PREDICTING DRUG COURT OUTCOME

AMONG AMPHETAMINE USING PARTICIPANTS

By

LORA J. WU

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To the Faculty of Washington State University:

The members of the Committee appointed to examine the thesis of LORA J. WU find it satisfactory and recommend that it be accepted.

_____
John M. Roll, Ph.D., Chair

_____
Dennis G. Dyck, Ph.D.

_____
G. Leonard Burns, Ph.D.

_____
Robert A. Short, Ph.D.

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Abstract

by Lora J. Wu, M.S.
Washington State University
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Chair: John M. Roll

Introduction: Amphetamine abuse and dependence is linked to crime, and carries great social and economic costs. Drug courts provide a multifaceted team approach to treatment and rehabilitation for substance dependent offenders by incorporating frequent judicial hearings with substance use disorders treatment. Identifying the demographic and individual variables predictive of success in drug court treatment programs allows for evidence-based recommendations for program optimization. The main objective of this study was to identify predictors of drug court outcome among amphetamine using participants.

Method: A court collected database was obtained and $N = 540$ participants were included in the total sample. Amphetamine using participants ($n = 341$) were identified by having a diagnosis of an amphetamine use disorder, using meth/amphetamine during the program, or having a charge associated with meth/amphetamine. Sample statistics were compared across outcome and amphetamine use groups with chi-square and *t* tests. Multivariate binary regression models with demographic and individual variables entered as predictors of outcome were used to identify predictors of drug court graduation.

Results: Multivariate binary regression models on the total sample revealed that having children and the interaction of using amphetamine and being employed were predictive of graduation. Amphetamine use, having restitution payments, being sanctioned to jail, and accumulating more days of community service as a sanction were inversely related to graduation. A similar pattern of results was found among amphetamine using participants, where being employed and having children were predictive of graduation and being sanctioned to jail was inversely related to graduation. Outcome among non-amphetamine using participants was predicted by days of community service assigned.

Discussion: Both amphetamine using and other drug court participants would likely benefit from program enhancements that support reinforcing activities inconsistent with substance use. In particular, encouraging and accommodating for participant employment and incorporating components of parental support may increase program completion.

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CHAPTER ONE

INTRODUCTION

AMPHETAMINE AND CRIME

There is a well-documented relationship between amphetamine and crime. In 2005, an estimated $4.2 billion was spent on criminal justice costs associated with methamphetamine in the United States (Nicosia, Pacula, Kilmer, Lundberg, & Chiesa, 2009). Amphetamine use and dependence carries individual, family, and societal costs. The presence of meth/amphetamine in a community has widespread effects including producing drug endangered children, affecting homeowners and renters, hospitals and healthcare providers, police and other law enforcement officials, and emergency responders (Altshuler, 2005; Thompson, Sowell, & Roll, 2009). The substantial amount of resources directed toward meth/amphetamine-related criminal justice costs, and the impact on individuals, families, and communities justifies an examination of efficacious means of dealing with meth/amphetamine addiction and associated crime.

First, it may be important to consider the nature of the connection between substance use and crime when evaluating legal and social consequences resultant from involvement with amphetamines. Goldstein (1985) proposed three major classifications of drug-violence or drug-crime connections: psychopharmacological (crime resulting from drug use), economic-compulsive (crime as a means of supporting drug use), and systematic (crime resulting from the manufacturing, transport, and sale of illicit drugs) (MacCoun, Kilmer, & Reuter, 2003; Farabee & Hawken, 2009). Amphetamine related crime is categorized by Goldstein's classifications below.

Psychopharmacological crime may be a function of chronic methamphetamine use increasing violent behavior, as it has been shown to increase fighting behavior in mice (Sokolv et al., 2004). Though this relationship has yet to be definitively demonstrated in humans, a comparative psychology approach may help to explain the sometimes violent behavior humans display with methamphetamine use (Farabee & Hawken, 2009). Cartier, Farabee, and Prendergast (2006) found that after controlling for drug trade related crime, methamphetamine use predicted self reported involvement in violent crime. Though a relationship between methamphetamine use and violence exists, methodological shortcomings including variations in operationally defining methamphetamine use and violence, the use of convenience samples, and retrospective self-reported data prevent us from drawing clear conclusions regarding the direction(s) intensity of the relationship (Tyner & Fremouw, 2008). Multiple logistic regression analysis of CA Department of Health Services (Office of AIDS) data regarding risky sexual behavior in those who used methamphetamine during sex versus those who did not report using methamphetamine during sex revealed that methamphetamine users were more than twice as likely to report having had sex with a prostitute or having received money or drugs for sex (Molitor, Truax, Ruiz, & Sun, 1998).

Economic-compulsive crime results from activity designed to support meth/amphetamine use. Although the cost of meth/amphetamine depends on frequency of use and the cost of the drug, it is reasonable to assume that for many frequent meth/amphetamine users, the cost of meth/amphetamine overwhelms licit income (Farabee & Hawken, 2009). It is difficult to assess the cost of use because the purity of meth/amphetamine fluctuates, making it difficult to predict how long the high from

meth/amphetamine will last and how much and often users will buy meth/amphetamine (Farabee & Hawken, 2009). Federal, state, and local law enforcement have reported increasing numbers of methamphetamine-related identity theft, and note that methamphetamine abusers are increasingly using identity theft to fund the purchase of methamphetamine (U.S. Department of Justice, 2007). More research on economic-compulsive meth/amphetamine crime is needed.

Finally, systematic crime results from the sale, production and distribution amphetamines, which has changed substantially in the United States over the last 10 years (Farabee & Hawken, 2009). Methamphetamine can be produced with chemicals commonly used in agriculture and those found in common household products such as pseudoephedrine in cold medicines. At one time, methamphetamine super-laboratories were able to purchase precursor ingredients such as pseudoephedrine and ephedrine in bulk; in response to this laws prohibiting the sale of large quantities of these precursor ingredients were enacted in 1989. These laws helped to curb some of the super-laboratory production of methamphetamine. Subsequent laws passed from 1995-1997 were targeted at smaller or home methamphetamine laboratories and controlled the sale and transfer of products containing precursor ingredients, such as cold medications (Cunningham & Liu, 2005). In one analysis of the effect of precursor ingredient restrictions on methamphetamine use, researchers found a 50% drop in felony and 25% drop in misdemeanor arrests for methamphetamine possession and sale (Dobkin & Nicosia, 2009). However, precursor ingredient regulations may lead producers of methamphetamine to acquire the chemicals through crime (e.g., burglarizing farms, homes, or pharmacies). Identity theft has also been linked to systematic methamphetamine and

crime, where producers use the funds generated from identity theft to support their operations (U.S. Department of Justice, 2007).

There is a link between methamphetamine and crime, as evidenced by self report (Cartier, Farabee, & Prendergast, 2006), and the prevalence rates of offenders testing positive for methamphetamine at arrest (Dobkin & Nicosia, 2009). The huge criminal and social costs of methamphetamine use and related crime warrant a significant social and legal response.

DRUG COURTS

Drug courts were established as an alternative to traditional court proceedings in dealing with drug-related offenses, largely in response to an increase in prosecution of drug related crimes. In the 1980s, arrests for all classes of crimes rose by 28% compared to 126% for drug offenses (Grinspoon & Bakalar, 1994). Figure 1 depicts the FBI Uniform Crime Reports documented increase in drug arrests among adults in the United States from 1970-2007 (United States Bureau of Justice Statistics, 2008). The rise in arrests could represent an increase in drug related crime on a societal level, an increase in the criminal justice response to drug related crime, or some combination of the two; regardless, the increase in drug related arrests presents a large workload for the legal system. The first drug court was established in Dade County, Florida, in 1989, under the jurisdiction of Janet Reno. The number of drug courts has increased since then, and by the end of 2008 there were 2,301 drug courts in operation across the country (NDCI, 2009; See Figure 2).

Typically, drug court involvement lasts for at least one year and includes mandated substance use disorders treatment (including random drug testing) and consistent judicial oversight. While some eligibility criteria vary between drug courts, generally the offenders'

offense and criminal history (e.g., gang involvement, violent crimes, prior felonies, etc.) are used to determine eligibility for the program. In pretrial programs, successful completion often results in the dismissal of felony charge(s), while failure to complete the program generally results in the conviction and sentencing of the defendant on the original felony charge(s). In post-trial programs, defendants are offered participation in the program after submitting a plea or being found guilty.

Success of drug court programs is measured on both the societal and participant level. Drug court participants are compared to non participants on measures of cost savings and recidivism by re-arrest to assess for social gains and community safety. Within drug court participants, graduates are compared to failures and factors such as reduced rates of substance abuse and dependence are considered to be proxies of social rehabilitation.

Drug courts aim to save taxpayer monies. While more money is initially spent on court proceedings and treatment-related factors in drug courts than in traditional court proceedings, there is a cost savings realized by offenders' reduced jail time and probation costs. One meta-analysis of drug court assessments found a $4500 savings per client served in drug court compared to those involved in traditional court proceedings (Aos, Miller, & Drake, 2006; Carey & Finigan, 2004).

Further cost savings are realized through reduced rates of recidivism. Drug court programs have been shown to reduce drug-related crime and recidivism rates during and up to one year after program completion, though it is difficult to quantify these outcome variables because studies have employed different methodologies and tracked offenders for varying amounts of time (U.S. Government Accountability Office, 2005). In a review and meta-analysis of 55 experimental and quasi-experimental comparison group design drug

court evaluations, drug court participants were less likely to reoffend than their comparison group counterparts (Wilson, Mitchell, & MacKenzie, 2006). Bavon (2001) assessed the effect of participation in a county drug court on recidivism rates over a one year period among drug court participants (graduates and drop outs) and a drug court opt-out comparison group (i.e., defendants who were eligible for drug court but did not opt to participate). He found that program participants had a 13% re-arrest rate within one year, while opt-outs had a rate of 17%. In the total sample, those who were re-arrested were younger (58% were between 17 and 24 years old), and likely to be re-arrested for a drug or alcohol related offense (55%). These findings indicate that certain demographic or individual characteristics may be important in predicting success or failure in a drug court program.

PREDICTORS OF DRUG COURT OUTCOME

Identifying predictors of participant success in drug courts allows for programs to serve more efficiently and effectively by implementing evidence-based practices specific to participant needs. It also allows for programs to pragmatically direct resources by selecting participants based on chance of success. As noted, drug court assessments have yielded varying results, partially as a result of researchers employing different methods. Studies vary in their sample characteristics, experimental and control group definitions, and outcome variables assessed. Regardless, several individual variables have emerged as predictors of drug court outcome, including age, gender, race, level of education, employment status, frequency of substance use, drug of choice, and route of administration. There are performance related variables that are predictive of outcome, such as receiving judge-ordered

sanctions or incentives. These variables as they relate to drug court participant outcomes are explored below.

Analyses of drug court programs have yielded mixed results in regard to the influence of age on outcome. Some analyses have found that older age predicts successful completion (Wolf, Sowards, & Wolf, 2003; Hickert, Boyle, & Tollefson, 2009), while other studies have not found age to significantly predict outcome (Butzin, Saum, & Scarpitti, 2002; Gray & Saum, 2005). Data that shows older age is a predictor of success converges with Bavon's (2001) finding that those who are re-arrested are often younger than those who are not re-arrested. The relationship between age and outcome in amphetamine using drug court participants merits further investigation.

