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Can Drug Court Results Be Predicted?

Completion and Termination of Drug Court
Participants

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4/19/2012

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EXECUTIVE SUMMARY

The substantial growth in Kentucky's prison population since the 1980s has resulted in increased spending on corrections, both the total amount and as a percentage of total general fund spending. The sustained growth in corrections spending combined with shrinking budgetary realities has created an incentive to explore ways to reduce costs without compromising public safety. Community supervision programs are one alternative to addressing this problem. They are an attractive approach to dealing with certain types of criminals because the cost is significantly lower than incarceration. Drug courts are an example of community supervision that allows drug offenders to avoid imprisonment and receive treatment for their drug abuse while still being supervised by the courts. An assessment of whether drug court participants successfully complete or are prematurely terminated from the program can help policymakers evaluate the effectiveness of drug courts and make improvements. In this study, I sought to measure the impact specific drug or drug types had on completion and termination outcomes for individual participants. In addition, I examined the same explanatory variables' effects on these outcomes based on the percentage of participants at the county-level. The findings for the individual participants suggest opiate and schedule II users are more likely to successfully complete the program, whereas oxycodone users are less likely. The county-level analysis does not generate any significant findings other than a slightly higher probability of completion in counties with a higher poverty rate. Termination among individuals appears to be less likely for methamphetamine and white participants. However, drug schedule I users seem to have a higher likelihood of being terminated. The greater the percentage of methamphetamine users within a county also decreases termination. Conversely, the higher the percentage of white participants results in a higher tendency for termination. The findings of this study are limited due to the relatively low number of participants who have completed the program and a lack of data regarding the individuals' education level, employment status, and marital status. These factors have been found in other studies to impact drug court outcomes. The lack of information about how each jurisdiction operates and differences in judicial discretion are also limitations. I believe further study with attention to these limitations is warranted to better assess drug court outcomes in Kentucky. Continued study of drug courts should also be expanded to examine how these variables and outcomes of interest relate to recidivism.

INTRODUCTION

Since the initiation and escalation of the “War on Drugs” the American prison population has grown significantly. According to the Bureau of Justice Statistics, at the end of 2007 there were over 2.3 million incarcerated citizens of which 1.6 million were in state or federal custody with the remainder in local jails. This represents a 274% increase from 1982 when the total inmate population was just over 0.6 million. One out of every 100 adults in the U.S. was confined to a correctional facility, a rate that exceeds other nations with high incarceration rates like South Africa (Pew, 2008). Kentucky has experienced a 324% growth in its incarceration rate since 1982. Additionally, as of 2007 there was one inmate for every 92 adults compared with the 1982 rate of one for every 391. Kentucky’s prisoner count increased 12% in 2007 alone (Pew, 2009).

The substantial growth in the inmate population has resulted in an increase in state appropriations for corrections expenditures. The ability to house, feed, and secure a growing number of prisoners has resulted in the construction of more facilities and higher costs for personnel and supplies. Rising medical costs have also contributed, as states are required to provide adequate services to meet the health needs of inmates as a result of the 1976 United States Supreme Court decision in *Estelle v. Gamble* (Klein, 1978). Total state spending on corrections is over \$50 billion with a majority of that costs going to prisons. During the past two decades state spending on corrections has quadrupled, making it the second fastest growing area of state budgets behind only Medicaid (Pew, 2011). In 2007, Kentucky corrections spending equaled \$454 million and represented 5.2% of the general fund, a percentage point change of 1.8 from 1987 (Pew, 2008).

On average, corrections is the fifth largest state budget category. It follows health, elementary and secondary education, higher education, and transportation as a percentage of state spending. On average, for every dollar spent on higher education, states spend 60 cents on corrections. Kentucky is below the national average and spends 35 cents on corrections for every dollar spent on higher education. Although Kentucky spends at a lower ratio on corrections, this is still a noticeable increase from the 21 cents it spent compared to higher education in 1987 (Pew, 2008). The need for states to allocate more funds to corrections has the potential for crowding out other state priorities. States may not necessarily choose one priority over another but every dollar spent on one category is not available for another.

Total corrections spending can be broken down into two separate purposes: for the operation of jails/prisons and for the supervision of parolees and offenders on probation. Not surprisingly, it is more expensive to house and feed an offender who also requires 24-hour surveillance. There are facility maintenance expenses that also add to the overall costs associated with imprisoning offenders. In 2008, the average prison cost, based on 33 states surveyed, was almost \$29,000 a year per inmate. In contrast the average yearly cost for community supervision was \$1,250 for probationers and \$2,750 for parolees. The difference in cost between institutional and community corrections vary widely among the states but the former is consistently greater than the latter (“Pew, 2009).

The variance in state spending between the two will depend on each particular state’s attitudes and policies towards imprisonment versus released supervision. In Kentucky for example, there exists an indeterminate sentencing structure that gives the

parole board authority to determine when a prisoner is suitable for release. A recent decline in the parole grant rate has resulted in an increase in the prison population and more inmates are staying locked up for longer periods of time (Pew, 2008). This will require more committed resources for institutional purposes and less for community supervision. Between fiscal years 2003 and 2008, Kentucky increased annual corrections spending by \$100 million. Ninety percent of this additional spending was channeled to prisons leaving only one of every 10 new dollars for supporting probation and parole operations (Pew, 2009).

