182362

CAREERS IN CRIME AND SUBSTANCE USE

Grant number 98-IJ-CX-0036

FINAL REPORT

April 6, 2000

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ACKNOWLEDGEMENTS

The authors thank Akiva Liberman, John MacDonald, Christy Visher, and Pam Lattimore at NIJ and Jessica Huiras and Kelly Shelton at the University of Minnesota for help throughout the grant period. This research was supported by grant number 98-IJ-CX-0036 from the National Institute of Justice ("Careers in Crime and Substance Abuse"). Of course, sole responsibility for errors and omissions lies with the authors.

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EXECUTIVE SUMMARY

This report summarizes our recent examination of the effects of work on crime and drug use and the effects of drug use on subsequent illegal earnings. We analyze data gathered in the 1970s as part of the National Supported Work Demonstration Project, an experimental study of the effects of employment on criminal offenders, drug addicts, and youth dropouts (ICPSR #7865). Supported Work randomly assigned persons to work in small crews in subsidized employment for up to 18 months. Respondents provided detailed information regarding monthly drug use, criminal activity and employment for up to 36 months. By tracking participants over time within their communities, the program allowed us to examine both the time until recidivism and month-to-month changes in work, crime, and drug use.

Our analysis goes beyond previous evaluations of the program by applying new statistical techniques that yield support for previous findings (Dickinson and Maynard 1981) as well as new evidence on the relationships between work, drugs, and crime. We approached the study of careers in crime and drug use in two distinct stages. First, we used event history analysis to examine the experimental effects of employment on recidivism to drug use and criminal activity. Second, we applied models of within-person change to examine how drug use and other changing life circumstances affect the amount of money that participants earn illegally each month.

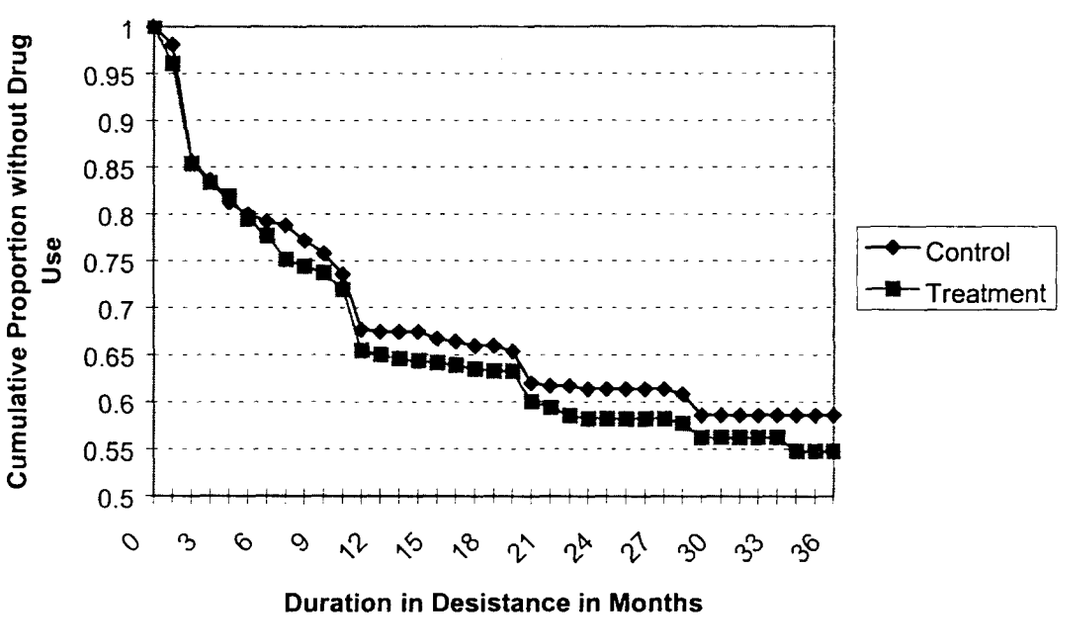
Experiment's Impact on Drug Use and Arrests

To see whether the work program reduced crime or drug use, we first conducted a simple nonparametric event history analysis of the effects of assignment to the work program,

comparing those assigned to the treatment group with those assigned to control status. The observation period ranged from 18 to 36 months, though all respondents were scheduled for 18 months of follow-up interviews. The survival techniques allow us to use all of the available information for each respondent, while making an "apples to apples" comparison of the work treatment and control groups. Figure 1 shows the survival curves for the cumulative proportion of addicts who remained in a state of desistance (did not resume drug use) during the period of observation. We found that:

- *Drug use.* The addicts assigned to the Supported Work treatment group were no more likely to desist from hard drug use (cocaine or heroin) than the control group of addicts. Approximately 65% of the control group survived the 18-month period without returning to hard drug use, while 63% of the treatment group survived, a difference that was not statistically significant.