In general, women are more likely to successfully complete drug court than men (Stageberg et al., 2001; Gray & Saum, 2005). This finding has also been demonstrated in a sample of primarily daily MA users, where Cox proportional hazards regression indicated women were more likely to complete the program than men (Hartman, Listwan, & Shaffer, 2008). Further research on gender and amphetamine use is warranted, as women have been shown to be more likely to indicate amphetamines as a primary drug of choice over other drugs than men (Listwan, Shaffer, & Hartman, 2009) and to be more likely to test positive for amphetamines at arrest than men (National Institute of Justice, 1998).

Several studies have found nonwhite participants less likely to succeed in drug courts than white participants (Butzin et al., 2002; Hartley & Phillips, 2001; Gray & Saum, 2005; Stageberg et al., 2001; Brewster, 2001). Butzin et al. (2002) also found that nonwhites were significantly less likely than whites to have completed high school, which could explain some of the observed variance, because education has also been found to be a predictor of

drug court success (Gray & Saum, 2005). Several studies have demonstrated that those with at least a high school education or GED equivalent were more likely to successfully complete drug court than those without the same (Butzin et al., 2002; Hartley & Phillips, 2001). Whether race or education level serves as a predictor of drug court success in amphetamine using drug court participants is unknown.

Several studies have found that employment status (particularly full time employment) predicts successful drug court outcome (Butzin et al., 2002; Roll, Prendergast, Richardson, Burdon, & Ramirez, 2005; Hartley & Phillips, 2001). The link between employment and success in drug court could be due to the nature of employment, which requires individuals to be functioning at a level that is perhaps higher than those who are unable to keep a job. Thus, employment may be a proxy for severity of impairment due to substance use (Roll et al., 2005). Another conceptualization is that employment may increase the exposure to reinforcing behaviors that are inconsistent with substance use.

Severity of substance use measured by frequency of use has been found to predict success in drug court programs. Butzin et al. (2002) found that reporting infrequent drug use (less than once a month) predicted successful completion of drug court. Gray and Saum (2005) found that successful participants reported using substances only 2 of the last 30 days as compared to 5 of the last 30 days in those who did not complete the program. Some studies have found that drug of choice or route of administration predicted drug court outcome. For example, studies have found that cocaine use (Hartley & Phillips, 2001; Wolf et al., 2003; Hickert et al., 2009) and intervenous drug use (Roll et al., 2005) predicted failure. Reports of whether indicating amphetamines as a drug of choice, frequency of

amphetamine use, or route of drug administration among amphetamine users were not found in the literature.

Few studies have focused specifically on methamphetamine abusing or dependent participants in drug court programs. However, the research that does exist suggests amphetamine users can be as successful as other types of substance users in drug court. For example, researchers who compared methamphetamine using drug court participants to non-methamphetamine using drug court participants found no difference in recidivism rates (Listwan et al., 2009). Bouffard and Richardson (2007) compared successfully completing methamphetamine involved drug court participants to similar non-drug court participants who were sentenced to and completed jail time for similar crimes. They did not find significant differences between recidivism rates using Cox survival analyses. However, when a statistical weighting procedure was applied to the data to increase the sample size of 46 to a hypothetical 92, they found that their model predicts significantly fewer methamphetamine involved drug court participants to be rearrested than methamphetamine involved offenders who completed traditional court proceedings. This provides moderate evidence that drug court programs could prove effective in the handling of methamphetamine involved offenders. In one of the most rigorous studies yet conducted of methamphetamine dependent drug court participants compared with methamphetamine dependent outpatient treatment patients, researchers found that drug court participants were significantly more likely to complete the treatment protocol, to remain in treatment, to be methamphetamine free during treatment, and to be methamphetamine free at 6- and 12-month follow ups (Marinelli-Casey et al., 2008). Taken together, these studies suggest that methamphetamine users can be successful in drug court programs.

The varying methods that courts use to gain participant compliance may influence outcome. Drug court research indicates that programs more often use punishment (in the form of sanctions) rather than immediate and tangible reinforcement as incentives (Burdon, Roll, Prendergast, & Rawson, 2001). In an analysis of two drug court programs researchers found that participants who had sanctions assigned were less likely to graduate than those who did not receive sanctions (Goldkamp, White, & Robinson, 2001). Drug courts use the substantial incentive of dropping criminal charges to motivate participant compliance, but the reward is placed far into the future and takes more than a year of consistent hard work to achieve. The influence of sanctions and incentives on meth/amphetamine using participant outcomes has not been explored.

Finally, research has identified several geographic factors that predict participant outcomes. In a study that compared participants in urban and rural areas, urban significant predictors of success included being unmarried, employed full time, and not reporting cocaine or multiple drug use, while rural predictors of success included only older age. Urban participants had more convictions and parole violations than rural participants (Mateyoke-Scrivner et al., 2004). Stoops et al. (2005) compared urban to nonurban methamphetamine using drug court participants and found urban participants reported a greater variety of substances used during their lifetime and had more criminal convictions than nonurban participants.

AMPHETAMINE AND THE SPOKANE COUNTY THERAPEUTIC DRUG COURT

Meth/amphetamine is consistently rated as the top drug problem by law enforcement and reported as a drug of choice among those involved with the criminal justice system.

Arrestee Drug Abuse Monitoring Program (ADAM) data for Spokane, WA in 2000 indicated that 36% of the individuals arrested for property crimes (which includes identity theft, an economic-compulsive crime), tested positive for methamphetamine at arrest; methamphetamine was the most common drug used by individuals engaged in property crimes. Additionally, 20% of males who submitted a urine sample at time of arrest (for all classes of crime) tested positive for methamphetamine in 2000. The last ADAM data was collected in Spokane in 2000, when methamphetamine was first becoming a major drug of abuse in the area. It is expected that the rates of arrestees testing positive for methamphetamine continue to rise.

From 2004-2008 Spokane County Therapeutic Drug Court (SCTDC) participants identified amphetamines as one of their top three drugs of choice 53-61% of the time, with the class of amphetamines cited more than any other class of substances (North East Washington Treatment Alternatives (NEWTA), 2008). Further evidence of meth/amphetamine abuse in the area comes from analysis of the Treatment Episode Data Set, which holds information about substance abuse treatment clients served by programs that receive public funds or report to federal agencies. In 2005, admissions to treatment programs in for meth/amphetamine dependence were the highest in Pacific and Mountain states, with Washington falling into the top three states for meth/amphetamine treatment admissions in the US (SAMHSA, 2008).

The Spokane County Therapeutic Drug Court (SCTDC) was established in January 1996, under the direction of a committee of the Spokane County Law and Justice Council. The SCTDC serves eligible offenders county wide, drawing from a region encompassing 1764 square miles. The Drug Court team is comprised of the judge, the prosecutor, the

defense attorney, the therapeutic drug court coordinator, the community corrections officer, and the treatment facility representative. Meetings are held prior to dockets twice a week, where each client is reviewed. The team works together to monitor and aid in participants' progress. Substance abuse and dependence treatment is provided by North East Treatment Alternatives (NEWTA), a community provider contracted with the drug court. They involve a variety of treatment methods, including individual and group therapy.

The SCTDC is a pretrial program, which means that a defendant is allowed to participate before being sentenced on a standing charge. Potential participants agree to waive their right to a speedy trial and stipulate that the allegations in the police report are facts in order to participate in SCTDC. These two agreements ensure a swift conviction and sentencing should the participant be terminated from the program. Potential drug court participants are advised by the Public Defender about the program and their rights and responsibilities should they opt to participate. The Public Defender is also the participant's advisor and representative throughout their participation.

Potential participants are screened by the Prosecutor's office and are eligible to participate in drug court based on their charges and other selection criteria. Eligible charges include Possession of a Controlled Substance, Forged Prescription, Conspiracy to Possess a Controlled Substance, Possession of a Controlled Substance with Intent to Manufacture Marijuana, 5 plants or less. Property crimes including Felony Theft first or second degree, Possession of Stolen Property first or second degree, Forgery, Unauthorized Issuance of a Bank Check, Taking a Motor Vehicle Without Permission, and Trafficking in Stolen Property first or second degree are eligible if the arrestee has a documented history of substance dependence and there is a causal connection between that and the crime. Some

charges are considered on a case by case basis, including Possession of a Controlled Substance with Intent to Deliver. To be eligible for drug court, arrestees must have no prior violent crime, no prior adult or juvenile sex convictions, have no other pending felony charges, and must not have a hold from another jurisdiction. Prior program participants and arrestees charged by the gang unit are considered on a case by case basis.

The participants must also be willing to participate in all components of the program and the drug court team must believe that the offender can successfully complete the program prior to their opting into the program. To be eligible for drug court, offenders must also have a documented diagnosis of a substance dependence disorder from a licensed clinician. This diagnosis can be made at the start of the drug court process by the contracted treatment provider or could exist prior to the proceedings.

The SCTDC implements a five phase program: Intervention (phase 1, one month), Restructuring (phase 2, 2 months), Stabilization (phase 3, 2 months), Relapse Prevention (phase 4, 3 months), and Application (phase 5, 4 months). Treatment is designed to last for 12 months, but typically lasts longer due to delays related to missed court and treatment appointments and completion of sanctions. Phase 1 consists of twice weekly random 5-panel substance (THC/COC/OPI/M-AMP/BZD) urinalysis testing (UA) and alcohol breathalyzer testing (BA), intensive outpatient substance abuse treatment (2 hour sessions three times per week), two support group meetings per week (e.g., Alcoholics Anonymous, Narcotics Anonymous), and court appearances every week. Phase 2 consists of twice weekly random UA and BA, three treatment meetings per week, two support groups per week, and court appearance every 2 weeks. Phase 3 includes twice weekly random UA and BA, two outpatient group counseling sessions per week, three support group meetings per week, and

court appearances every 2 weeks to 30 days. Phase 4 includes once to twice weekly random UA and BA, two relapse prevention treatment sessions per week, three support groups per week, and court appearances every 2 weeks to 30 days. Finally, Phase 5 includes once weekly random UA and BA, one continuing care treatment session per week, two support groups per week, and a court appearance at least every 30 days and for graduation.

The drug court team meets to review each case before the judge sees the case in court as a part of the docket. During this meeting progress and regressions in the treatment, legal, and social and community realms are reported. The team provides input about whether or not the judge should impose sanctions or incentives during the hearing. For example, unexcused absences from treatment sessions, missed UAs, stalled UAs (when a participant reported for drug testing but was unable to provide an adequate amount of urine to complete UA testing), or missed court appearances are usually sanctioned with 8 hours of community service per incident. Other sanctions the judge can impose are day or weekend reporting to jail, electronic monitoring, county work crew/community service hours, daily support group attendance, increased contact with case manager, jail time, and program termination. The team can also decide to have a participant move into a structured living environment such as inpatient substance use disorders treatment or structured recovery housing, but funds for and space in such programs are limited. Sanctions can be conceptualized as both punishment and as therapeutic interventions, and are intended to increase participant compliance and to aid in participant progress.