The sustained growth in corrections spending over the last two decades combined with the budgetary deficits many states are facing, has created greater incentives for states to begin examining ways to cut costs without significantly impacting delivery of goods and services. Corrections spending is an attractive budget category for analysis because almost all the funding comes from the states' own coffers whereas healthcare draws a substantial amount of funding from the federal government (Pew, 2008). Reductions in corrections spending are a difficult issue for policymakers to address because of the balance between costs and the states' responsibility to provide public safety. The aforementioned comparison between institutional and community supervision costs suggest a state can lower total corrections spending simply by granting more inmates parole or increasing the number of inmates who are given probation sentences. However, there is a risk associated with expanding parole and probation programs. The evidence in Kentucky suggests that any short-term savings from community supervision may cost taxpayers more in future prison expenses. In 2007, nearly one in every six parolees in Kentucky was returned to prison for committing a new

crime or breaking the technical conditions of their release (Pew, 2009). A stronger community supervision system and a greater understanding of which offenders are best suited for early release, probation, or diversion programs may assist states in decreasing total corrections spending without creating a threat to public safety.

Drug courts are one example of community supervising that has become more widespread across the United States. Their creation was born from the need to address the growing number of drug offenders or those whose criminal acts were a result of drug use and dependency. Drug courts allow for the offender to remain out of prison while actively participating in their rehabilitation under the supervision of the court. They are an attractive alternative for policymakers and political officials because of the lower costs associated with community supervision programs. Efforts to maximize cost savings and maintain public safety through drug courts require an analysis of participation and the outputs and outcomes. Analysis can assist in guiding policy regarding eligibility requirements, structural guidelines for the participants, and the operation of the program.

LITERATURE REVIEW

Community correction programs have become a popular response states have turned to in dealing with the growing prison population. Drug courts are a high profile example of using community corrections where eligible offenders are permitted to remain out of prison dependent upon their adhering to the conditions set forth by the drug court jurisdiction. The first drug court was established in Miami-Dade County, Florida in 1989

as a reaction to the high volume of drug-related cases that were straining the regular court system. Officials created this special court to address addiction through an integrated set of social and legal services instead of solely relying upon sanctions through incarceration or probation. Since 1989, drug courts have spread throughout the country and now operate in all 50 states. The drug court movement reflects a policy shift of combating drug crimes from reducing the supply of drugs to addressing the demand for drugs through the treatment of addiction (King & Pasquarella, 2009). The nationwide creation of drug courts suggests policy makers and government officials believe there is some benefit to having special courts handle cases where drug use is at the core or is a mitigating factor in an individual's criminal behavior. The states hope these drug courts will not only reduce re-arrest and reconviction rates for drug related offenses, but also decrease the amount of total spending for corrections services.

The Pew Center on the States has performed an extensive amount of research on the topic of community corrections. Pew's historical review of community corrections and its effectiveness found the guiding philosophy behind community corrections has swung back and forth between two strategies, law enforcement and social work ("Pew, 2011). Pew created a framework with specific recommendations they believe states can follow for less crime at lower cost. The basis of this framework is to create a blend of the two strategies that focuses on a primary mission of preventing crime; the belief is that the combination of these strategies is more effective than either punishment or treatment by itself. The framework has six principles that can all be applied to drug court operations. The first recommendation is to use risk assessment instruments to sort offenders by their risk to public safety. Risk assessment is not fool-proof and the science is always

changing so it requires evaluation based on a review of the results. The second suggestion is to base intervention programs on science and the use of evidence based programs. As it pertains to drug courts, if research provides evidence of when an offender is most likely to relapse then greater attention should be paid to people in that stage of their recovery. The third component of the framework is to harness technology to improve supervision capabilities such as through the use of electronic monitoring devices. The fourth recommendation is to impose swift, certain, and proportionate sanctions for violations to stop misbehavior early on and hopefully reduce the likelihood of future more serious violations that could result in being sent to prison. The fifth recommendation is to create incentives for success designed for both the offenders and for the overseeing agency of the program. The final suggestion is to perform frequent evaluation and measure progress through identified performance measures (Pew, 2011).

In order for community corrections to generate desired results of reducing both the cost of corrections and crime, the eligible participants need to successfully complete the specific program. To estimate whether drug courts are effective in reducing the likelihood of future criminal activity by graduates of the program, an evaluation of who graduates is worth performing. The previous research has focused on assessing whether there were similarities or differences between graduates and non-graduates, and whether there were identifiable factors that could predict program completion.

The first two published studies were performed in the mid 1990s when drug courts were still a relatively new approach to adjudicating some criminal offenses involving drug use (Peters, Haas & Murrin 1999). These two studies focused on the relationships among several unrelated variables and developed models to predict the

probability of success in drug court programs based on combinations of demographic and background variables. These initial attempts at predictive modeling produced limited results in regards to accurately predicting the success or failure of drug court participants. However, the first study did produce findings for several variables associated with successful program completion. Specifically, the 1993 study of Dade County, Florida drug court participants found race/ethnicity, education, and marital status to be associated with whether participants completed the program. Participants who were Caucasian, had more years of education, and were married were predominant among those who graduated (Peters, Haas & Murrin 1999). The second study published in 1996 focused on the drug court program in Maricopa County, Arizona. This study solely focused on developing a predictive model for violations of community supervision. The authors used factors such as age at first arrest, number of prior arrest, drug use history, and risk level to generate predictive models. The model was not highly effective in predicting the probability of participants being arrested while in the program (Peters, Haas & Murrin 1999).