Figure 1: Time to Drug Use (All Age Groups)

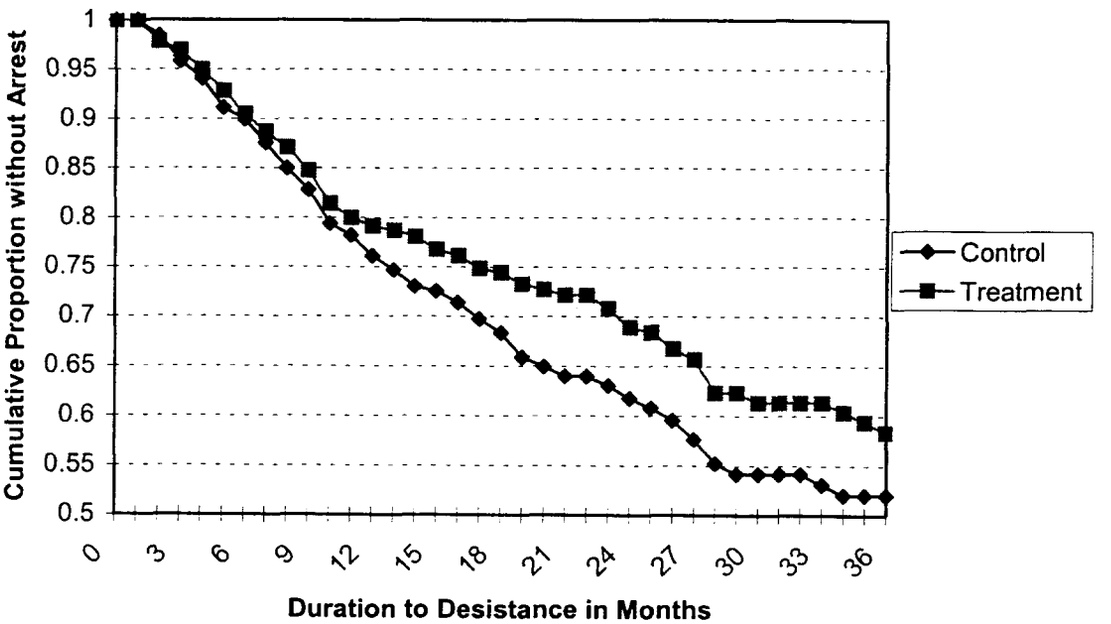


N=1156 Log-Rank Chi-Square=1.01 p=.31 Wilcoxon Chi-Square=0.88 p=.35

While the experiment had little effect on desistance from *drug use* among the addicts, we did find significant program effects for *arrests* among the addict group (see Figure 2).

- *Arrest.* Using survival curves for time to arrest, we found that members of the work treatment group were significantly less likely to be arrested than members of the control group. By the end of the eighteenth month, 66% of the control group survived without arrest, while 73% of the experimental group survived in a state of desistance by this measure. Moreover, this treatment effect appears to increase over the observation period and is statistically significant at the .05 level.

Figure 2: Time to Arrest (All Age Groups)



N=1063 Log-Rank Chi-Square=5.22 p=.022 Wilcoxon Chi-Square=3.95 p=.047

- *Robbery and burglary arrest.* We isolated robbery and burglary arrests because these index offenses reflect serious crime, weeding out arrests for drug possession and other

common offenses. Assigning drug addicts to supported employment treatment significantly reduced the likelihood of arrests for robbery and burglary.

- *Illegal earnings.* Although the experiment did not have a significant *overall* effect on self-reported illegal earnings, it reduced the likelihood of economic crime among *older* ex-addicts (those age 28 and older). Nevertheless, we found little evidence that other effects were age-graded and so we do not separate the remaining results by age group.

These findings are generally consistent with those reported in the initial program evaluation (MDRC 1980; Hollister, Kemper and Maynard 1984). We next examined predictors of recidivism in multivariate models.

Significant Predictors of Crime and Drug Use in Multivariate Models

Employment, of course, is just one of the factors affecting crime and drug use. We therefore examined predictors of the time until drug use, crime, and arrest in a multivariate model based on theories of rational choice, social commitment, and opportunity.

- *Predictors of drug use.* In these models, we measured supported employment as a time-dependent variable to see whether persons were "on the job" when they "fell off the wagon." Even active participation in a Supported Work job, however, failed to affect the rate of drug use. Time-varying factors that did significantly decrease the rate of cocaine or heroin use included holding a regular (non-supported) job, the perceived risk of losing one's job if arrested, and friendship ties to persons who are not involved in deviance. Not surprisingly, the rate of drug use increased when the respondent reported more frequent opportunities to earn money illegally.

- *Predictors of arrest.* For the multivariate analysis of time to arrest, we modeled drug use as a time-varying covariate. Net of the other variables in the model, the rate of arrest among those using cocaine or heroin in the preceding month was about 110% higher than the arrest rate among those not using these drugs. Both Supported Work participants and regularly employed respondents were less likely to be arrested, as were females and older respondents. Persons who perceived frequent illegal opportunities were more likely to be arrested.

We thus concluded that the experimental work treatment was successful in reducing rates of arrest, but not drug use, among ex-addicts. Although Supported Work did not reduce drug use, our multivariate model showed that regular employment, and the perceived risk of losing one's job, were negative predictors of cocaine and heroin use. We found greatest support for the "opportunity" portion of our multivariate model, with deviant friends and frequent illegal opportunities significant predictors of recidivism to both drug use and crime.

