

Potential interactions with the significant time-dependent covariate (jail sanction #1) were then examined, but none achieved statistical significance. Interactions added to the model at this stage included those between first jail sanction and 1) employment, 2) age, 3) gender, 4) education in years, and 4) indicators of substance use involvement (primary substance, treatment history, duration of use, frequency of use, and number of previous treatment contacts).

To establish a final parsimonious model, the interaction between first jail sanction and the timing of the first jail sanction was then examined by establishing time to first sanction as a time-dependent covariate. The description of this final model appears in Table 1. This model demonstrates that the impact of a first sanction at greater than 30 days' participation (HR 0.22, p = 0.025) is reversed in direction from the impact of a first sanction at less than 30 days (HR 11.34, p < 0.001).

Discussion

The primary results of the current study are of interest in light of existing literature for several reasons. The finding that unemployed status and lower educational attainment are associated with treatment failure hazard during drug treatment court corroborates previous work with DTC and other treatment populations. When other potential confounders are controlled, such as employment and substance use history, ethnicity is not associated with treatment failure hazard during drug court participation. Given that early sanctioning is associated with dramatically increased failure hazard (HR 11.34), but that a later first sanction predicted retention (HR 0.22), an initial jail sanction for non-adherence may foster treatment compliance in less refractory individuals.

The finding that unemployed participants are less likely to complete drug treatment court has been replicated in several studies.[42–44] The literature is contradictory regarding the association between minority ethnicity and treatment completion. Several studies have indicated that minority ethnicity is associated with a lower likelihood of completing drug treatment court (DTC) programming.[34,42,45] Of particular concern, one large study examining a national sample of over 2000 DTC participants, with a non-white majority, found significantly lower graduation rates for African-Americans.[46] Studies in other populations, however, have failed to find such a difference in graduation rates based upon ethnicity.[47–48]

This conflict in findings has led to speculation that confounding factors, such as employment status, educational attainment, substance used (e.g. cocaine), and cultural factors, rather than ethnicity per se may explain the relationship between ethnicity and DTC graduation rates.[49–52] A further factor of importance may be the sensitivity of particular drug court environments to issues of race and culture. In fact, in one jurisdiction where an African-American male was the primary case manager for the drug treatment court, African-Americans achieved superior success rates to their white counterparts.[53] The results of the current study imply that factors associated with ethnicity, rather than ethnicity itself, may explain success in DTC programs and responses to case management components, such as jail sanctioning for program non-adherence.

In considering the apparent differential effects of first versus later jail sanctions and the timing of sanctions during DTC participation, deterrence theories provide a potentially useful framework. Previous study has explored the potential importance of *conditional* rather than *specific* deterrence when considering jail sanctions as measures to enhance desirable behaviors, such as treatment and other program compliance. *Specific deterrence* theory posits that those experiencing a sanction, or a more severe sanction, are more likely

to demonstrate desired and socially acceptable behaviors in the future than those not receiving sanctioning or exposed to a less severe sanction.[54] The more sophisticated *conditional deterrence* theory holds that the response to a given sanction likely depends in great part upon the strength of ties to conventional versus criminal communities.[26–28,55–56] DeJong verified this theoretical framework in demonstrating that individuals with more prior experiences with incarceration (and thus more ties to a criminally involved network) were more likely to recidivate regardless of other potentially contributing covariates. However, more severe sanctions did appear to extend the time until a return to criminal behavior for even the highly criminally involved. Potential predictors of recidivism beyond previous criminal history were more highly associated with future crime among those previously naive to incarceration.[57] The current results corroborate DeJong's findings. Those receiving a first sanction later during participation (after 30 days, HR 0.022, p = 0.025) exhibited a significantly lower failure hazard.

While predilection for criminal behavior appears to be an important factor to address, and may explain findings often attributed to other indicators, factors such as employment appear to exert an independent effect upon treatment completion. Case management focused upon employment outcomes (e.g. vocational training/retraining and monitoring of employment status) is therefore likely an important component of supervisory conditions directed at fostering community reintegration.

Study Limitations

The current study findings are limited by the lack of a randomized experimental study design, the potential persistence of important underlying confounding factors, and the potential lack of power to detect relationships for particular independent variables. The lack of a randomized, prospective design necessitates that significant relationships be interpreted as associations; causal inferences are more difficult to draw. However, characteristics which obviously predate DTC participation (e.g. ethnicity, employment status, educational attainment) would logically more likely bear a causal relationship to factors/events occurring immediately prior to or during participation (e.g. crime precipitating DTC participation, maximum possible jail time for the index offense, jail sanctions during participation, final outcome of DTC participation).