Other researchers used the initial studies to produce further research on whether there are either demographic characteristics or other factors associated with eligibility that affect the completion or termination status of drug court participants. A study of the drug court program operated in Escambia County, Florida by a group of researchers produced varying results compared with the earlier studies of different jurisdictions. They found no significant difference between graduates and non-graduates on several demographic variables including age, gender, marital status, average income, and rates of self-reported mental health problems and abuse (Peters, Haas & Murrin 1999). These

results differ from the Dade County, Florida findings as to the impact of marital status on graduation. This study did find other characteristics where the two groups differed significantly. A higher proportion of high school graduates completed the program than non-high school graduates and had full-time employment, which was consistent with the results from earlier research. The main contribution from this study was the inclusion of the type of substance used by participants in the analysis. Program graduates were more likely to report alcohol or marijuana as their primary substance abuse problem, while non-graduates were more likely to report problems with cocaine use (Peters, Haas, & Murrin, 1999).

In 2000, a team of researchers published a study of the relatively new Kentucky drug court program. The data collection and research methods associated with this study were similar to previous research efforts, however this one also included interviews with selected individuals involved in the drug court system. The results from this analysis found non-graduating participants were younger and had difficulty obtaining or maintaining employment (Logan, Williams, Leukefeld & Minton, 2000). This finding in regards to age contrasted with the preceding studies that did not find age to be a significant factor in completing the program. Type of substance used was also included in the analysis but participants were categorized by whether their substance use was limited to one drug or multiple drugs. Non-graduates were more likely to report using multiple substances and experiencing more drug problems immediately prior to their arrest (Logan, Williams, Leukefeld & Minton, 2000). The implications from this study complement the recommendations made by the Pew Center on the States, recommending that program administrators should use risk assessment techniques when determining an

appropriate level of supervision. In this case, high-risk participants are more likely to terminate without increased supervision or intervention. Risk assessment requires research on factors predicting completion and termination.

The issue of drug court outcomes continued to receive attention from researchers with more studies being performed on specific jurisdictions. One such study that focused on a jurisdiction in a mid-Atlantic state was published in 2001. The findings associated with this study revealed five significant variables for determining graduation success. The variables were employment prior to entering the program, maintaining or gaining employment after joining, being white, having a high school degree, and substance use not involving cocaine (Hartley and Phillips, 2001). These findings in regards to employment were consistent with some of the previous studies but not all of studies differentiate between employment prior to and during participation in the program. Cocaine was the only substance mentioned in the study as decreasing the chance of graduation.

There have been other studies that have looked at the type of substance an offender reports using. One of the more recent studies found that participants with substance abuse problems associated with cocaine, crack cocaine, or other derivatives of amphetamines were most at risk to fail drug court. Conversely, those who acknowledged using marijuana or hallucinogens successfully graduated from the program at a higher rate (Hickert, Boyle & Tollefson, 2009). This study also examined the influence of psychological/mental health problems on drug court outcomes. The presence of a disorder, specifically depression, was found to contribute to failing. The previously mentioned study by Logan, et al., also included psychological problems in the analysis

but found it to be more highly correlated to graduates. The authors suggested this finding was due to their increased motivation to receive treatment for both substance use and their psychological issues.

The studies included in this literature review suggest that considerable variation exists across studies involving the relationship between drug court graduation and participant characteristics. The most common factors associated with successful completion of drug court programs were higher levels of education, lower level of drug use and type of drug, and being employed prior to and while participating in the program. In some studies race was found to be a contributing factor whereas in other studies it was not statistically significant. There were other variables, such as marital status and psychological problems, included in some models, but these were not consistent across all the studies. All of these studies focused on a particular jurisdiction encompassing a specific county or an entire state. The discrepancies in some of the findings associated with each of these may be attributed to the jurisdiction itself, the administration of the particular drug court program, the individual characteristics of the participants involved, and the different study designs used by the researchers.

ELIGIBILITY AND DRUG COURT GUIDELINES IN KENTUCKY

The state of Kentucky has a list of requirements to assist in determining which offenders are eligible to be referred to drug court. Their offense must be a non-violent drug or drug-related crime. The defendant must be eligible for probation or Class D

diversion. A participant can be someone who has violated the current terms of probation due to substance-abuse issues. The defendant is able to acknowledge he/she has a drug addiction and is deemed as such through a clinical assessment. The offender must not have previously participated in a drug court program for adults and must be willing to sign all forms, agreements, and waivers (Kentucky Court of Justice, 2012). These requirements are in place to determine who is eligible but the final authority for who is approved for drug court is the presiding judge. Instead of being adversarial like the standard court structure, drug courts are designed to be cooperative. They coordinate recovery efforts by involving judges, prosecutors, defenders, probation authorities, law enforcement, community service groups, and drug treatment professionals (Hartley & Phillips, 2001). The judge can weigh the specific circumstances of a particular offenders case with the opinions of the others and use this as the basis for granting or denying drug court entry.