Within-Person Analysis of Change in Criminal Careers and Illegal Earnings

After analyzing the predictors of reoffense or desistance, we next investigated the relationship between work, crime, and drug use in the short term. Whereas the event history analysis predicted the presence of illegal earnings, the following models predict the actual amount of money earned illegally. In prior research, it has been difficult to determine whether drug use is an independent cause of crime or simply a surface manifestation of underlying criminal propensities. In our analysis of within-person change, we use pooled cross-sectional time series analysis to model how criminal earnings respond to changes in drug use, legal earnings, and opportunity structure. These models statistically control for all stable characteristics of persons (such as propensities or family background) to better isolate the effects

of current drug use and other variables. In addition to the addict-only sample used in the first half of the project, this analysis also examines ex-offender and disadvantaged youth program groups. Table 1 shows the fixed effects model developed through these analyses. We note that:

- *Drug use.* Use of cocaine or heroin increased illegal earnings in the following month by about $680 (inflation adjusted 1998 dollars), net of the other variables and all other stable characteristics of subjects. Incarceration served to incapacitate offenders, and decreased monthly illegal earnings by approximately $470.
- *Earnings.* Each dollar earned legally reduced illegal earnings in the following month by about seven cents.

Table 1. Fixed Effects Estimates of Monthly Illegal Earnings – Total Sample

	Within-Person Fixed Effects
Drugs and Money	
Cocaine or heroin use	678.23**
	(25.99)
Earned legal income ($)	-.07**
	(.01)
Unearned legal income ($)	-.04
	(.02)
Opportunity Structure	
Incarceration status	-469.20**
	(24.52)
Unemployment rate	25.45**
	(3.99)
Adjusted R^2	.412
Number of observations	77,627

* $p < .05$ ** $p < .01$ (two-tailed tests)

We respecified our models to compare drug effects under varying statistical assumptions (see Table 2). First, we used the natural logarithm of our dollar variables, in order to address the skewed distribution of illegal earnings. Second, we employed a first difference analysis, to address concerns about unobserved factors simultaneously influencing *both* drug use and illegal earnings. Finally, we disaggregated the drug use variable to examine the differential effects of cocaine and heroin. From these specifications in Table 2, we note that:

- *Drug type.* While both types of drug use increase illegal earnings, heroin use has a greater impact than cocaine use.
- *Drug effect.* Under most specifications, drug use (either cocaine or heroin) drives up criminal earnings by at least $400 per month, net of the other variables in the model.

Table 2: Estimated Illegal Earnings Associated with Drug Use

	Logged		Unlogged	
	FE	FD	FE	FD
Cocaine	$603 (181%)	$416 (125%)	$500	$65
Heroin	$769 (231%)	$470 (141%)	$797	$331
Either	$699 (210%)	$446 (134%)	$678	$238

Note: Estimates for the effect of drug use were taken from regression models that included legal earnings, unearned legal income, incarceration, and unemployment rate. Estimates for logged models were computed at mean.
Key: FE = Fixed Effects; FD = First Differences

Discussion

The results of this study demonstrate both the potential and the limitations of employment programs for drug addicts and criminal offenders. By providing a basic work experience to hardcore drug addicts, Supported Work decreased the likelihood of recidivism as

measured by self-reported illegal earnings and arrest. Although the experiment provides the most direct information on experimental work effects, we also note strong time-varying effects of regular (unsubsidized) employment and the community unemployment rate in our analysis. Unfortunately, the work experiment was ineffective in reducing drug use, even during periods of active program participation. These mixed results suggest that employment is an important aspect of efforts to encourage desistance from crime and drug use, but that it is only one component of a successful reintegration strategy.

We also find some evidence for a causal relationship between heroin and cocaine use and illegal earnings in our within-person analysis. Changes in drug consumption appear to directly influence the level of illegal earnings in the following month. The results of this project therefore suggest that the connection between drug use and crime is strong, and perhaps linked by an economic mechanism. We believe that drug use may create an immediate earnings imperative, the need for ready funds to ensure an adequate supply, which increases the motivation to commit economic crimes. Employment programs may be an important factor in breaking the cycle between drug use and crime, in part, because they reduce the economic strain on participants who continue to use drugs.

Recommendations for Future Research and Policy

This research suggests several areas in need of additional research, though we can offer tentative policy recommendations based on current knowledge. First, this analysis must be replicated using more recent official data and urinalysis to validate our findings for self-reported drug use. We suggest a national probability sample of released offenders be followed to determine the predictors of desistance. In addition, pilot experiments providing family support

for addicts and offenders may prove effective, particularly in combination with employment and training services. The present study points to the need for employment programs similar to Supported Work, but with important modifications. Since placing addicts in work crews with other drug offenders may have resulted in unintended negative consequences, we believe that supported employment may be more effective in reducing drug use if addicts worked alongside non-addicts. Further, the strong effects of regular employment and the perceived risk of losing one's job on drug use suggest that effective job placement programs may also reduce recidivism. Finally, the large magnitude of drug effects on illegal earnings – up to $700 per month after controlling for all stable characteristics of respondents – highlights the necessity of keeping offenders drug free and justifies further investment in effective drug treatment programs.