If a participant reports a drug relapse to a drug court representative (usually the treatment provider) prior to giving a positive UA, no sanction is given. After a pattern of positive UAs and poor treatment compliance, participants are at times told to act in 100%

compliance or they will be sent to jail for a period of time or terminated from the program (which would, in all practical senses, result in a guilty plea and time served). Other transgressions, such as lying to the judge in court, are also censured by the drug court team during the review hearing. Incentives are generally limited to verbal praise from the judge during the docket, which elicits peer support and praise, and the presentation of sobriety medallions when 1-, 2-, 3-, 6-, 9-, and 12-month sobriety dates are met. Other incentives the drug court team uses are decreased frequency of court meetings and reduced community service hours. The incentive of greatest value is the dismissal of charges that coincides with drug court graduation. Graduation is celebrated before a court docket, where graduates are publicly lauded and presented with a number of small gifts and praise.

STUDY OBJECTIVES

The primary objectives of this study were to identify predictors of drug court outcome among amphetamine using participants, and to compare predictors of drug court outcome between amphetamine using participants, non-amphetamine using participants, and the total sample of drug court participants.

This study examined the demographic or independent variables demonstrated to influence drug court outcome including age, gender, race, employment status, and substance related variables, in this case substance use category (amphetamine use or non-amphetamine use). Additionally, analyses considered the influence of having children, and receiving judge-imposed sanctions on outcome. Predictors of outcome were analyzed among the total sample, among non-amphetamine using participants, and among amphetamine using participants.

Variables found to predict success or failure in the drug court treatment program could help members of the court and policymakers restructure programs to better serve amphetamine using offenders. This work aims to optimize treatment options for amphetamine users by providing evidence-based recommendations to drug court treatment programs. As meth/amphetamine is a popular drug of abuse in the Inland Northwest and is often related to crime, this work is directly relevant to the SCTDC and the community at large.

CHAPTER TWO

METHODOLOGY

Human Subjects approval was granted by the Washington State University Institutional Review Board (IRB). Additionally, all study personnel signed Spokane County Superior Court volunteer confidentiality agreements, which were approved by the presiding SCTDC Judge. Previously collected court data was obtained from an electronic database stored at the Spokane County Superior Court and maintained by the SCTDC. Identifying information was removed and participants were given a unique identifier before data was analyzed.

PARTICIPANTS

Individuals who had graduated or were terminated from the SCTDC from 01 January 2003 to 15 July 2009 were included as participants. These dates were selected because of inconsistent electronic data keeping before the start date, and by IRB restrictions on the end date. The data used are a cross sectional summary of variables over time.

Amphetamine users were identified by three pathways. Participants with a Diagnostic and Statistical Manual of Mental Disorders IV-TR (American Psychiatric Association [*DSM-IV-TR*], 2000) diagnosis of Amphetamine Dependence or Amphetamine Abuse, a charge associated with meth/amphetamine, or who tested positive by UA for meth/amphetamine during participation were considered to be amphetamine users (dichotomous variable). A variable was created to count the number of pathways by which participants were identified to be an amphetamine user (i.e., 1 = identified by either DSM diagnosis of an amphetamine

use disorder, a meth/amphetamine related charge, or UAs positive for meth/amphetamine during participation; 3 = identified by DSM diagnosis of amphetamine use disorder, meth/amphetamine related charge, and UAs positive for meth/amphetamine use during the program).

Participants who did not have a DSM diagnosis of an amphetamine use disorder, did not have a charge associated with meth/amphetamine, and who did not test positive for meth/amphetamine during participation were coded as non-amphetamine users on the dichotomous amphetamine user variable. The non-amphetamine user sample included several classes of substances used, including cannabis, opiates, alcohol, and cocaine. Substance use classes were not exclusive of each other, and participants used overlapping classes of substance.

VARIABLES

The major dependent variable of analyses was program outcome (graduation or termination). Independent variables were selected based on previous research and theoretical considerations. The literature reviewed previously indicated that the demographic variables of age, gender, race, education level, employment status, frequency of drug use, drug of choice, and route of administration are predictive of outcome. Receiving sanctions during participation also predicts outcome.

The database contained several open-text sections that could be accessed by the court, treatment provider, or community corrections officer to comment on participant relevant data. The notes sections were combed for information to add to individual and demographic

variables as appropriate. Drug court personnel were consulted in determining ambiguous pieces of data (e.g., acronym use). Missing data is described in more detail by variable.

We were able to obtain age, gender, and race data from the database. Level of education was not included in analyses due to missing data. Employment status was determined by a participant reporting employment at any time during the program, as this was the most comprehensive way to account for employment in the sample due to incomplete records of employment at program entry. The notes sections were combed for mention of start, end, transition of, or otherwise noteworthy events related to employment, income sources, or student status, and were coded for whether or not the participant reported being employed during the program. Participants who had notes regarding being assigned to complete court-mandated employment plans or receiving social security income were coded as not employed, unless there was another note about the same participant that indicated employment at some other time during participation. Participants with notes regarding student status were coded as employed. Drug court personnel familiar with the database and data entry procedures confirmed that participants who had no mention of employment could be assumed to be unemployed during program participation.

We considered the use of sanctions during the drug court program, as this has been shown to influence outcome (Goldkamp et al., 2001). Restitution constitutes the repayment of gains to the victim of the offenders' crime and can be considered a sanction that is applied at the beginning of drug court. Restitution dollar amount was unable to be analyzed due to missing data. Judge-mandated sanctions include daily support meeting attendance, days of community service (usually assigned in 8 hour units), mandatory structured living, and jail time. A variable of total 8 hour days of community service assigned was created, as were

dichotomous variables of having been sanctioned to daily support meetings, structured living, and jail time.

We included additional variables that were available in the database and hold theoretical relevance. For instance, whether participants have children or not can be conceived of as important in influencing motivation and level of external responsibility. Participants were determined to have children if such was indicated in the relevant dependents section in the database, or if the notes sections mentioned their having children. It was not possible to accurately determine the number of children that participants had due to incomplete data, and whether the children resided with the participant or not, as this was not formally assessed. Therefore, a dichotomous variable of having children or not having children was used. This variable was coded as 0 if the dependents section was marked as such, and if no other available data indicated that the participant had children.

Finally, the total number of counts for which an individual was charged (1-14) was included, because this could represent severity of crime.

ANALYSES

The total sample was analyzed, and then amphetamine use groups were analyzed separately. To compare sample demographics, chi-square difference tests were performed between outcome groups (graduation/termination) for dichotomous variables, and *t* tests were used for continuous variables. Fisher's exact probability values and probability values were reported for chi-square tests and *t* tests, respectively.

Univariate binary regression models for each of the variables were conducted on each sample. A multivariate binary logistic regression model was used to analyze the effect of the

predetermined variables from the literature shown to predict outcome and a multivariate binary logistic regression model with the predetermined variables plus the variables for children, number of counts charged, and the four sanction variables were conducted on each sample.

The non-amphetamine user group was included only in order to enable later comparisons between amphetamine using and non-using participants, and interactions were not tested on this sample.

The final a multivariate binary regression model run on the total and amphetamine using participants included the aforementioned variables and salient variable interactions between amphetamine use and independent variables.

All analyses were performed using SAS software, Version 9.1.3 of the SAS System for Windows (SAS Institute Inc., Cary, NC). One exception is that IBM SPSS 18, Release Version 18.0.0 (SPSS, Inc., Chicago, IL) was used to obtain only the odds ratio point estimates and 95% confidence intervals for the odds ratios for variables included in interaction terms.

CHAPTER THREE

RESULTS

SAMPLE STATISTICS: TOTAL SAMPLE

There were 540 individuals who either graduated or were terminated from the Spokane County Therapeutic Drug Court from 01 January 2003 to 01 July 2009. Seven participants had two cases in drug court during this time period; their most recent case was used for analyses. The remainder of the individuals had one current court case each in drug court.

Complete sample statistics for the total sample and total sample by outcome are shown in Table 1. The sample was 43% female and the mean age was 32.2 years (*SD* = 9.5 years, range = 18 – 57 years), and included 273 graduates. Chi-square difference tests and *t* tests between graduates and terminates revealed significant differences in graduation status between those who had children ($\chi^2[1, N=540] = 14.25$, $p < 0.001$), those who reported employment during the program ($\chi^2[1, N=540] = 20.21$, $p < 0.001$), and those who were sanctioned with jail time during the program ($\chi^2[1, N=540] = 16.64$, $p < 0.001$). As expected, graduates spent significantly more days participating in drug court than those who were terminated from the program ($t[538] = -18.53$, $p < 0.001$). Because graduates must spend at least 365 days in the drug court program, and days spent in the program is highly correlated with outcome ($r = 0.62$, $p < 0.001$ in the total sample), this variable was not included in the forthcoming regression models. Figure 3 depicts select demographic variables by outcome for the total sample.

SAMPLE STATISTICS: NON-AMPHETAMINE USING PARTICIPANTS

There were 199 non-amphetamine users identified in the sample, with 108 graduating from the program. Complete sample statistics are reported in Table 2. Analysis of sample statistics by outcome showed that those who were terminated from the program were more likely to have restitution payments ($\chi^2[1, N=199] = 4.98$, $p = 0.05$) and to be assigned to attend daily support meetings ($\chi^2[1, N=199] = 4.01$, $p = 0.05$), and had more days of community service assigned ($t[197] = 2.59$, $p = 0.01$) than graduates. Graduates spent significantly more time in the program ($t[197]=-12.44$, $p < 0.001$).

SAMPLE STATISTICS: AMPHETAMINE USING PARTICIPANTS

There were 341 amphetamine users identified in the sample, identified by at least one of three possible pathways. Having a charge associated with meth/amphetamine is a less objective pathway of identifying amphetamine users from non-users as compared to a DSM-IV-TR amphetamine use disorder diagnosis or meth/amphetamine positive UA tests. However, there was a high percentage of overlap between pathways identifying amphetamine use, with 73% of participants with a charge associated with meth/amphetamine having also tested positive for meth/amphetamine during participation and 80% also having a DSM-IV-TR diagnosis of an amphetamine use disorder.

One hundred sixty five amphetamine using participants graduated from the program. Figure 4 shows graduation outcome for the total sample and by amphetamine use status. Sample statistics analyzed with chi-square difference tests and *t* tests by outcome are shown in Table 3. The number of pathways amphetamine use was identified (amphetamine use 1-3) differed significantly between graduates and those who were terminated ($t[339] = 2.47$, $p =$

0.01), with graduates having a greater number of pathways identified. There were also significant differences between outcome groups for having children (χ^2[1, N=341] = 20.43, p < 0.001), being employed during the program (χ^2[1, N=341] = 34.78, p < 0.001), and being sanctioned with jail time (χ^2[1, N=341] = 9.48, p = 0.002), with amphetamine using participants more likely to have positive values on each of the variables than non-amphetamine using participants.