Once an offender has been referred to participate in a drug court they must follow guidelines the state has established in order to remain a part of the program. The program has been organized into three phases, summarized below, according to the Kentucky Court of Justice website:

Phase I:

This period usually lasts between four and six weeks and requires participants to complete at least three random urine drug/alcohol screen tests weekly. They must attend three counseling sessions per week as well as one court session per week. They have to maintain court-approved full time employment, training, or education while living in

court-approved housing. Participants are expected to begin making arrangements for payment of court obligations. They must make at least one weekly individual contact with drug court staff. They have to enroll and regularly attend a self-help program and indicate an initial understanding of substance abuse treatment. Prior to being considered for promotion to the next phase they must remain drug-free for at least 30 consecutive days.

Phase II:

This period usually lasts eight months and includes many of the same requirements of phase I. Participants are still expected to adhere to the employment and housing requirements. They must continue paying court obligations and attending a self-help program. They also have to continue making at least one weekly individual contact with a staff member. There are slight reductions in regards to some of the other requirements from phase I. The number of random drug/alcohol tests and counseling sessions are decreased from three to two. Also, the one required court session is now required to be every two weeks instead of weekly. Lastly, they have to indicate an appropriate understanding of recovery principles. In order to be recommended for promotion to the final phase they must remain drug-free for the final 90 days consecutively.

Phase III:

This phase generally last three months and is characterized by the continuation of many of the same requirements, while also continuing to decrease the frequency of some of the others. Employment, housing, court payments, self-help program attendance, and weekly meetings with drug court staff remain the same as before. Participants are now expected

to demonstrate an appropriate level of a recovery lifestyle. The random urine drug/alcohol screens and the counseling sessions are reduced to only once a week. The participant must be drug-free for 90 days consecutively during this phase and a total of 180 consecutive days with the addition of phase II before they can graduate from the program.

In addition to all the requirements laid out in the three phases, drug court staff also conducts visits at participants' places of employment, school, and home. Participants, depending on the nature of their criminal offenses, may be required to receive other types of counseling. If a participant continues to relapse, then a higher level of substance abuse treatment will be considered. If there is a relapse during either phase II or III, a demotion to the previous phase will be imposed. A participant's failure to comply with the conditions of the program will result in sanctions that may include community service, jail, and termination from the program.

RESEARCH DESIGN

Data:

The drug court participant data used in this paper were provided by the Kentucky Administrative Office of the Courts. The dataset included records by serial number for every drug court participant during 2009 and 2010. In total, the dataset consisted of 3,648 participants representing 110 of the 120 counties in the state. Specific information for each participant included basic demographic characteristics, drug of choice, and

current status in the program. County data pertaining to population, median income, poverty rate, and race were gathered from the U.S. Census Bureau and added to the dataset. Each county was categorized as to whether or not it was considered a part of Appalachia as determined by the Appalachian Regional Commission. The 2007 crime rate for each county, indexed by the number of incidents per 100,000 people, was the final piece of data included in the dataset. A description of each variable is provided in the following table.

Table 1 Variable Descriptions

Variable	Description
Completion (success)	Number of participants who completed the program
Termination (failure)	Number of participants who were terminated from the program
Active	Number of participants who remain active in the program
Current Drug (e.g. Methamphetamine)	The reported type of drug used by participants at the time of entry to the program.
Drug Schedule (e.g. schedule II)	Participants drug of choice as defined by the Department of Justice
White Participants	Participants who are white
Gender - Males	Participants who are male
Appalachia	Participants located in an Appalachian county
Crime Index	Crime rate for each county in 2007 indexed per 100,000 people
Population	Population for each county in 2010
Poverty Rate	Poverty rate for each county in 2010
White County %	Percentage of population in a county that is white

Current drug is a categorical variable that includes 29 separate drug or drug types. Each drug and drug type was assigned a schedule number based on how they are

categorized according to the U.S. Department of Justice Drug Enforcement Administration, whose definitions are as follows. Schedule I substances have a high potential for abuse, have no currently accepted medical use in treatment, and there is a lack of accepted safety for use under medical supervision. Schedule II substances also have a high potential for abuse that may lead to severe psychological or physical dependence. Substances given a schedule III classification have less potential for abuse than schedules I and II and abuse may lead to moderate or low physical dependence or high psychological dependence. Schedule IV substances have a low potential for abuse relative to schedule III (U.S. DOJ., 2011). The dataset included instances where either the current drug did not fit in a schedule, such as alcohol, or a current drug was not identified. These were grouped together and given a classification of schedule 0. Participants who identified as having a problem with alcoholism could still be tested for how they fared in the program by including alcohol as a variable in the regression models.

Current status was also a categorical variable with 12 unique status identifiers. The current statuses this paper is concerned with are whether participants successfully completed or were terminated as these outcomes represent concrete conclusions to their involvement in the program. Most of the other current statuses listed are not as definitive and may be subject to change. These types of statuses include: suspended, temporary inactive, and transferred out.