At the most general level, we see a need for research and policy that places greater emphasis on desistance from crime and drug use among identified offenders. Approximately 500,000 individuals emerge from the nation's prisons each year with a high probability of reoffense. We are only beginning to learn about their adult lives and the interventions that may help them to desist from crime. Although this research fails to provide unequivocal support for employment interventions, it suggests their continuing potential in breaking the cycle between drug use and crime.

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INTRODUCTION

Overview of Project

This project examines the effects of work on crime and drug use and the effects of drug use on subsequent illegal earnings. The first stage estimates the experimental effects of employment on desistance from drug use and criminal activity. In the second stage of the research, we apply economic and sociological models of earnings determination to the study of within-person changes in illegal income. We analyze data from the National Supported Work Demonstration Project, a sample of criminal offenders, drug addicts, and disadvantaged youth. Initial evaluation of the Supported Work program showed no significant crime effects for the youth dropout or offender groups (Hollister et al. 1984). Among the addict group, however, the work program reduced arrests but not drug use (Dickinson and Maynard 1981). The current project adds to these evaluations by conducting an event history analysis to identify the time-varying predictors of recidivism and a fixed effects analysis to determine how illegal earnings fluctuate in response to changing levels of employment, drug use, and other factors.

This research has three primary research objectives. First, it seeks to measure the effects of subsidized employment on economic crime, arrests, and drug use. Random assignment of ex-addicts to work and control statuses ensures that measures of work effects are unbiased by selectivity. Event history methodology allows us to treat work as both a fixed and a time-varying status to produce a range of treatment effects. Specifically, we estimate the contemporaneous and lagged effects of program work, regular work, and drug use on self-reported crime and arrest.

The second objective is to isolate the specific mechanisms linking work, crime, and drug use. Is it financial remuneration (Mallar and Thornton 1978), adult social bonds to work and family (Sampson and Laub 1993), or an improved ratio of legal to illegal opportunities (Cloward and Ohlin 1960) that accounts for work effects? Which target groups are most amenable to subsidized employment programs? Our multivariate analysis identifies the predictors of recidivism to crime and drug use. Evidence for these factors is not based on a true experimental design, since independent variables such as obtaining regular employment or the perceived frequency of illegal opportunities are not under the researcher's control. For example, it is difficult to disentangle to impact of job availability, acceptance of jobs, and continuation of jobs. Nevertheless, these results could also inform policy. If regular (unsubsidized) employment affects drug use, for example, this would provide some support for job placement services for ex-addicts.

Finally, the third objective of this research is to explore changes in drug use and crime *within* persons. Since people self-select into employment and other statuses, it if difficult to separate job effects from pre-existing characteristics of workers. We therefore examine fixed effects models of within-person changes in work, crime, and drug use to show how changes in the lives of criminal offenders increase or decrease criminal earnings. Results of the within-person models identify the changing life circumstances that accompany changes in criminal behavior, pointing to potential policy interventions to reduce recidivism.

Program Design and Methodology

The supported work data file. The data to be analyzed, taken from the National Supported Work Demonstration Project, provide perhaps the best experimental information on

employment, crime, and drug use among "ex-addict," "ex-offender," and "youth dropout" populations (ICPSR #7865; Hollister, Kemper, and Maynard 1984). The first phase of our study examines the addict group alone and the second stage of analysis examines all three groups simultaneously. Unlike many employment and training programs, Supported Work successfully recruited socially marginalized or disaffiliated individuals -- particularly chronic hardcore drug users and serious and multiple criminal offenders (Auletta 1982:22; Hollister et al. 1984). Moreover, Supported Work tracked respondents in their communities, rather than recording the retrospective criminal histories of prison inmates (Horney et al. 1995; Wilson and Abrahamse 1992). Though these data have been carefully examined in a number of important articles (e.g. Dickinson and Maynard 1981; Matsueda et al. 1992; Piliavin et al. 1986), this project is the first to analyze the event history data structure and to examine within-person changes in drug use, legal, and illegal earnings.

Program eligibility requirements. To be eligible for Supported Work, members of the ex-offender sample had to have been recently incarcerated, currently unemployed, and employed for no more than three of the preceding six months. Those in the ex-addict group were additionally required to have been enrolled in a drug treatment program within the past six months. Half of the youth dropout participants were required to have an official criminal history. Referrals came from public, private, and nonprofit agencies in addition to walk-ins or self-referrals. Enrollment was based on eligibility requirements designed to ensure that the program targeted those most severely disadvantaged within these groups, who were able to work and were not normally served by employment programs (MDRC 1980). All subjects were randomly assigned to treatment and control conditions. Those in the treatment group were offered subsidized jobs for up to 18 months. Members of both the treatment and the control groups

provided monthly self-reported work, income, crime, and arrest data at nine-month intervals for up to three years.[1]

We explore the first objective of this project within the context of the experimental design of the National Supported Work Demonstration Project. Through this project, subjects were recruited from drug treatment and social service agencies and randomly assigned to treatment and control conditions. Those in the treatment group were offered subsidized jobs for up to 18 months in work crews with six to eight other participants. Members of both the treatment and the control groups provided semi-monthly self-reported work, income, crime, and arrest data at nine-month intervals for up to three years. In analyzing these experimental data, only the addict group was used, although results for the dropout and offender group have been reported elsewhere (e.g., Piliavin and Gartner 1981; Uggen 1999).