The lack of a significant relationship between repeated jail sanctioning and treatment completion is potentially due to a lack of power for sanctions occurring after the first. Second, third, and fourth sanctions were received by 38, 11, and 3 out of 572 participants respectively. The broad width of confidence limits for coefficients for later sanctions also lends some credence to this concern. The change in coefficient sign from sanction one (negative) to sanction two (positive) when the time interaction is included, however, is consistent with the theoretical framework provided by conditional deterrence theory. Coefficient stability with the removal of later sanctions from the model also indicates that this is likely a real effect.

An important set of factors not measured in detail by the DTC under consideration is the severity of any related mental illness. The prevalence of mental illness is higher among offender populations than in the general population and in the more general population of adults seeking treatment for substance use disorders. A diagnosis of particular importance in the offender population is anti-social personality disorder, since this condition is highly associated with likelihood of reoffending, and also is more likely to respond positively to conditions of increased supervision when such offenders are followed in community-based programs such as drug court.[23] Given that the current DTC solicited information only

regarding the presence or absence of mental illness generally, there remains the possibility that mental health factors contribute, in part, to explaining the current findings.

That a single judge presided over all drug court cases in the current study may also affect interpretation of findings. While it might easily be argued that findings derived from a sample overseen by a single judge might not be widely generalizable, this consistent characteristic of the study sample also improves the likelihood that the current results are internally valid.

Conclusions

Despite the inherent limitations of the current findings, it appears that there is very likely an effect of jail sanctions on time to failure during drug court participation. Those without an extensive criminal history and, hence, without an acclimation to criminal justice penalties may be more likely to respond to an initial jail sanction and to make efforts to adhere to treatment recommendations. This raises questions regarding the effectiveness of drug treatment courts for all drug offenders. Those with more extensive criminal histories may require more intensive supervision and individualized service provision to promote their own health and the wider public safety.

Acknowledgments

References

1. Office of National Drug Control P. Enforcement. Drug Courts. [Accessed 12/18/07]. 2007 http://www.whitehousedrugpolicy.gov/enforce/drugcourt.html

2. Simpson, DD.; Friend, HJ. Legal status and long-term outcomes for addicts in the DARP followup project. National Institute on Drug Abuse; Bethesda, MD: 1988.

3. Lurigio AJ. Drug Treatment Availability and Effectiveness: Studies of the General and Criminal Justice Populations. Criminal Justice and Behavior 2000;27:495–528.

4. Farabee D, Prendergast M, Anglin MD. Effectiveness of Coerced Treatment for Drug-Abusing Offenders. The Federal Probation 1998;62:3–10.

5. Hser YI, Maglione M, Polinsky ML, Anglin MD. Predicting drug treatment entry among treatment-seeking individuals. Journal of Substance Abuse Treatment 1998;15:213–220. [PubMed: 9633033]

6. Anglin, MD.; Prendergast, M.; Farabee, D. The effectiveness of coerced treatment for drug-abusing offenders. Paper presented at: Office of National Drug Control Policy's Conference of Scholars and Policy Makers; 1998; Washington, DC.

7. Hiller ML, Knight K, Simpson DD. Prison-based substance abuse treatment, residential aftercare and recidivism. Addiction 1999;94:833–42. [PubMed: 10665073]

8. Brecht ML, Anglin MD, Wang JC. Treatment effectiveness for legally coerced versus voluntary methadone maintenance clients. The American journal of drug and alcohol abuse 1993;19:89–106. [PubMed: 8438834]

9. Hepburn JR. Recidivism among drug offenders following exposure to treatment. Criminal Justice Policy Review 2005;16:237.

10. Boyle K, Polinsky ML, Hser Y-I. Resistance to drug abuse treatment: A comparison of drug users who accept or decline treatment referral assessment. Journal of Drug Issues 2000;30:555–574.

11. Hepburn JR, Albonetti CA. Recidivism among drug offenders: A survival analysis of the effects of offender characteristics, type of offense, and two types of intervention. Journal of Quantitative Criminology 1994;10:159–179.

12. Visher CA, Linster RL. A survival model of pretrial failure. Journal of Quantitative Criminology 1990;6:153–184.

13. Belenko S. Research on drug courts: A critical review. National Drug Court Institute Review 1998;1:143–71.

14. Goldkamp, JS.; Weiland, D. Assessing the impact of Dade County's felony drug court. U.S. Department of Justice; Washington DC: 1993.

15. Finn, P.; Newlyn, AK. Miami's" Drug Court": A Different Approach. US Dept. of Justice, Office of Justice Programs, National Institute of Justice; 1993.