Table 2: Individual-Level Summary Statistics

Variable	n^a	Mean	Std. Dev.
Completion	3648	0.067	0.250

Termination	3648	0.307	0.461
Active	3648	0.465	0.499
Alcohol	3648	0.096	0.295
Amphetamine	3648	0.016	0.124
Barbiturate	3648	0.004	0.060
Benzodiazepine	3648	0.089	0.285
Buprenorphine	3648	0.002	0.044
Cocaine	3648	0.069	0.253
Codeine	3648	0.002	0.041
ETG/Alcohol	3648	<0.000	0.017
Heroin	3648	0.018	0.131
Hydrocodone	3648	0.004	0.060
LSD	3648	0.002	0.044
MDA	3648	<0.000	0.017
MDMA	3648	0.002	0.047
Marijuana	3648	0.181	0.385
Mephedrone	3648	<0.000	0.017
Methadone	3648	0.023	0.151
Methamphetamine	3648	0.103	0.304
Methaqualone	3648	<0.000	0.017
Morphine	3648	0.001	0.029
Neurontin	3648	0.001	0.023
Opiates	3648	0.216	0.412
Oxycontin	3648	0.013	0.113
Oxycodone	3648	0.032	0.177
PCP	3648	<0.000	0.017
Propoxyphene	3648	<0.000	0.017
Soma	3648	0.001	0.029
Suboxone	3648	0.008	0.089
Synthetic Cannabinoids	3648	0.001	0.023
Ultram	3648	0.001	0.029
Drug Schedule I	3648	0.203	0.403
Drug Schedule II	3648	0.479	0.500
Drug Schedule III	3648	0.010	0.099
Drug Schedule IV	3648	0.090	0.286
White Participants	3648	0.903	0.296
Gender – Males	3648	0.601	0.490
Appalachia ^b	3648	0.423	0.494
Crime Index	3584	0.021	0.015

Population	3648	0.095	0.163
Poverty Rate	3648	21.196	6.570
White County %	3648	90.552	8.014

^a n refers to the number of individual records in the dataset

^b Appalachia represents individuals living in counties that are defined as part of Appalachia

Since the participant-specific descriptive data were limited to only the county of residence, race, age, and gender, the data were aggregated to the county-level. The participant characteristics, current status, current drug variables were now represented as a percentage of the number of participants within each county. I aggregated the data to the county-level in an effort to analyze the completion and termination results beyond just the individuals. I would now have the ability to get statistical results for completion and termination based on the percentage of participants within a county who identified as having a problem with a specific type of drug.

Table 3: County-Level Summary Statistics

Variable	n ^a	Mean	Std. Dev.
Completion	110	0.058	0.077
Termination	110	0.305	0.174
Active	110	0.471	0.180
Alcohol	110	0.093	0.102
Amphetamine	110	0.012	0.049
Barbiturate	110	0.004	0.015
Benzodiazepine	110	0.086	0.094
Buprenorphine	110	0.002	0.010
Cocaine	110	0.061	0.079
Codeine	110	0.001	0.006
ETG/Alcohol	110	0.001	0.011
Heroin	110	0.015	0.057
Hydrocodone	110	0.003	0.013

LSD	110	0.001	0.003
MDA	110	<0.000	0.001
MDMA	110	0.002	0.009
Marijuana	110	0.191	0.129
Mephedrone	110	0.001	0.008
Methadone	110	0.025	0.047
Methamphetamine	110	0.111	0.135
Methaqualone	110	<0.000	0.001
Morphine	110	0.001	0.005
Neurontin	110	0.001	0.004
Opiates	110	0.232	0.182
Oxycontin	110	0.010	0.025
Oxycodone	110	0.030	0.067
PCP	110	0.001	0.014
Propoxyphene	110	<0.000	0.002
Soma	110	0.001	0.008
Suboxone	110	0.007	0.017
Synthetic Cannabinoids	110	<0.000	0.004
Ultram	110	0.002	0.015
Drug Schedule I	110	0.209	0.136
Drug Schedule II	110	0.488	0.178
Drug Schedule III	110	0.009	0.020
Drug Schedule IV	110	0.087	0.095
White Participants	110	0.944	0.088
Gender – Males	110	0.608	0.162
Appalachia ^b	110	0.455	0.500
Crime Index	106	0.015	0.012
Population	110	0.038	0.077
Poverty Rate	110	20.815	6.724
White County %	110	93.528	5.561

^a n refers to the number of counties the data were aggregated to

^b Appalachia represents the counties that are defined as part of Appalachia

Research Model:

The purpose of this paper was to determine if it is possible to predict the probability of success and failure in the Kentucky drug court program based on the drug a

participant uses or other factors. I was also interested in assessing whether the location where a participant attends drug court has any effect on the outcomes of interest. The data can be analyzed at an individual-level with controls for age, race, and sex, or can be analyzed at the county-level with aggregation of all individuals in the county. To be precise, a panel data model can be estimated with individual data with fixed or random effect of county, or a cross section model can be estimated using only county aggregates. The panel data model has more information and would thus be preferable in general, but crime data are often available only in the aggregate, and this research permits a comparison between these two analyses. The cross section model is appropriate in any case.