In order to analyze within-person changes in illegal earnings, we used semi-monthly self-reports of income, crime, drug use, and other factors in all 3 sample groups. These data allow us to determine the effect of changes in individual statuses on criminal activity. For example, we estimate the effect of legal income on illegal earnings in the following month. Before presenting our results, however, we briefly discuss relevant literature on the relationship between drug use, employment, and criminal activity.

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[1] The program was administered between April 1975 and December 1977 in nine sites: Atlanta, Chicago, Hartford, Jersey City, Newark, New York, Oakland, Philadelphia, and San Francisco. Overall, data were collected for 2,268 offenders (most of whom were referred by parole agencies), 1,394 addicts (most of whom were referred by drug treatment agencies), and 1,204 youth dropouts (referred from social service and educational institutions). Sample selectivity analyses suggest that the loss of observations due to nonresponse or panel attrition is unlikely to threaten internal or external validity for the outcomes considered in this study (Brown 1979). All respondents were tracked for at least 18 months. Subsamples were followed for 27 and 36 month periods. Completion response rates varied from 77% at the 9 month interview to 67% at the 36 month interview.

STATE OF CURRENT KNOWLEDGE – WORK AND RECIDIVISM TO CRIME AND DRUG USE

Previous Studies Based on Supported Work Data

Prior analyses of the Supported Work data have shown that participants in the program were poor, minimally educated, with little connection to the regular labor market, and considerable experience with criminal justice and public assistance agencies. The mean age of participants ranged from 18 years for the youth sample to over 25 years for the ex-offenders (MDRC 1980). The employment program achieved an overall attendance rate (total attendance time divided by the total participant days) of 83% for all target groups, with the highest rate for ex-addicts (83.9%), and the lowest for youths (75.8%) (Hollister, Kemper and Maynard 1984). On average, participants remained employed in a program job for 6.7 months; reasons for leaving included finding another job (28.9%), getting fired (29.6%), and other "neutral" reasons (23.3%)[2] (Hollister, Kemper and Maynard 1984).

The original Supported Work researchers (MDRC 1980) suggested that the program was generally successful in meeting short-term objectives of increasing employment and earnings, reducing welfare dependency, and producing useful goods and services. Long-term success, however, was mixed. The ex-offender group seemed to benefit from supported work while in the program -- they worked more hours and earned more dollars than the controls -- but these results did not persist once they left the program. The program was not effective in increasing employment or reducing the welfare receipt, drug use, or criminal activities of the ex-offender

[2] This figure includes "mandatory graduations," which were departures that occurred when Supported Workers reached the maximum allowable length of stay in the program without having found postprogram employment. Other neutral departures included such things as death and resignations for personal or family health problems.

group over the long-term. The program researchers do note a possible success in terms of drug use and crime for older ex-offenders, although they advise caution for this result since there were not similar findings for the total sample (MDRC 1980:133). Uggen (2000) notes that for respondents with an official arrest history, age interacts with employment to affect the rate of recidivism; offenders aged 27 or older are less likely to report crime and arrest when provided with a Supported Work job. Supported Work had little effect on the employment of members of the youth group beyond the period in which they participated in the program, and no noticeable effect on drug use. There is some indication that the program led to a reduction in the youth-related criminal activities, although there is no clear consistent pattern.

Supported work appeared to affect the employment and criminal activities of the ex-addict group, but failed to have an impact on their drug use. Some analyses showed that employment increased significantly during the time in which the ex-addicts participated in the program and, for the subset of the sample followed the full 36 months, also in the last months of the study (48.8% for experimentals compared to 31.6% for controls in months 34-36). Employment in supported work also led to a consistent reduction in arrest for ex-addicts over the study period; these were particularly concentrated in the first 18 months and in robbery and drug-related crimes (MDRC 1980). In contrast to the current research, however, these initial investigations did not consider the timing of recidivism or the changing effects of employment and other statuses in a multivariate event history model.

The total cost of the Supported Work Demonstration's 5-year research effort was $82.4 million (MDRC 1980). To estimate the program's ultimate societal benefit, Kemper, Long, and Thornton's (1984) cost-benefit analysis of the project indicates a yearly cost per participant of about $8,100 (in 1976 dollars). In comparison, they note benefits from program output, taxes,

reduction in transfers, and reduced crime to be approximately $5,000, meaning that measured benefits fell short of costs by about $3,100 (Kemper, Long, and Thornton 1984:251). Once future benefits and costs are extrapolated, these researchers indicate that the net value per participant is only positive for the ex-addict group. We therefore focus many of our analyses on this sample. While Kemper, Long and Thornton's cost-benefit analysis did take into account the national *average* per-victimization costs of personal injury, property damage, and stolen property offenses, they did not consider the direct social harm associated with illegal earnings.