Independent variables were entered into a correlation matrix to obtain Pearson's r and probability values (see Table 4) between variables among amphetamine using participants. Amphetamine use and employment had a correlation value of r = 0.55, days of community service assigned was correlated with being sanctioned to a structured living environment at r = 0.42, and days of community service assigned was correlated with being sanctioned to attend daily support meetings at r = 0.40; no other variables had correlation values of $r \geq$ 0.40. Multicollinearity tests indicated that independent variables were not too highly correlated, as all inflation factors were ≤ 1.73 and tolerance values were ≥ 0.58.

Comparisons of sample statistic between amphetamine use groups are shown in Table 5. Amphetamine using participants were more likely to be white (χ^2[1, N=540] = 17.61, p < 0.001), to be employed (χ^2[1, N=540] = 12.62, p < 0.001), and to have children (χ^2[1, N=540] = 17.61, p < 0.001) than non-amphetamine using participants. Amphetamine using participants also had a greater number of counts of criminal charges (t[538] = -1.97, p = 0.05), were sanctioned to a greater number of days community service (t[538] = -4.56, p < 0.001), and were more often sanctioned to a structured living environment (χ^2[1, N=540] = 6.84, p < 0.01), and to attend daily support meetings (χ^2[1, N=540] = 6.56, p < 0.01) than non-amphetamine using participants.

MODELS: TOTAL SAMPLE

Univariate binary regression models using individual variables to predict drug court graduation revealed that amphetamine use did not predict graduation ($p = 0.19$, odds ratio = 0.79), nor did number of amphetamine use identifying pathways ($p = 0.09$, odds ratio = 1.17). Having children ($p < 0.001$, odds ratio = 2.46) and being employed ($p < 0.001$, odds ratio = 2.28) predicted graduation, and being sanctioned to jail was inversely related to graduation ($p < 0.001$, odds ratio = 0.12).

Next, the predetermined variables that predicted drug court outcome from the literature (age, gender, race, employment, and days of community service assigned as an estimate of sanctions) were entered into a binary logistic regression model to predict drug court graduation. The model included 532 participants, was significant over a null model ($p < 0.001$), and had a good fit. Being employed ($p < 0.001$, odds ratio = 3.27) was predictive of graduation. Having a greater number of days community service assigned was negatively related to graduation ($p = 0.001$, odds ratio = 0.98).

Next, the variables from the literature and the additional variables from our analyses (amphetamine use, children, number of counts, restitution, sanctioned to jail time, sanctioned to structured living, and sanctioned to daily support) were entered into a binary logistic regression model to predict graduation from drug court. The model was run on 532 participants and reached overall significance over a null model ($p < 0.001$), AIC = 687.77. Being employed ($p < 0.001$, odds ratio = 3.88) and having children ($p = 0.002$, odds ratio = 2.53) were significant predictors of drug court graduation. Using amphetamine ($p = 0.05$, odds ratio = 0.67), having restitution payments ($p = 0.01$, odds ratio = 0.34), being sanctioned to jail time ($p < 0.001$, odds ratio = 0.10), and being assigned more days of community

service during the program ($p = 0.02$, odds ratio = 0.98) were inversely related to graduation. Age, gender, and race were not found to be significantly related to drug court graduation (all p values ≥ 0.15). Results from this multivariate binary logistic regression model on the entire sample are shown in Table 6.

Since the primary interest of this analysis was the effect of amphetamine use on drug court outcome, the interaction of amphetamine use with the significantly predictive independent variables were examined. The twelve variable binary regression model was run five times with one interaction added at each time to test the significance of each interaction predicting graduation while the independent variables were controlled for. The interaction of amphetamine use and having children ($p = 0.23$, see Figure 5) and amphetamine use and being sanctioned to jail ($p = 0.98$) were not significant predictors of outcome. The interaction variables between amphetamine use and employment ($p < 0.001$, see Figure 6), amphetamine use and having restitution payments ($p = 0.04$, see Figure 7), and amphetamine use and days of community service assigned ($p = 0.02$, see Figure 8) were significant predictors of outcome when added to the twelve variable model serially.

A model that included the twelve independent variables and the three significant interaction variables was run on the total sample. The model reached overall significance ($p < 0.001$), and had an improved fit over the multivariate model without the interaction terms (AIC = 680.36). Complete model results are reported in Table 7. This model revealed that after controlling for other independent variables and salient interactions, having children ($p = 0.002$, odds ratio = 2.54), and the interaction of amphetamine use and employment ($p = 0.04$, odds ratio = 2.99) predicted graduation (whereby graduation rates were higher among employed amphetamine users relative to unemployed amphetamine users, and to employed

or unemployed non-amphetamine users). Amphetamine use was inversely predictive of graduation, ($p < 0.001$, odds ratio = 0.41), as were the sanction variables of having restitution payments ($p = 0.04$, odds ratio = 0.15), being sanctioned to jail time ($p < 0.001$, odds ratio = 0.10), and days of community service assigned ($p = 0.05$, odds ratio 0.97).

MODELS: NON-AMPHETAMINE USING PARTICIPANTS

Univariate binary regression models revealed that having restitution payments (coefficient = -1.63, $p = 0.04$, odds ratio = 0.20), being sanctioned to structured living (coefficient = -1.35, $p = 0.05$, odds ratio = 0.26), and days of community service assigned (coefficient = -0.06, $p = 0.02$, odds ratio = 0.97) predicted outcome. The variable representing being sanctioned to jail time could not be included because n cell counts were insufficient to perform fit statistics. None of the non-amphetamine users who graduated received jail time as a sanction.

The five predetermined variables were entered into a binary regression model to predict graduation among non-amphetamine users ($N = 199$, model included 194). The model did not reach overall significance over a null model ($p = 0.07$), AIC = 269.04. Days of community service assigned predicted outcome (coefficient = -0.03, $p = 0.03$, odds ratio = 0.97).

The model with the five predetermined variables plus the additional variables from our analyses (in this subsample children, number of counts, restitution, sanctioned to structured living, and sanctioned to daily support) were entered into a binary regression model to predict graduation. The model was run on 194 non-amphetamine users and reached overall significance ($p = 0.04$), but with a poor fit compared to the intercept only (AIC

increased from 269.27 to 270.41 when covariates were added). Only having a greater number of days community service assigned significantly predicted outcome (inverse relationship, $p = 0.04$, odds ratio = 0.97). Results are shown in Table 8.

MODELS: AMPHETAMINE USING PARTICIPANTS

Univariate binary regression models showed that having children ($p < 0.001$, odds ratio = 3.49) and being employed ($p < 0.001$, odds ratio = 3.85) predicted graduation, while being sanctioned to jail time negatively predicted graduation ($p = 0.006$, odds ratio = 0.17). The model for amphetamine use pathways revealed that a greater number of pathways predicted graduation ($p = 0.02$, odds ratio = 1.40). The three meth/amphetamine use inclusion criteria were run as predictive variables in separate univariate binary regression models, which revealed that having a charge associated with meth/amphetamine ($p = 0.01$, odds ratio = 2.94) and testing positive for meth/amphetamine during the drug court program ($p < 0.001$, odds ratio = -0.16) predicted graduation, whereas having a DSM-IV-TR diagnosis of an amphetamine use disorder did not ($p = 0.89$, odds ratio = 1.07).

The multivariate binary logistic regression model to predict graduation from drug court using the five predetermined independent variables (age, gender, race, employment, and days of community service assigned as an estimate of sanctions received) reached overall significance ($p < 0.001$), and had a good fit. This model included 338 of the 341 amphetamine using participants. Results indicated that being employed during the program ($p < 0.001$, odds ratio = 5.01) was related to graduation and that days of community service assigned was inversely related to graduation ($p = 0.05$, odds ratio = 0.99). Age, gender, and

race did not predict graduation (all p values ≥ 0.22) among amphetamine using drug court participants.

The next multivariate binary logistic regression model included the five predetermined variables identified from the literature and the additional variables from our analyses (amphetamine use 1-3 variable, children, number of counts, restitution, sanctioned to jail time, sanctioned to structured living, and sanctioned to daily support meetings). The model was run on 338 amphetamine using participants and reached overall significance ($p < 0.001$), with a good fit. Results are shown in Table 9. This model revealed results comparable to the model on the entire sample, with a similar pattern of variables significantly predicting graduation. Reporting employment ($p < 0.001$, odds ratio = 6.22), having children ($p = 0.02$, odds ratio = 3.03), and having jail time assigned as a sanction (inverse relationship, $p = 0.004$, odds ratio = 0.13) predicted graduation.

Next, the interaction between the number of identified pathways of amphetamine use (amphetamine use 1-3 variable) and the independent variables found to predict outcome were entered into the model serially. The interaction between number of amphetamine use pathways and being sanctioned to jail was not a significant predictor of outcome ($p = 0.68$). The interaction between number of amphetamine use pathways and having children ($p = 0.05$) and the interaction between number of amphetamine use pathways and being employed ($p = 0.04$) significantly predicted outcome.

We included the two significant interaction terms in our final multivariate binary regression model to control for their effect, which improved the overall fit of the model. The results were of the same pattern as before controlling for interactions: being employed ($p < 0.001$, odds ratio = 19.98) and having children ($p = 0.02$, odds ratio = 15.07) were predictive

of graduation, and being sanctioned to jail (p=0.002, odds ratio = 0.11) was inversely related to graduation. Model results are shown in Table 10.

To elucidate the relationship between having children and graduation in amphetamine using participants, univariate binary regression models were used to compare the effect of having children on outcome by gender. Results indicated that having children significantly predicted graduation in both men and women, but had a greater odds ratio in men (p = 0.002, odds ratio = 5.99) than women (p = 0.003, odds ratio = 2.85).

CHAPTER FOUR

DISCUSSION

There is a strong link between meth/amphetamine use and crime. The Western United Sates is a fitting area to study amphetamine use disorders and associated crime because of the relativity high levels of use and strong relationship between use and crime.

The present study analyzed data collected by the Spokane County Therapeutic Drug Court for 540 individuals who either graduated or were terminated from 2003 to 2009. Our main objective was to identify variables that predict outcome in amphetamine using drug court participants, and to discover whether there are differential predictors of outcome among amphetamine using participants relative to other groups.

A summary of results from all multivariate binary regression models is shown in Table 11. We first analyzed the entire sample to compare our sample to samples published in the literature on variables shown to predict outcome. While some variables predicted outcome in this data set consistent with those in the literature (e.g., sanctions were inversely related to graduation), other previously demonstrated relationships were not observed (e.g., there was no significant influence of gender or race on outcome).

Binary logistic regression analyses were used to identify variables that predict graduation from drug court. A model run on the entire sample while controlling for independent and interaction variables revealed that amphetamine use, restitution payments, being sanctioned to jail time, and being assigned a greater number of days community service were inversely related to graduation, while having children and the interaction of amphetamine use and being employed were predictive of graduation.

We identified amphetamine using participants by three pathways of use. In order to define the amphetamine users, an assumption was made that having a charge associated with meth/amphetamine indicated use, possibly posing a threat to construct validity. Cross variable data checks revealed a high correlation ($p < 0.001$) between each variable and level of overlap between having a charge with meth/amphetamine and having a DSM diagnosis of amphetamine use disorder or testing positive for meth/amphetamine during the program.

A multivariate binary logistic regression model run on the 199 non-amphetamine users while controlling for independent variables revealed that being assigned a greater number of days community service was inversely related to graduation.