Completion and termination were regressed for separately as they are vastly different outcomes with different implications. Factors that contribute to a participant successfully completing the program may differ from those that lead to a greater probability of being terminated. A comprehensive approach, assessing which factors lead to each of the two specific outcomes, should assist in evaluating the effectiveness of the program.

As a result of the large number of drug and drug types in the dataset, I selected four specific drug or drug types that are considered to be highly addictive based on their schedule designation by the Department of Justice. The specific drug variables in my model were opiates, heroin, methamphetamine, and oxycodone. I selected opiates and methamphetamine due to their prevalence in the dataset. These two types of drugs accounted for 21.6% and 10.3% of all participants, respectively. Oxycodone was selected because of the local media attention it and oxycontin receive in Kentucky.

However, because the two have similar pain-killing effects I chose oxycodone because it had a higher rate of identification among participants. Heroin was chosen because it is classified as a schedule I drug, thus indicating a high level of addictiveness. Separate regression models were also set up with schedule I and schedule II so the results would include all the drugs in the dataset that correspond to those two schedules. The variables used to represent the socioeconomic status of the counties were whether it was in Appalachia, crime index, population, poverty rate, and the percentage of the population that is white.

Research Question 1: Does drug choice affect successful completion of drug court participation?

I addressed this question by analyzing both the individual-level and county-level datasets. First, four separate regression models with different variables were used to estimate the impact on successful completion at the individual-level. A random effects regression model was used for the individual-level data to account for any fixed but unobservable differences of the counties. The variables for the first model include only the four drug or drug types of particular interest (opiates, heroin, methamphetamine, and oxycodone) and whether the participant is white. The second model takes those same variables and also controls for the county-specific variables: crime rate, poverty rate, Appalachia, population, and percentage of white population. This approach allowed me to assess the impact of the specific drug or drug types on successful completion as well as their impact when the observable county-specific variables were controlled for. These

two regression models are repeated but the specific drug and drug types are replaced by drug schedules I and II. The model is represented by:

$$Y_c = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \alpha_c + \varepsilon_c$$

where Y represents the successful completion of the program, X denotes the variables of interest, α denotes the county effect, and ε is the random error in the model.

The question arises whether fixed or random effects are appropriate here. Fixed effects use 109 dummy variables for the 110 Counties of Kentucky with data, while random effects assume a correlation of zero between explanatory variables and county effects. The estimated correlation of explanatory variables and fixed effects is -0.038 with a standard error of about 0.1 (precisely, the square root of 1/106), so there is no statistical evidence of correlation. Random effects are more efficient.

A similar approach was used to estimate the effects of the variables of interest on the aggregated county-level data. The exact same variables were repeated for the four models however this time a standard linear regression model was used. The aggregation of the data to the county-level eliminates the need to include α_c and control for county differences not included in the dataset. This type of model is represented by:

$$Y_c = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \varepsilon_c$$

Research Question 2: Does drug choice affect termination of drug court participation?

The same approach of using four regression models was used to estimate the impact of the specific drug used on whether a participant was terminated from the program. The same four drugs of interest were included in the first two models and the same drug schedules were placed in the last two. The random effects model for the individual-level data is represented by:

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \alpha_t + \varepsilon_c$$

and the standard regression model for the county-level data is:

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + \varepsilon_t$$

where Y represents termination from the program, X denotes the variables of interest, α denotes the county effect, and ε is the random error in the model.

To summarize, the model includes county characteristics in all cases, and some personal characteristics and a random effect for county to control for fixed but unobserved characteristics of counties in the panel data model. The interpretation of coefficients is the same for explanatory variables included in both.

ANALYSIS AND FINDINGS

Completion:

The regression results for the individual-level and the county-level data produce varying results on the impact a particular drug had on successfully completing the

program. This is not unexpected since the individual-level estimations are specific to the participants' outcomes whereas the aggregated county-level data estimations are of county results. The individual-level analysis suggests opiate users are more likely to graduate whereas oxycodone users are less likely. These findings are consistent regardless if the county-specific variables are controlled for in the regression model. There were no statistically significant findings for the other drugs of interest in this study. As a group, drug schedule II is also found to increase completion of the program with and without controlling for county-specific variables. This may be explained by the drugs included in drug schedule II having less addictiveness than those in schedule I. I would assume a similar pattern would hold for drug schedules III and IV, however I chose to narrow the scope of this study to only include drug schedules I and II. The only county-specific variable that appears to have an impact is poverty rate, which I find to have a positive effect on completion but not a significant impact.

Table 4: Individual-Level Completion Results

Standard errors in parentheses

	Drug Type		Drug Schedule	
	(1)	(2)	(3)	(4)
Variables	Completion	Completion	Completion	Completion
Opiates	0.028***	0.026**		
	(0.010)	(0.011)		
Heroin	-0.049	-0.040		
	(0.032)	(0.033)		
Methamphetamine	0.009	0.010		
	(0.014)	(0.014)		
Oxycodone	-0.044*	-0.053**		
	(0.024)	(0.024)		
Drug Schedule I			-0.003	0.001
			(0.012)	(0.012)
Drug Schedule II			0.028***	0.029***
			(0.010)	(0.010)
White Participants	0.022	0.017	0.021	0.016