More recent studies using these data have uncovered additional aspects of the project. For example, Piliavin et al.'s (1986) analysis of Supported Work data found evidence to support the opportunity and reward component of the rational-choice model of crime, but failed to find evidence for the risk component. Matsueda et al. (1992) showed how the prestige accorded different types of deviant work affected criminal behavior. Uggen (1999) examined the offender subgroup to show how the quality of employment affected the likelihood of recidivism. To date, however, no study has examined how changing patterns of drug use and employment affect criminal behavior.

Other Empirical Findings

Today we have solid empirical evidence that regular and frequent use of heroin and cocaine is positively associated with property crime (Needle and Mills 1994; Fagan 1994) and negatively associated with employment (USDHHS 1994, Kandel and Davies 1990).[3] We still know very little, however, about the causal ordering of these phenomena as they unfold over

[3] See Kaestner 1994 and Kandel, Chen, and Gill 1995 for discussions of the labor market effects of less frequent or "casual" use of marijuana and cocaine.

time. These relationships are poorly understood in part because of selectivity problems and in part because of data limitations. Since people self-select into employment, it is typically difficult to disentangle employment effects from pre-existing characteristics of workers. Moreover, drug use is so intimately connected to other criminal activity that standard statistical techniques are incapable of establishing the causal ordering of the phenomena (see Akers 1992:64-70; Faupel and Klockars 1987; White, Pandina, and Lagrange 1987). Constrained by these difficulties, researchers have come to conflicting conclusions. Some investigations suggest that unemployment causes drug use (Currie 1993, Vaillant 1988, Peck and Plant 1986), while others argue that drug use causes unemployment (Kandel and Yamaguchi 1987; Kandel and Davies 1990; Hartnagel and Krahn 1989).

Our Theoretical Approach

This research attempts to disentangle these phenomena by investigation desistance rather than etiology and experimental rather than survey data. A desistance analysis is less concerned with why people use drugs or commit crime than with the positive interventions that promote cessation from these behaviors (Uggen and Piliavin 1998). Although etiological studies are invaluable for testing theory, their implications often suggest interventions that are unworkable for public policy. Neither the researcher nor the state has the ethical or constitutional license to alter, say, the personality, parental background, neighborhood, or associates of youth identified as "at risk" or "predelinquent" (Glueck and Glueck 1972) who have yet to violate the law. Although these concerns do not disappear in desistance programs, desistance strategies are better able to concentrate resources on a specific target group that is likely to benefit from them. Prevention programs, in contrast, must cast a much wider net that is liable to include many non-

users and non-offenders. Programs designed to encourage desistance among "hardcore" users or "career criminals" may therefore offer a greater return to investments in treatment and employment and training (ONDCP 1995:20).

Why focus on work as an explanatory variable? Work is important for policy analysis because it is so clearly *manipulable*. In fact, the provision of employment is one of rather few policy instruments at the government's disposal. For example, it is a much simpler matter to assign individuals to varying work statuses than to assign them to different family backgrounds. Therefore, employment may be a viable adjunct to other forms of treatment for drug-involved offenders or an important treatment modality in itself. Unfortunately, experimental work programs have had small and uneven effects in reducing drug use (Dickinson and Maynard 1981) and criminal recidivism (Piliavin and Gartner 1981; Uggen, Piliavin, and Matsueda forthcoming; but see Lattimore, Witte, and Baker 1989). Nevertheless, this apparent failure may be an artifact of particular evaluation designs and analytic techniques that are insensitive to the timing of work and offending (Uggen 1995).

ANALYTIC STRATEGY – WORK AND RECIDIVISM TO CRIME AND DRUG USE

We first test simple hypotheses about work, drug use, and crime using survival curves and tests of equality based upon life tables. This approach answers primary research questions without imposing a great amount of structure on the data or making untenable assumptions: Do jobs encourage desistance? For whom? We then estimate a multivariate model of choice, commitment, and opportunity, based on theories of rational choice (Piliavin et al. 1986), adult social bonds (Sampson and Laub 1990), and differential opportunity (Cloward and Ohlin 1960).

This elaborates the nonparametric results by gauging the relative importance of the various mechanisms thought to link work and crime.

Under the broad heading of *rational choice*, we include indicators such as work history, prior crime and arrests, the unemployment rate, perceived risk of prison, and monthly income. *Social commitment* is measured by whether respondents are living with a spouse, living with a parent, having one or more children, along with the perceived risk of losing one's spouse or job if caught. Finally, *opportunity* is indicated by whether the respondent's best friend is "straight" (not engaged in deviance) and working, along with the perceived frequency of illegal opportunities, the perceived ability to earn more illegally than legally, and the pay discrepancy between legitimate and illegitimate employment. We view each of these components as complementary rather than competing in our model. Our partitioning of the variables into these categories is helpful in highlighting each set of factors, but is not intended as a test of competing hypotheses.