A multivariate binary regression logistic model run on the 341 amphetamine users while controlling for independent variables showed that being employed during the program and having children were predictive of graduation, and that being sanctioned to jail time was inversely related to graduation.

STRENGTHS AND LIMITATIONS

This analysis has high ecological validity, as participants were selected from an operational drug court program. The study results are also externally valid and may be translated into evidence-based recommendations to drug court programs, especially in areas with similarly high levels of amphetamine abuse as the Inland Northwest.

Several limitations to these analyses warrant discussion. The data reported here are cross sectional, and the effects of relationships over time remain unclear. Some variables shown in the literature to predict drug court outcome were not included in analyses because of missing data (e.g., level of education), and whether these variables influence outcome

among amphetamine users remains unknown. Finally, as the SCTDC is a county drug court, all participants were drawn from the same geographical area.

FUTURE RESEARCH

This study was designed to examine the independent variables that predict drug court outcome among amphetamine using participants. While sanctions were included in analyses, the study was not specifically designed to assess the influence of judge-mandated sanctions on outcome. The relationship between sanction magnitude and outcome or between sanction use and outcome over time could be analyzed. Future research might employ techniques such as hierarchical linear regression models or general estimation equations to analyze relationships between variables and outcome over time.

Another approach to data analyses could include factor analysis of the demographic variables that contribute to outcome, or perhaps structural equation modeling. These techniques prove difficult at this point, as the pathways between independent and demographic variables predicting outcome in drug court are not yet well known.

Spokane County is large and includes both rural and urban areas. Previous research has identified differences between rural and urban drug court participants (Mateyoke-Scrivner, et al., 2004; Stoops, et al., 2005) which were not examined or controlled for in the present analyses. A location based analysis using geographic information systems and geographically weighted regression may be warranted, as it could reveal differences in demographic or outcome variables between drug court participants living in different parts of a large service area.

The influence of employment during drug court on successful outcome also deserves further investigation. Studies that lead to a better understanding of why employment is helpful to participants, and to what the drug court can do to help support and encourage employment during participation, could help recommend evidence based policies in drug court. Also, evaluations of whether increasing employment among participants increases graduation rates would help to elucidate the relationship between employment and positive outcome.

Previous research has demonstrated that there are complex relationships between parenting and substance use (e.g., see Maluccio & Ainsworth, 2003), which certainly warrant further investigation. A study designed to address the influence of having children on successful outcome should include information on whether or not children reside with the participant/parent and other demographic variables that might help explain the relationship between having children and successful outcome. It is conceivable that parenting mediates the relationship between having children and successful outcome. Further, considering the experience of parenting during drug court and assessing for perceived support during participation might help explain this relationship.

CONCLUSION AND IMPLICATIONS

After controlling for independent and interaction variables, models revealed that amphetamine using participants are at a disadvantage to graduate from drug court; amphetamine users were 41% as likely to graduate as non-amphetamine users. Nevertheless, the SCTDC graduates a substantial number and proportion (48%) of amphetamine users. Amphetamine users may be more successful in drug court treatment programs as compared

to other treatment venues (e.g., Marinelli-Casey et al., 2008). Despite the disadvantage that amphetamine use carries, the drug court program seems to be an effective treatment protocol for amphetamine users who are involved with the legal system.

Employment has emerged as a replicable predictor of drug court graduation, observed in this sample and others reported in the literature (Butzin et al., 2002; Roll, Prendergast, Richardson, Burdon, & Ramirez, 2005; Hartley & Phillips, 2001). Being employed during participation interacted with amphetamine use in the total sample, such that employment enhanced graduation among the amphetamine using participants. Employment may serve as a proxy for level of functioning (Roll et al., 2005); it may be that higher functioning participants are able to find and maintain employment for the same reasons that they are more likely to graduate from drug court than those who are unable to find and maintain employment.

In this sample, amphetamine use was demonstrated to be inversely related to graduation, and the interaction between amphetamine use and employment suggests that employment might moderate the disadvantageous effect of amphetamine use on outcome. These results have clinical significance, as they demonstrate the importance of employment on drug court outcome in both the total sample and among amphetamine using participants. Importantly, employment is an individual variable that can be changed or enhanced. Employment likely increases the opportunity for and exposure to reinforcing activities that are inconsistent with drug use. Employment offers individuals increased options and access to resources, which may translate to a sense of self-worth which might conflict with drug using behavior. Employment should be both encouraged and accommodated for by drug court programs. These data also warrant the implementation of employment training or

transitional employment programs that would help to employ a greater number of participants. It is also possible that amphetamine use enhances or increases employment. Evaluating whether increasing employment rate also increase graduation rate may help to explain the relationship between employment and successful outcome, and the interaction between amphetamine use and employment on successful outcome.

Results also indicated that having children predicts success in drug court (see Figure 5), among amphetamine using participants and the total sample. One conceptualization of the impact of having children on graduation is that having children is a proxy for responsibility outside of oneself similar to holding a job. Similar to employment, having children also exposes individuals to reinforcing activities. Having children might also offer a sense of self-worth or responsibility outside of oneself that is inconsistent with drug use. Caring for children itself is an activity that is inconsistent with drug use.

That having children predicts success lends to the suggestion that drug court programs should accommodate for participants with children. The SCTDC provides childcare while parents are engaged in drug court activities at the courthouse or treatment center. It could be possible that these efforts have already yielded increased graduation rates among parents. Perhaps aiming to expand childcare and family involvement as part of the treatment protocol would further enhance the positive influence that having children yields on outcome. Providing childcare during employment would leverage two predictors of success, and might further enhance successful outcome among those who are employed and have children.

Because meth/amphetamine abuse and dependence have such significant social and financial costs, it is important to determine effective and efficient ways of treating these

disorders and associated problems. The number of individuals being treated for amphetamine use disorders continues to rise in the United States (SAMHSA, 2006, 2008; See Figure 4), making the development and support of successful treatments a social issue. Drug courts have been shown to reduce recidivism, reduce substance abuse, and to rehabilitate successful participants at a significant cost savings to taxpayers.

Analyses reveled that amphetamine users share a similar pattern of independent variables that predict outcome as the total sample. In determining individual covariates of success in drug court programs, we can help inform policy that will channel public funds to have the greatest impact. This research suggests that drug courts are an efficacious means of treating criminally offending amphetamine using participants. Further, amphetamine using participants and the general drug court population alike would likely benefit from the same enhancement efforts to increase and support activities such as employment that increase reinforcing behaviors outside of drug use, support social integrations, and promote self-efficacy and self-worth.

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APPENDIX

Table 1. Sample statistics by outcome for the entire sample (N = 540) with t value (degrees of freedom) and probability value or chi-square value (degrees of freedom) and Fisher's Exact Test probability value reported. Variables marked with * differed significantly alpha = 0.05.

	Terminated N=267	**Graduated N=273**	***t(df)*or χ*(df),P* value**	**Total sample N=540**
Amp Use	65.9%	60.4%	χ=1.74 (1), P=0.21	63.2%
Age	31.7(9.3)	32.6(9.8)	t=-1.04(532), P=0.30	32.2(9.5)
Gender (% female)	40.4%	46.2%	χ=1.83 (1), P=0.19	43.3%
Race (% white)	93.6%	93.0%	χ=0.08(1), P=0.86	93.3%
Children*	10.9%	23.1%	χ=14.25 (1), P<0.001	17.0%
Employed*	25.8%	44.3%	χ=20.21 (1), P<0.001	35.2%
Days in DC*	236(149)	421(71)	t=-18.53(538), P<0.001	330(149)
Restitution	7.5%	5.1%	χ=1.28(1), P=0.29	6.3%
Days CS	14.8(16.1)	12.8(16.3)	t=1.42(538), P=0.16	13.8(16.3)
Jail time*	8.6%	1.1%	χ=16.64(1), P<0.001	4.8%
Structured	11.6%	9.5%	χ=0.62(1), P=0.49	10.6%
Daily support	12.0%	11.4%	χ=0.05(1), P=0.89	11.7%
# counts	1.82(1.34)	1.82(1.27)	t=-0.04, P=0.37	1.82(1.30)

Table 2. Sample statistics by outcome for the non-amphetamine using participants (*N* = 199) with *t* value (degrees of freedom) and probability value or chi-square value (degrees of freedom) and Fisher's Exact Test probability value reported. Variables marked with * differed significantly alpha = 0.05.

	Terminated N = 91	**Graduated N = 108**	***t(df)*or *χ(df),P* value**	**Non-Amphetamine Users N = 199**
Age (years)	31.3(10.6)	32.9(10.4)	t=-1.07(194), P=0.29	32.2(10.5)
Gender (%female)	31.5%	40.7%	χ=1.81(1), P=0.19	36.6%
Race (% white)	84.6%	89.8%	χ=1.22(1), P=0.29	87.4%
Children	8.8%	9.3%	χ=0.01(1), P=1.00	9.1%
Employed	26.4%	25.0%	χ=0.05(1), P=0.87	25.6%
Days in DC*	228(129)	409(72)	t=-12.44(197), P<0.001	326(136)
Restitution*	8.8%	1.9%	χ=4.98(1), P=0.05	5.0%
Days CS*	12.4(16)	7.4(11.0)	t=2.59(197), P=0.01	9.7(13.8)
Structured	9.9%	2.8%	χ=4.41(1), P=0.07	6.0%
Daily support*	11.0%	3.7%	χ=4.01(1), P=0.05	7.0%
# Counts	1.77(1.06)	1.60(0.94)	t =1.19(197), P=0.24	1.68(0.99)

Table 3. Sample statistics by outcome for amphetamine using participants (N = 341) with t value (degrees of freedom) and probability value or chi-square value (degrees of freedom) and Fisher's Exact Test probability value reported. Variables marked with * differed significantly alpha = 0.05.

	Terminated N = 176	**Graduated N = 165**	***t(df)*or χ*(df),P* value**	**Amphetamine Users N = 341**
Age (years)	31.9(8.6)	32.3(9.4)	t=-0.43(336), P=0.67	32.1(9.0)
Gender (%female)	44.9%	49.7%	χ=0.79(1), P=0.39	47.2%
Race (% white)	98.3%	95.2%	χ=2.70(1), P=0.13	96.8%
Children*	11.9%	32.1%	χ=20.43(1), P<0.001	21.7%
Employed*	25.6%	57.0%	χ=34.78(1), P<0.001	40.8%
Days in DC*	240(158)	429(70)	t=-14.14(339), P<0.001	332(156)
Restitution	6.8%	7.3%	χ=0.03(1), P=1.00	7.0%
Days CS	16.0(16.0)	16.4(18.3)	t=-0.17(339), P=0.87	16.2(17.1)
Jail time*	9.7%	1.8%	χ=9.48(1), P=0.002	5.9%
Structured	12.5%	13.9%	χ=0.15(1), P=0.75	13.2%
Daily support	12.5%	16.4%	χ=1.03(1), P=0.36	14.4%
# counts	1.85(1.46)	1.97(1.43)	t=-0.79(339), P= 0.43	1.91(1.44)
Amp Use 1-3*	1.54(0.80)	1.75(0.78)	t=-2.47(339), P= 0.01	1.64(0.80)

Table 4. Sample statistics by amphetamine use status and for the entire sample with *t* value (degrees of freedom) and probability value or chi-square value (degrees of freedom) and Fisher's Exact Test probability value reported. Variables marked with * differed significantly alpha = 0.05.