	(0.014)	(0.015)	(0.014)	(0.015)
Appalachia		0.017		0.015
		(0.021)		(0.020)
Crime Index		-0.383		-0.451
		(0.788)		(0.781)
Population		0.072		0.067
		(0.083)		(0.082)
Poverty Rate		0.002*		0.002*
		(0.001)		(0.001)
White County %		<0.000		<0.000
		(0.002)		(0.002)
N=	3648	3584	3648	3584

*** p<0.01, ** p<0.05, * p<0.1

The county-level data did not produce any statistically significant findings other than for poverty rate. The most interesting take away from the county-level analysis is how the percentage of users of the specific drug types and drug schedules do not appear to affect the likelihood of successfully completing the program. Similar to the results for the individual-level data, a county's poverty rate does seem to contribute to successful completion but the effect is relatively minor and its statistical significance is only at the 10% level.

Table 5: County-Level Completion Results

Standard errors in parentheses

Variables	Drug Type		Drug Schedule	
	(1) Completion	(2) Completion	(3) Completion	(4) Completion
Opiates	-0.002 (0.036)	-0.033 (0.044)		
Heroin	-0.053 (0.088)	0.016 (0.100)		
Methamphetamine	0.041 (0.054)	0.036 (0.062)		
Oxycodone	0.176 (0.124)	0.096 (0.157)		
Drug Schedule I			-0.015	0.009

			(0.054)	(0.054)
Drug Schedule II			0.014	-0.003
			(0.034)	(0.009)
White Participants	0.014	-0.112	0.021	-0.092
	(0.075)	(0.127)	(0.071)	(0.132)
Appalachia		-0.008		-0.007
		(0.022)		(0.024)
Crime Index		-0.064		-0.210
		(0.784)		(0.768)
Population		0.090		0.090
		(0.067)		(0.070)
Poverty Rate		0.003*		0.003*
		(0.002)		(0.002)
White County %		0.003		0.002
		(0.002)		(0.002)
N=	110	106	110	106

*** p<0.01, ** p<0.05, * p<0.1

Termination:

The findings suggest the variables in these regression models are more relevant in explaining who is terminated from the program than who completes it. Specifically, the results of the individual-level regression find that methamphetamine users are less likely to be expelled from the program. This could be because of specialized treatment programs designed for the methamphetamine users or potentially the drug court administrators give them more opportunities before ultimately terminating them. Drug schedule I users are estimated to have a positive relationship with termination. This suggests that addictions to drugs in this category are some of the most difficult to overcome even with the treatment and services available within the community as opposed to prison. White participants are also found to be less likely to be terminated in all four of the regression estimates performed on the individual-level data. This may indicate that white offenders are dealt with less harshly than minorities. Termination is

not automatic, but is a judicial decision. Another possible explanation for the results associated with white participants is their education level, which is often related to race. However, I am unable to control for education since it was not included in the dataset.

Table 6: Individual-Level Termination Results

Standard errors in parentheses

Variables	Drug Type		Drug Schedule	
	(1) Termination	(2) Termination	(3) Termination	(4) Termination
Opiates	-0.024 (0.019)	-0.028 (0.020)		
Heroin	-0.068 (0.061)	-0.060 (0.061)		
Methamphetamine	-0.058** (0.026)	-0.060** (0.027)		
Oxycodone	-0.005 (0.044)	-0.003 (0.046)		
Drug Schedule I			0.040* (0.022)	0.042* (0.022)
Drug Schedule II			0.017 (0.018)	0.016 (0.018)
White Participants	-0.054** (0.027)	-0.051* (0.028)	-0.060** (0.027)	-0.058** (0.027)
Appalachia		0.013 (0.037)		0.022 (0.042)
Crime Index		1.732 (1.431)		1.707 (1.620)
Population		0.041 (0.148)		0.037 (0.178)
Poverty Rate		0.003 (0.003)		0.003 (0.003)
White County %		<0.000 (0.003)		<-0.000 (0.004)
N	3648	3584	3648	3584

*** p<0.01, ** p<0.05, * p<0.1

The county-level data produce more statistically significant findings regarding termination than completion. Similar to the individual-level results, a county with a

higher level of methamphetamine users has a lower percentage removed from the program. Interestingly, a finding that is reverse from the individual-level results is that a higher percentage of the county's participants being white may increase the probability of being terminated. Different results appear for counties with higher percentage white population from the individual results for white participants given the county's characteristics. Appalachian counties are found to have a lower likelihood of termination whereas the poverty rate had the opposite effect. This is a surprising finding as generally Appalachian counties are considered poorer areas of Kentucky. The level of statistical significance is higher for poverty rate but the effect of being in an Appalachian county is stronger.