The first goal of our research is to obtain unbiased estimates of work effects on drug use. To this end, the analysis distinguishes between the effects of assignment to Supported Work and active participation in the experiment. *Assignment effects* are the more conservative estimate because: (1) they count among the treatment group those who were assigned but never worked in the program; and, (2) assignment is a fixed status that follows the respondent throughout the observation period. He or she therefore remains "assigned" to the treatment group in post-program follow-up interviews. *Participation effects* measure the impact of current or contemporaneous employment. The participation analysis asks whether subjects were working *during* the period immediately preceding their resumption of crime or drug use. That is, were subjects on the job when they fell off the wagon? In contrast to assignment, participation is not

exogenously determined by the research design; those assigned to the treatment condition may or may not have opted to work in a program job. Since this element of choice or selectivity may bias participation effects upwards, we adjust participation estimates with time-varying terms for having left Supported Work, for entering regular unsubsidized employment, and for school participation.

Methods – event history analysis. Event history analyses are especially well-suited to investigations of recidivism or desistance from crime or substance use. These continuous-time methods utilize more information on both the independent and dependent variables than standard regression analysis (Allison 1984). In a study of work, crime, and drug use, a properly specified event history model is sensitive to both the duration that persons spend in a given state and changes in their work statuses over time. For the purposes of this project, event history analysis: (1) increases the precision of estimates of work effects; (2) aids in determining the temporal order of work, crime, and drug use; (3) provides an appropriate model of censored cases (those who never left the state of desistance) over varying observation periods; and, (4) allows work participation to be modeled as a time-varying rather than a fixed explanatory factor. The net effect of these advantages is to provide estimates of work effects that are sensitive to the timing of work and criminal behavior.

To identify sources of variation in the timing of criminal behavior, we estimate Cox's proportional hazard model (Cox 1972). In this model, the dependent variable is the natural logarithm of the hazard of entering a period of criminal activity or substance use defined as an instantaneous probability. The Cox model does not require the selection of a particular distribution for survival times. This is because Cox's estimation method maximizes a *partial* likelihood that leaves the baseline hazard unspecified. We estimate models of the form

$$\log h_i(t) = \alpha_0(t) + \beta_1 X_{i1} + \beta_2 X_{i2}(t) + \ldots \beta_k X_{ik}$$

where $\alpha_0(t)$ represents the natural logarithm of the unspecified baseline hazard function at time *t*; $\mathbf{X}_1$ represents fixed explanatory variables; β_1 represents the effects of these variables; $\mathbf{X}_2$ represents time-dependent explanatory variables; and, β_2 represents the effects of these variables. Cox's proportional hazards model assumes that for any two persons, the ratio of their hazards is a constant that does not vary with time. This implies that covariates raise or lower individual hazard rates by a constant multiple at all time points. Under this specification, employment is therefore assumed to have a uniform effect on crime and arrest.[4]

Event history techniques are predicated on accurately modeling patterns of time dependence in the change process (see, e.g., Tuma and Hannan 1984; Allison 1984; Yamaguchi 1991). In experimental studies, the time origin is best specified as the time of randomized assignment. This allows for calculation of risk differentials across experimental and control conditions that become operative when the treatment begins. Randomization ensures that the distribution of other time origins is approximately equal across the two groups. In assessing dynamic relationships, it is often difficult to distinguish between self-selection and causation (Kandel and Yamaguchi 1987:836). The experimental design of the Supported Work demonstration provides some protection against the related problems of omitted variable bias and unobserved heterogeneity. Since the assignment to supported employment is determined by an exogenous process (random assignment), individuals do not "self-select" into this state. To assure the temporal ordering of work and crime in this investigation we also lag the effects of employment status by two weeks (so that employment at time *t* predicts crime at time *t + 2 weeks*).

FINDINGS – WORK AND RECIDIVISM TO DRUG USE

For the drug analysis, the dependent variables include self-reported cocaine and heroin use. How reliable are the drug use data? Since no official records exist for drug use and participants were not tested during the program, a reverse record check of these data is impossible. Nevertheless, Dickinson (1979) compared addicts' reported use for identical periods across interviews and discovered "no evidence that reported use during any 9-month period was differentially reported by experimentals and controls" (1981:19). Anglin, Hser and Chou (1993) analyzed the reliability and validity of self-reported retrospective drug use among a sample of narcotics addicts, using a test-retest design with urinalyses reliability checks. These researchers characterize self-reports of recent narcotics use as "reasonably good" and report rates of congruence for urinalysis and self-reported narcotics use between 74 and 86% (Anglin, Hser and Chou 1993:104). More recently, the Arrestee Drug Abuse Monitoring program reports concordance rates of over 90% for self-reported and urinalysis data (Taylor and Bennett 1999). We thus conclude that self-reported drug use data are reasonably reliable and valid, but acknowledge the need for replication of these findings with modern techniques for verifying substance use.