	Non-Amp N=199	**Amp Using N=341**	***t(df)*or χ*(df),P* value**	**Total sample N=540**
Graduated	54.3%	48.4%	χ=1.74 (1), 0.212	50.5%
Age	32.2(10.5)	32.1(9.0)	*t*=0.09 (532), 0.925	32.2(9.5)
Gender (% female)*	36.6%	47.2%	χ=5.79 (1), 0.019	43.3%
Race (% white)*	87.4%	96.8%	χ=17.61 (1), <.001	93.3%
Children*	9.1%	21.7%	χ=14.24 (1), <0.001	17.0%
Employed*	25.6%	40.8%	χ=12.62 (1), <0.001	35.2%
Days in DC	326(136)	332(156)	*t*=-0.40 (538), 0.689	330(149)
Restitution	5.0%	7.0%	χ=0.86 (1), 0.463	6.3%
Days CS*	9.7(13.8)	16.2(17.1)	*t*=-4.56 (538), <.001	13.8(16.3)
Jail time	3.0%	5.9%	χ=2.23 (1), 0.150	4.8%
Structured*	6.0%	13.2%	χ=6.84 (1), 0.009	10.6%
Daily support*	7.0%	14.4%	χ=6.56 (1), 0.012	11.7%
# counts*	1.68(0.99)	1.91(1.44)	*t*=-1.97 (538), 0.049	1.82(1.30)

Table 5. Pearson's correlation values for variables with 2-tailed *p* value on the second line for the amphetamine using participants (*N* = 341, 338 used).

	Gend.	Age	Race	Emp.	Child.	Rest.	Jail	Struct.	Daily supp.	d. CS	Amp
Out-come	0.05 0.35	0.02 0.67	0.09 0.10	0.33 <.001	0.24 <.001	0.01 0.86	-0.16 0.004	0.03 0.57	0.06 0.30	0.01 0.81	0.14 0.01
Gend.		-0.14 0.01	0.09 0.08	0.04 0.43	0.25 <.001	-0.01 0.90	-0.08 0.17	0.22 <.001	0.02 0.77	0.11 0.05	0.05 0.34
Age			-0.06 0.26	-0.11 0.05	-0.19 <.001	-0.001 0.98	-0.07 0.20	-0.15 0.01	-0.15 0.01	-0.16 <.001	-0.03 0.59
Race				0.05 0.36	-0.02 0.78	-0.05 0.35	0.03 0.61	0.08 0.15	-0.03 0.61	-0.06 0.30	-0.02 0.67
Emp.					0.35 <.001	0.19 <.001	0.06 0.30	0.36 <.001	0.31 <.001	0.36 <.001	0.55 <.001
Child.						0.11 0.05	-0.07 0.23	0.20 <.001	0.15 0.01	0.22 <.001	0.33 <.001
Rest.							-0.07 0.22	0.20 <.001	0.02 0.76	0.06 0.25	0.11 0.05
Jail								0.02 0.71	0.08 0.13	0.16 0.004	0.04 0.43
Struct.									0.22 <.001	0.42 <.001	0.26 <.001
Daily supp.										0.40 <.001	0.30 <.001
d. CS											0.33 <.001

Table 6. Results from the multivariate binary regression model using demographic and individual variables to predict drug court outcome for the total sample (*N* = 540, 532 included in model). Variables marked with * indicate a significant predictor of graduation at the level of alpha = 0.05.

Model Fit Statistics			**Testing Global Null Hypothesis: BETA=0**		
	Intercept	**Intercept & Covariates**		**Chi-Square (df)**	**P value**
AIC	739.441	687.766	**Likelihood Ratio**	75.68(12)	<.001
SC	743.718	743.362	**Score**	67.30(12)	<.001
-2 Log L	737.441	661.766	**Wald**	55.64(12)	<.001

	Model Estimates				**Odds Ratio Estimates**	
	Estimate	**Standard Error**	**Wald Chi-Square (df)**	**P value**	**Point Estimate**	**95% Wald Confidence Interval**
Intercept	-0.5235	0.4036	1.682(1)	0.195		
Amp Use*	-0.3999	0.2022	3.913(1)	0.048	0.670	0.451-0.996
Gender	0.2845	0.1971	2.082(1)	0.149	1.329	0.903-1.956
Age	0.0129	0.00993	1.675(1)	0.196	1.013	0.993-1.033
Race	0.1041	0.3760	0.077(1)	0.782	1.110	0.531-2.319
Employed*	1.3552	0.2543	28.402(1)	<.001	3.878	2.356-6.383
Children*	0.9264	0.3022	9.396(1)	0.002	2.525	1.397-4.566
Restitution*	-1.0677	0.4302	6.159(1)	0.013	0.344	0.148-0.799
Jail*	-2.3377	0.6668	12.292(1)	<.001	0.097	0.026-0.357
Structured	-0.5363	0.3696	2.106(1)	0.147	0.585	0.283-1.207
Daily support	0.00120	0.3457	0.000(1)	0.997	1.001	0.508-1.972
# counts	0.0590	0.0778	0.575(1)	0.448	1.061	0.911-1.236
Days CS*	-0.0194	0.0081	5.684(1)	0.017	0.981	0.965-0.997

Table 7. Results from the final multivariate binary regression model using demographic and individual variables while controlling for interaction terms to predict drug court outcome for the total sample (N = 540, 532 included in model). Variables marked with * indicate a significant predictor of graduation at the level of alpha = 0.05.

Model Fit Statistics			**Testing Global Null Hypothesis: BETA=0**		
	Intercept Only	**Intercept & Covariates**		**Chi-Square (df)**	**P value**
AIC	739.441	680.362	**Likelihood Ratio**	89.0785(15)	<.001
SC	743.718	748.789	**Score**	79.9314(15)	<.001
-2 Log L	737.441	648.362	**Wald**	66.2381(15)	<.001

	Model Estimates				**Odds Ratio Estimates**	
	Estimate	**Standard Error**	**Wald Chi-Square (df)**	**P value**	**Point Estimate**	**95% Wald Confidence Interval**
Intercept	-0.1150	0.4294	0.0717 (1)	0.7889		
Amp Use*	-0.9011	0.2614	11.8830 (1)	0.0006	0.406	0.243-0.678
Gender	0.2525	0.2013	1.5729 (1)	0.2098	1.287	0.868-1.910
Age	0.0105	0.0101	1.0868 (1)	0.2972	1.011	0.991-1.031
Race	0.0360	0.3809	0.0089 (1)	0.9247	1.037	0.491-2.187
Employed	0.6420	0.4373	2.1555 (1)	0.1421	1.900	0.807-4.477
Children*	0.9308	0.3065	9.2205 (1)	0.0024	2.536	1.391-4.625
Restitution*	-1.8769	0.9288	4.0831 (1)	0.0433	0.153	0.025-0.945
Jail*	-2.3073	0.6619	12.1521 (1)	0.0005	0.100	0.027-0.364
Structured	-0.6937	0.3809	3.3167 (1)	0.0686	0.500	0.237-1.054
Daily support	0.0355	0.3582	0.0098 (1)	0.9210	1.036	0.513-2.091
# counts	0.0411	0.0800	0.2639 (1)	0.6075	1.042	0.891-1.219
Days CS*	-0.0298	0.0150	3.9407 (1)	0.0471	0.971	0.942-1.000
INT AmpUse-Employed*	1.0938	0.5274	4.3006 (1)	0.0381	2.986	1.062-8.395
INT AmpUse-Restitution	1.2194	1.0426	1.3678 (1)	0.2422	3.385	0.439-26.124
INT AmpUse-Days CS	0.0144	0.0173	0.6966 (1)	0.4039	1.015	0.981-1.049

Table 8. Results from the multivariate binary regression model using demographic and individual variables to predict drug court outcome among the non-amphetamine using participants (N = 199, 194 included in model). Variables marked with * indicate a significant predictor of graduation at the level of alpha = 0.05.

Model Fit Statistics			**Testing Global Null Hypothesis: BETA=0**		
	Intercept	**Intercept & Covariates**		**Chi-Square (df)**	**P value**
AIC	269.269	270.405	**Likelihood Ratio**	18.8635(9)	0.042
SC	272.536	306.352	**Score**	17.5147(9)	0.064
-2 Log L	267.269	248.405	**Wald**	14.7043(9)	0.143

	Model Estimates				**Odds Ratio Estimates**	
	Estimate	**Standard Error**	**Wald Chi-Square (df)**	**P value**	**Point Estimate**	**95% Wald Confidence Interval**
Intercept	0.2802	0.6159	0.207(1)	0.649		
Gender	0.5845	0.3314	3.111(1)	0.078	1.794	0.937-3.435
Age	0.0038	0.0150	0.066(1)	0.798	1.004	0.975-1.034
Race	-0.6176	0.4520	1.867(1)	0.172	0.539	0.222-1.308
Employed	0.5172	0.4437	1.359(1)	0.244	1.677	0.703-4.002
Children	1.1570	0.7529	2.362(1)	0.124	3.180	0.727-13.909
Restitution	-1.716	1.0221	2.818(1)	0.093	0.180	0.024-1.333
Structured	-1.3993	0.9032	2.400(1)	0.121	0.247	0.042-1.449
Daily support	0.3848	0.8893	0.187(1)	0.665	1.469	0.257-8.396
# counts	-0.0867	0.1680	0.267(1)	0.606	0.917	0.660-1.274
Days CS*	-0.0330	0.0158	4.383(1)	0.036	0.968	0.938-0.998

Table 9. Results from the multivariate binary regression model using demographic and individual variables to predict drug court outcome among amphetamine using participants (*N* = 341; 338 included in model). Variables marked with * indicate a significant predictor of graduation at the level of alpha = 0.05.

Model Fit Statistics			**Testing Global Null Hypothesis: BETA=0**		
	Intercept	**Intercept & Covariates**		**Chi-Square (df)**	**P value**
AIC	470.141	424.250	**Likelihood Ratio**	69.89(12)	<.001
SC	473.964	473.950	**Score**	62.29(12)	<.001
-2 Log L	468.141	398.250	**Wald**	50.62(12)	<.001

	Model Estimates				**Odds Ratio Estimates**	
	Estimate	**Standard Error**	**Wald Chi-Square (df)**	**P value**	**Point Estimate**	**95% Wald Confidence Interval**
Intercept	-1.0570	0.5964	3.141(1)	0.076		
Amp 1-3	-0.2449	0.2000	1.501(1)	0.221	0.783	0.529-1.158
Gender	0.0428	0.2593	0.027(1)	0.869	1.044	0.628-1.735
Age	0.0198	0.0140	1.999(1)	0.157	1.020	0.992-1.048
Race	1.2219	0.7500	2.654(1)	0.103	3.393	0.780-14.759
Employed*	1.8277	0.3517	27.011(1)	<0.001	6.220	3.122-12.392
Children*	1.1088	0.3603	9.472(1)	0.002	3.031	1.496-6.141
Restitution	-0.6943	0.5100	1.854(1)	0.173	0.499	0.184-1.357
Jail*	-2.0302	0.7066	8.255(1)	0.004	0.131	0.033-0.525
Structured	-0.5177	0.4301	1.449(1)	0.229	0.596	0.256-1.384
Daily support	0.0762	0.3998	0.036(1)	0.849	1.079	0.493-2.363
# counts	0.0749	0.0926	0.655(1)	0.419	1.078	0.899-1.292
Days CS	-0.0134	0.0099	1.821(1)	0.177	0.987	0.968-1.006

Table 10. Results from the final multivariate binary regression model using demographic and individual variables while controlling for the interaction of number of amphetamine use pathways (Amp 1-3) and having children, and number of amphetamine pathways and employment (* signifies significance at alpha = 0.05 level) to predict drug court outcome for the total sample (*N* = 540, 532 included in model).