Table 7: County-Level Termination Results

Standard errors in parentheses

Variables	Drug Type		Drug Schedule	
	(1) Termination	(2) Termination	(3) Termination	(4) Termination
Opiates	0.148 (0.153)	0.031 (0.108)		
Heroin	-0.028 (0.176)	0.035 (0.156)		
Methamphetamine	-0.413*** (0.118)	-0.532*** (0.113)		
Oxycodone	-0.082 (0.251)	0.073 (0.264)		
Drug Schedule I			-0.094 (0.123)	-0.038 (0.123)
Drug Schedule II			0.008 (0.136)	-0.130 (0.104)
White Participants	0.077 (0.179)	0.503* (0.303)	0.073 (0.168)	0.476* (0.262)
Appalachia		-0.075* (0.044)		-0.021 (0.046)
Crime Index		-0.999 (1.941)		1.708 (1.786)
Population		0.052		0.086

		(0.133)		(0.123)
Poverty Rate		0.007**		0.007*
		(0.003)		(0.004)
White County %		-0.009*		-0.005
		(0.005)		(0.005)
N	110	106	110	106

*** p<0.01, ** p<0.05, * p<0.1

The panel data model using individual data and county random effects controls for more variation and produces more precise estimates. That is the usual result and the reason panel models are generally preferred. However, crime data often do not permit individual analyses, so it is important to compare estimation methods.

DISCUSSION

Limitations:

There were several limitations associated with this study, most of which can be attributed to a lack of participant-specific information. Previous studies discussed in the literature review section of this paper mentioned statistically significant findings associated with other variables such as education, employment, and marital status. A participant's motivation for remaining out of prison, or maintaining a focus on future prospects, is important in obtaining a positive result. It is reasonable to believe the more opportunities and ties the participant has to the community, then the more incentive the participant has to adhere to the program. I would have preferred to incorporate these and other types of data to have more detailed understanding of the participants. This would

have allowed for more control variables to better understand the impact of the type of drug and drug schedule variables of interest in this study.

The time period from which the data were taken presents limitations especially when it comes to the analysis of those who successfully complete the program. Only approximately 7% of the more than 3,600 participants were identified as having graduated, compared with the almost 31% who have been terminated. As previously mentioned, the data included the 2009 and 2010 calendar years and the expected time to complete drug court is around 18 months. It is possible a large number of participants started the program towards the end of the data collection period or are taking more time to fulfill all the requirements for graduation. This was supported by almost half (47%) in the dataset having a status of “active”. The small sample of actual completers may have contributed to the lack of significant findings pertaining to completion, especially at the aggregated county-level. The analysis, in effect, concerns those who complete quickly.

The final authority on when a participant is terminated is given to the presiding judge. The review of the drug court guidelines in this paper indicates violations can result in various sanctions with the most serious being termination. The exact sanction is up to the discretion of the judge. This study is not able to identify or control for several variables that may have provided more insight into who was terminated. These variables include the number of violations, the nature of the violations, and the variance in the amount of leniency judges may exercise. The lack of narrowly defined procedures and the allowance for judges to use their discretion in handling individual cases can lead to different outcomes for similar situations. Some judges could be more inclined to keep participants in the program even if they are violating certain terms whereas other judges

may impose a more serious, final punishment. The participants, by definition, have problems with drugs, and perfect conformity to the rules is likely to be a problem, so judicial discretion can matter a lot.

The lack of information about the level of supervision is another limitation associated with this study. Each participant has scheduled meetings with the judge and a court supervisor, but the supervisors are also expected to perform outside evaluations. These can take place at the participants' homes, places of employment, or schools. The data in this study did not include any information regarding either the frequency or extensiveness of those evaluations. These on-site evaluations are one of the various mechanisms for ensuring the participants are upholding their responsibilities to remain in the program. There are bound to be differences across the different jurisdictions in the number and thoroughness of these evaluations.

The random effects regression model to estimate the results for the individual-level data was able to account for the unobserved differences of living in one county compared with another. But the county-level analysis is only able to control for the known variables included in the model. Other variables that change over time are omitted. As a result there are more limitations associated with the county-level data and this must be considered when assessing the results.

Recommendations:

A difficult question for policymakers in many states, including Kentucky, is how to address overcrowded prisons, shrinking budgets, and public safety. Over the last 20

years drug courts have been an example of using community supervision to punish criminal behavior in a less costly manner while maintaining public safety through supervision and a focus on rehabilitation. Scientifically selecting the offenders most likely to complete drug court is the first step in achieving the desired outcome of less future criminal behavior. The findings from this study reveal the particular type of drug may be an indicator of a participant's likelihood to complete or be terminated from the program. The state may want to continue performing similar analysis for the completion results before any consideration is given to adjusting eligibility requirements involving offenders with identified drug problems found in this study to have a higher rate of completion. Although this study produced statistically significant positive findings for opiate and schedule II users, the previously mentioned limitation about the size of the completion sample suggests more analysis is necessary. The results indicate methamphetamine users are less likely to be terminated but there are not significant findings for methamphetamine regarding completion. It is possible there are still a large number of methamphetamine offenders who are still active in the program. Once more of them have a final outcome, I recommend those results should be studied to determine if there is an effect of methamphetamine use on successful completion.

The differences in termination might arise from behavior of participants, decisions of judges, or both. Further research to examine these differences is important for policy in this area. Racial differences in particular need to be understood better.

My final recommendation is to continue pursuing future research to either validate the findings in my study or produce other more rigorously tested results. I believe this can be done by first addressing the limitations I have identified. This would

include collecting more participant-specific data and gathering more observational data on the operations of the different drug court jurisdictions. Once a clearer understanding of drug court results is obtained then research should focus on how drug courts affect recidivism. This is the ultimate outcome where the state and public receive the most benefit.

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