16. Gottfredson DC, Najaka SS, Kearley BW. Long-term effects of participation in the Baltimore City Drug Treatment Court: Results from an experimental study. Journal of Experimental Criminology 2006;2:67–98.

17. Banks D, Gottfredson DC. The Effects of Drug Treatment and Supervision on Time to Rearrest Among Drug Treatment Court Participants. Journal of Drug Issues 2003;33:385–412.

18. Belenko, S. Research on drug courts: A critical review, 2001 update. National Center on Addiction and Substance Abuse; New York, NY: 2001.

19. Nurco DN, Hanlon TE, Kinlock TW. Recent research on the relationship between illicit drug use and crime. Behavioral Sciences and the Law 1991;9:221–42.

20. Marlowe DB, Festinger DS, Foltz C, Lee PA, Patapis NS. Perceived deterrence and outcomes in drug court. Behavioral Sciences & the Law 2005;23:183–198. [PubMed: 15818611]

21. Satel S. Observational study of courtroom dynamics in selected drug courts. National Drug Court Institute Review 1998;1:43–72.

22. Marchand, G.; Waller, M.; Carey, SM. Barry County Adult Drug Court Outcome and Cost Evaluation. 2006.

23. Gottfredson DC, Kearley BW, Najaka SS, Rocha CM. How Drug Treatment Courts Work: An Analysis of Mediators. Journal of Research in Crime and Delinquency 2007;44:3–35.

24. Marlowe DB, Festinger DS, Dugosh KL, Lee PA. Are judicial status hearings a "key component" of drug court? Six and twelve months outcomes. Drug and Alcohol Dependence 2005;79:145–155. [PubMed: 16002024]

25. Marlowe DB, Festinger DS, Dugosh KL, Lee PA, Benasutti KM. Adapting judicial supervision to the risk level of drug offenders: discharge and 6-month outcomes from a prospective matching study. Drug and Alcohol Dependence 2007;88 (Suppl 2):S4–13. [PubMed: 17071020]

26. Claster DS. Comparison of risk perception between delinquents and non-delinquents. Journal of Criminal Law and Criminology 1967;58:80.

27. Paternoster R, Saltzman LE, Waldo GP, Chiricos TG. Perceived risk and social control: Do sanctions really deter. Law & Society Review 1982;17:457.

28. Toby J. Social disorganization and stake in conformity: Complementary factors in the predatory behavior of hoodlums. Journal of Criminal Law and Criminology 1957;48:12.

29. Adams WL, Cox NS. Epidemiology of problem drinking among elderly people. International Journal of the Addictions 1995;30:1693–716. [PubMed: 8751316]

30. McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, et al. The Fifth Edition of the Addiction Severity Index. Journal of Substance Abuse Treatment 1992;9:199–213. [PubMed: 1334156]

31. Banks D, Gottfredson DC. Participation in drug treatment court and time to rearrest. Justice Quarterly 2004;21:637–658.

32. Gottfredson D, Najaka SS, Kearley B. Effectiveness of drug courts: Evidence from a randomized trial. Criminology and Public Policy 2003;2:171–94.

33. Gottfredson DC, Exum ML. The Baltimore City Drug Treatment Court: One-Year Results From a Randomized Study. Journal of Research in Crime and Delinquency 2002;39:337–356.

34. Brewster MP. An evaluation of the Chester County (PA) Drug Court Program. Journal of Drug Issues 2001;31:177–206.

35. Carey, S.; Marchand, G. Marion County Adult Drug Court Outcome Evaluation. NPC Research; Portland, OR: 2005.

36. Carey, S.; Marchand, G. Malheur County Adult Drug Court (S.A.F.E. Court) Outcome Evaluation. NPC Research; Portland, OR: 2005.

37. Cresswell LS, Deschenes EP. Minority and non-minority perceptions of drug court program severity and effectiveness. Journal of Drug Issues 2001;31:259–292.

38. Deschenes EP, Turner S, Greenwood PW. Drug Court or probation?: An experimental evaluation of Maricopa County's Drug Court. The Justice System Journal 1995;18:55–73.

39. Festinger DS, Marlowe DB, Lee PA, Kirby KC, Bovasso G, McLellan AT. Status hearings in drug court: when more is less and less is more. Drug and alcohol dependence 2002;68:151–157. [PubMed: 12234644]

40. Marchand, G.; Waller, M.; Carey, SM. Kalamazoo County Adult Drug Treatment Court: Outcome and cost evaluation. 2006.

41. Marlowe DB, Festinger DS, Lee PA, Schepise MM, Hazzard JER, Merrill JC, et al. Are judicial status hearings a key component of drug court? During-treatment data from a randomized trial. Criminal Justice and Behavior 2003;30:141–162.