Model Fit Statistics			**Testing Global Null Hypothesis: BETA=0**		
	Intercept	**Intercept & Covariates**		**Chi-Square (df)**	**P value**
AIC	470.141	421.473	**Likelihood Ratio**	76.6681 (14)	<.001
SC	473.964	478.819	**Score**	66.2543 (14)	<.001
-2 Log L	468.141	391.473	**Wald**	51.8022 (14)	<.001

	Model Estimates				**Odds Ratio Estimates**	
	Estimate	**Standard Error**	**Wald Chi-Square (df)**	**P value**	**Point Estimate**	**95% Wald Confidence Interval**
Intercept	-1.6661	0.6517	6.5366	0.0106		
Amp 1-3	0.2246	0.2772	0.6565	0.4178	1.252	0.727-2.155
Gender	0.0729	0.2619	0.0775	0.7808	1.076	0.644-1.797
Age	0.0197	0.0142	1.9159	0.1663	1.020	0.992-1.049
Race	1.2569	0.7498	2.8101	0.0937	3.515	0.808-15.280
Employed*	2.9949	0.8263	13.1352	0.0003	19.983	3.956-100.935
Children*	2.7126	1.1544	5.5216	0.0188	15.069	1.568-144.779
Restitution	-0.8622	0.5167	2.7846	0.0952	0.422	0.153-1.162
Jail*	-2.1880	0.7222	9.1792	0.0024	0.112	0.027-0.462
Structured	-0.4900	0.4274	1.3146	0.2516	0.613	0.265-1.416
Daily support	0.0324	0.3988	0.0066	0.9351	1.033	0.473-2.257
# counts	0.0781	0.0929	0.7070	0.4005	1.081	0.901-1.297
Days CS	-0.0140	0.0100	1.9599	0.1615	0.986	0.967-1.006
INT Amp1-3-children	-0.7592	0.4898	2.4024	0.1211	0.468	0.179-1.222
INT Amp1-3-employment	-0.6593	0.3912	2.8402	0.0919	0.517	0.240-1.113

Table 11. Summary of multivariate binary regression models predicting outcome, on which sample, and significant results.

Analysis	Sample	Significant Results
Multiple binary regression (6 & 12 variable)	Total	amphetamine use, employment, children, restitution, jail, days CS
Multiple binary regression (interactions serially)	Total	amphetamine use * employment, amphetamine use * restitution, amphetamine use * days CS
Final Multiple binary regression + 3 interactions	Total	amphetamine use, children, restitution, jail, days CS, amphetamine use * employment
Multiple binary regression (5 & 10 variable)	Non-amphetamine using	days CS
Multiple binary regression (5 & 12 variable)	Amphetamine using	employment, children, jail
Multiple binary regression (interactions serially)	Amphetamine using	amphetamine use pathways*children, amphetamine use pathways * employment
Final Multiple binary regression + 2 interactions	Amphetamine using	employment, children, jail

Figure 1. FBI Uniform Crime Reports adult arrests for drug crimes from 1970-2007 in the United States (U.S. Bureau of Justice Statistics, 2010).

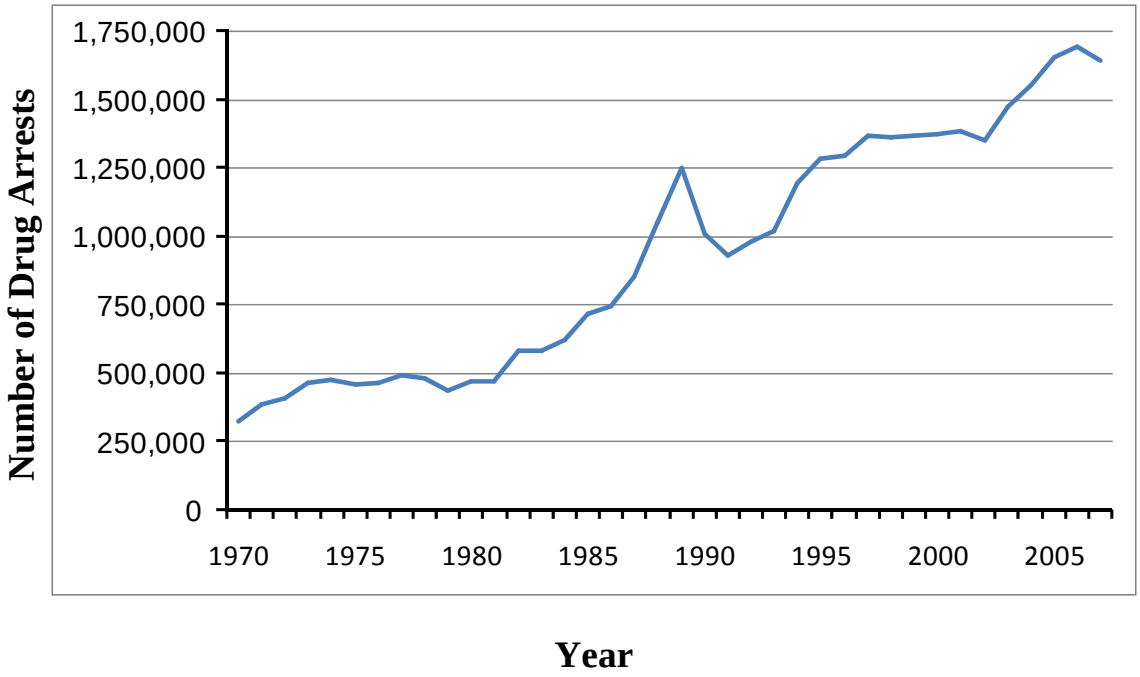

Figure 2. Number of drug court programs in operation in the United States from 1989 to 2009.

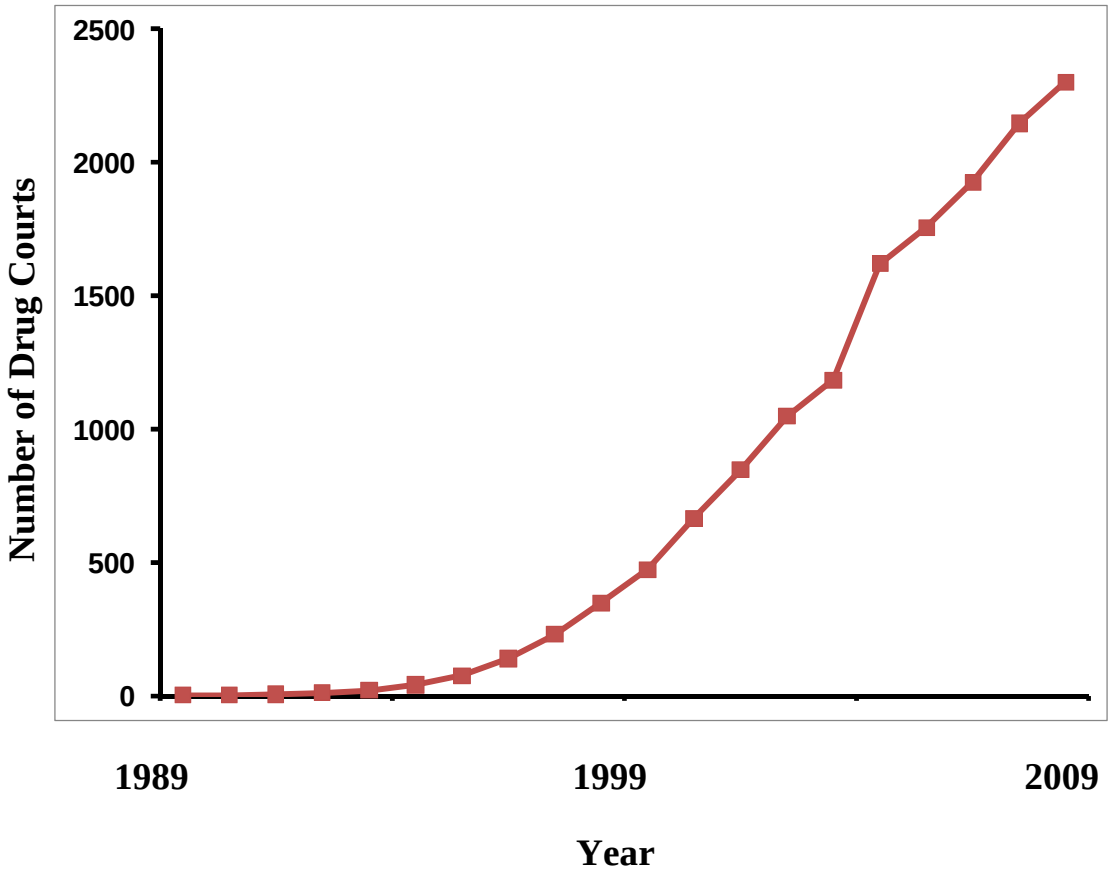

Figure 3. Percent of total sample by outcome for those who are meth/amphetamine users, female, white, have children, employed, have restitution payments, were sanctioned with jail time, were sanctioned with structured living, and were sanctioned with daily support meetings.

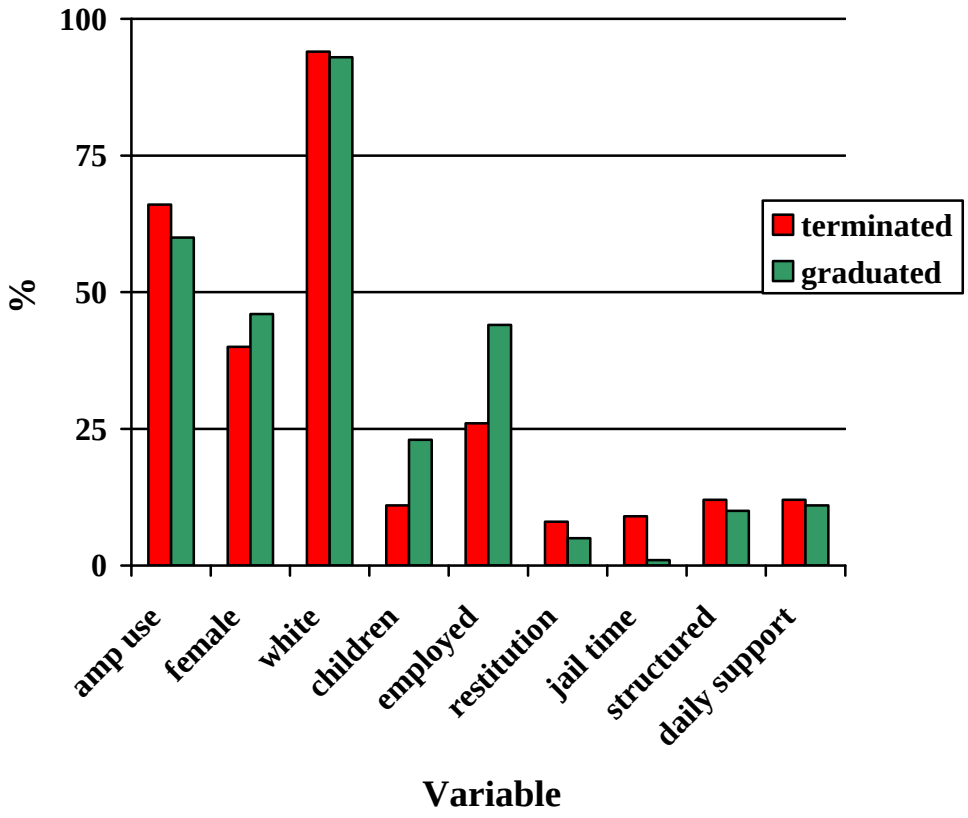

Figure 4. Percent of participants who were terminated from or graduated from the drug court program by amphetamine use status.

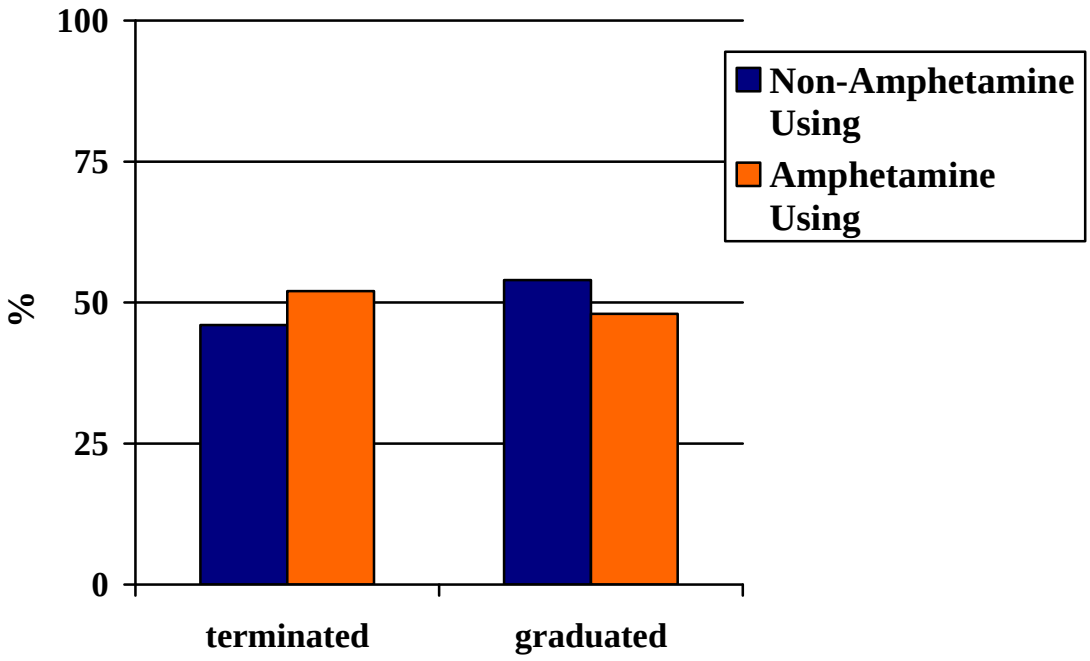

Figure 5. Percent of sample who graduate from drug court by amphetamine use status and reporting having children or not. A greater percentage of participants who report having children graduate than those who do not report having children, among both amphetamine using and non-amphetamine using participant groups.

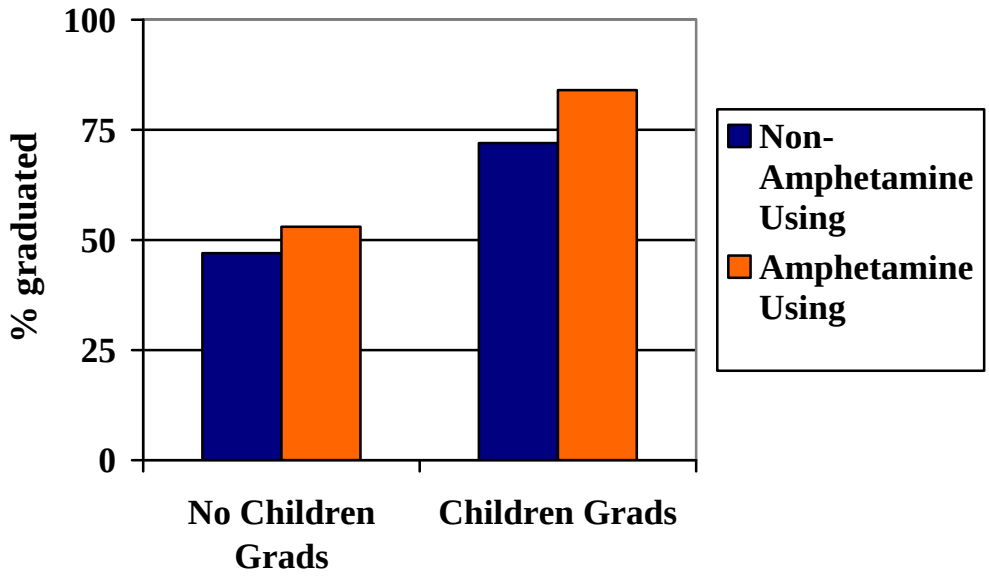

Figure 6. Percent of sample employed during drug court by outcome and amphetamine status to demonstrate the interaction of between amphetamine use and employment. A greater number of amphetamine using participants who graduate report employment than amphetamine using participants who do not graduate, and non-amphetamine using participants.

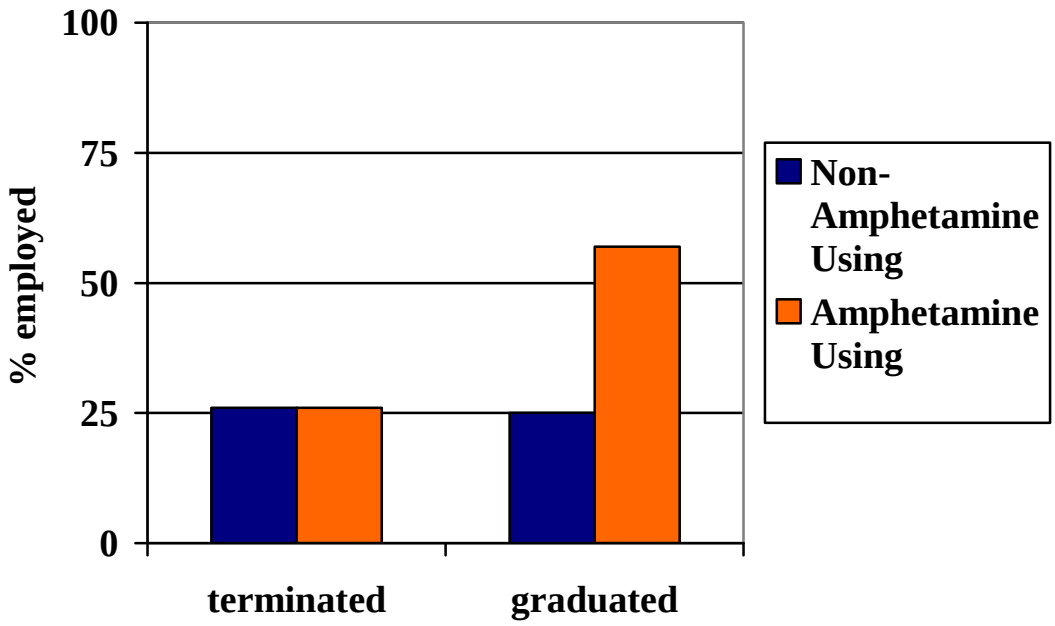

Figure 7. Percent of sample with restitution payments in drug court by outcome and amphetamine use status to demonstrate the interaction between amphetamine use and restitution. Non-amphetamine using participants who were terminated from drug court were more likely to have restitution payments than non-amphetamine using participants who graduated; this relationship is not observed among amphetamine using participants.

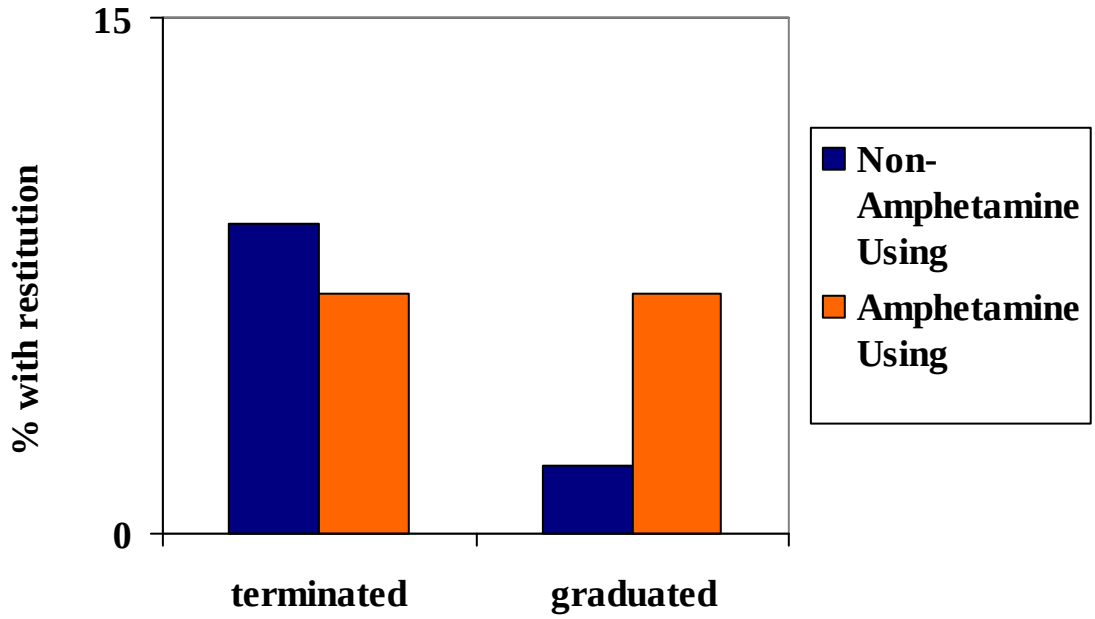

Figure 8. Days of community service assigned during drug court participation by outcome and amphetamine use status to demonstrate the interaction between amphetamine use and days of community service assigned. Non-amphetamine using participants who were terminated from drug court were more likely to have a greater number of days community service assigned than non-amphetamine using participants who graduated; this relationship is not observed among amphetamine using participants.