42. Sechrest DK, Schicor D. Determinants of graduation from a day treatment drug court in California: A preliminary study. Journal of Drug Issues 2001;31:129–147.

43. Sung, H-E.; Belenko, S. Journal of Offender Rehabilitation. US: Haworth Press; 2005. Failure after success: Correlates of recidivism among individuals who successfully completed coerced drug treatment; p. 75-97.

44. Sung, H-E.; Belenko, S.; Feng, L.; Tabachnick, C. Journal of substance abuse treatment. Netherlands: Elsevier Science; 2004. Predicting treatment noncompliance among criminal justice-mandated clients: A theoretical and empirical exploration; p. 13-26.

45. Schiff M, Terry C. Predicting graduation from Broward County's dedicated drug treatment court. Justice System Journal 1997;19:291–310.

46. Roman, J.; Townsend, W.; Bhati, AS. Recidivism rates for drug court graduates: Nationally based estimates. The Urban Institute; Washington DC: 2002.

47. Fetros, C. The Los Angeles County Drug Courts: Correlates of success. Long Beach, CA: California State University; 1998.

48. Harrell, A.; Smith, B. Evaluation of the District of Columbia Superior Court Drug Intervention Program: Focus group interviews. National Institute of Justice; Washington DC: 1996.

49. Dannerbeck A, Harris G, Sundet P, Lloyd K. Understanding and Responding to Racial Differences in Drug Court Outcomes. 2006;5:1–22.

50. Goodman E, Huang B. Socioeconomic status, depressive symptoms, and adolescent substance use. Archives of Pediatrics & Adolescent Medicine 2002;156:448–53. [PubMed: 11980549]

51. Terrell F, Terrell S. Race of counselor, client sex, cultural mistrust level, and premature termination from counseling among Black clients. Journal of Counseling Psychology 1984;31:371–375.

52. Walton MA, Blow FC, Bingham CR, Chermack ST. Individual and social/environmental predictors of alcohol and drug use 2 years following substance abuse treatment. Addictive Behaviors 2003;28:627–642. [PubMed: 12726780]

53. Vito GF, Tewksbury RA. The impact of treatment: The Jefferson county (Kentucky) drug court program. Federal Probation 1998;62:46–51.

54. Andenaes J. Does punishment deter crime?, 76–93. Criminal Law Quarterly 1968:11.

55. Matza, D. Delinquency and drift. New York: John Wiley & Sons; 1964.

56. Tittle CR, Logan CH. Sanctions and deviance: Evidence and remaining questions. Law & Society Review 1972;7:371.

57. DeJong C. Survival analysis and specific deterence: Integrating theoretical and empirical models of recidivism. Criminology 1997;35:561–576.
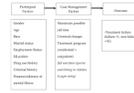
Figure 1. Theoretical framework guiding addition of variables to proportional hazards model
(Italicized text = time varying covariate; plain text = time-fixed covariates). Participant pre-existing factors were entered into model first. Significant indicators were retained in subsequent steps; age, gender, and race were also retained for purposes of statistical control. Secondly, case management factors were entered into the model with the exception of the time-dependent covariate (jail sanctioning). Thirdly, the final model with time-dependent indicators for jail sanctioning was constructed. Finally, time itself was introduced as a time-dependent covariate to examine the interaction between first jail sanction x timing of first jail sanction.

Table 1

Final Cox proportional hazards model of time to treatment failure[1].

	Parameter Estimate	Standard Error	p-value	Hazard Ratio (95% Confidence Limits)
Gender	0.146	0.154	0.341	1.16 (0.86, 1.57)
Age in years	0.000	0.007	0.959	1.00 (0.99, 1.01)
Non-White vs White	−0.027	0.173	0.878	0.97 (0.69, 1.37)
Education (< high school vs high school or greater	0.348	0.152	0.022	1.42 (1.05, 1.91)
Unemployed vs Employed	0.403	0.144	0.005	1.50 (1.13, 1.98)
Polysubstance misuse (yes vs no)	0.387	0.176	0.028	1.47 (1.04, 2.08)
First Sanction at ≤ 30 days	2.429	0.644	<0.001	11.34 (3.21, 40.0)
Second Sanction	0.451	0.288	0.118	1.57 (0.89, 2.76)
Third Sanction	0.501	0.451	0.266	1.65 (0.68, 3.99)
Fourth Sanction	0.454	0.704	0.519	1.58 (0.40, 6.26)
First Sanction at > 30 days	−1.506	0.671	0.025	0.22 (0.06, 0.83)

[1] Jail sanctions during drug court participation are time-dependent covariates. This model also includes the interaction between first sanction and time (where time is dichotomized into ≤ 30 days or > 30 days)..