Non-parametric survival analysis. The survival curves for the four dependent variables, hard drug use (cocaine and/or heroin), illegal earnings, any arrests, and arrests for robbery or burglary are presented in Figures 1-5. The survival curves show the cumulative proportion of addicts who remained in a state of desistance during the observation period. All Supported Work

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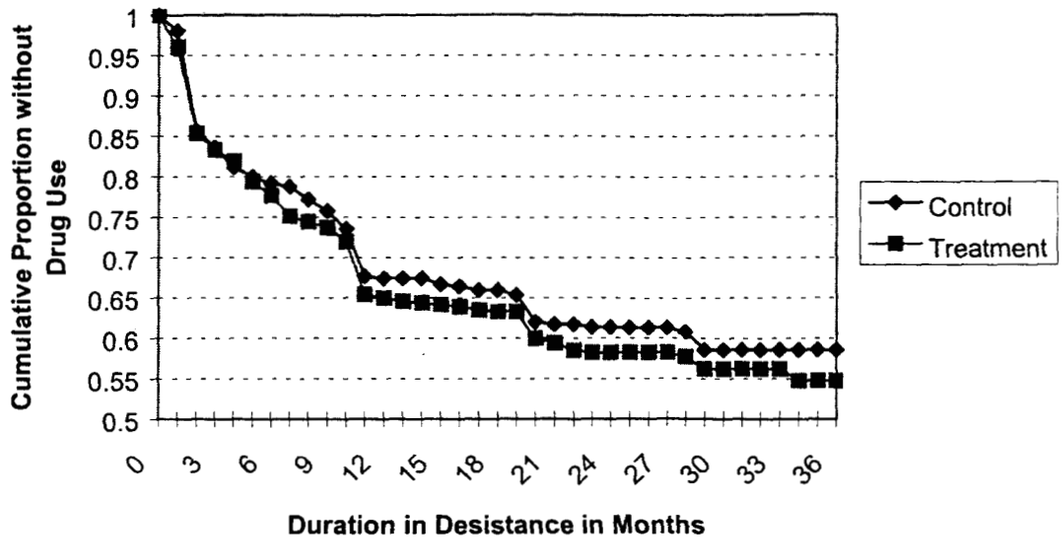
[4] When we relax this assumption by estimating piecewise models, we find that employment effects are strongest in the earliest months of program participation.

subjects were scheduled for 18 months of follow-up interviews. Although some participants were observed for up to 36 months, the survival techniques allow us to analyze all of the available data for each subject. The survival analyses are stratified by experimental status, and the chi-square test of significance tests the equality of survival curves over the experimental and control strata. For example, Figure 1 shows that assignment to Supported Work treatment does not affect desistance from cocaine and heroin use. Approximately 65% of the control group survived eighteen months without hard drug use, while 63% of the treatment group survived. More tellingly, the treatment and control curves are almost indistinguishable during the first six months of the experiment. Since participation in the program was at its highest in this period, the failure to observe treatment effects here is discouraging. The chi-square tests for homogeneity over the treatment and control groups are not significant, and thus, the addicts assigned to the treatment group are no more likely to remain in a state of desistance from hard drug use than the control group of addicts.

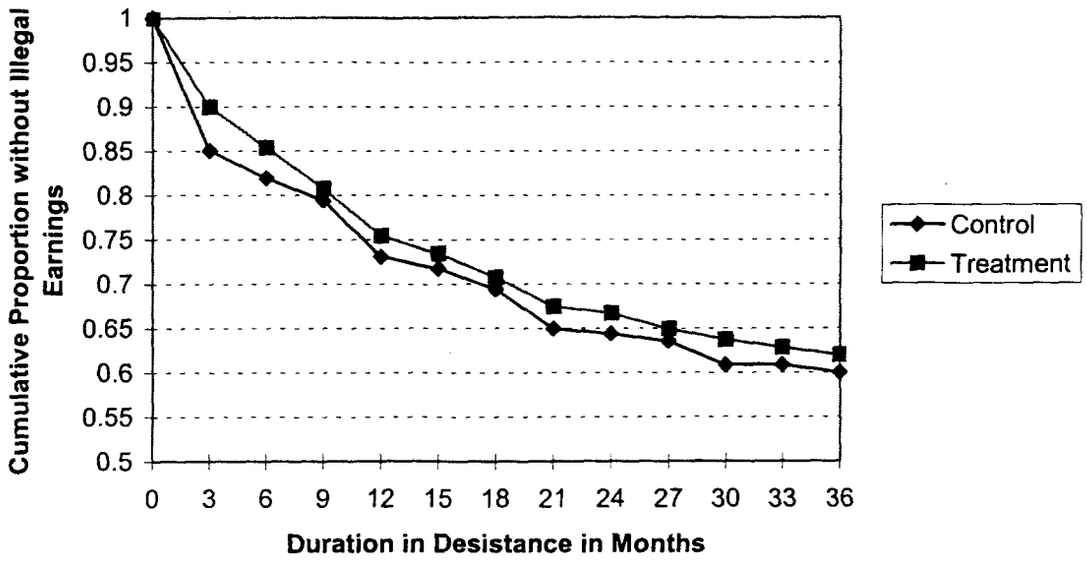
Figure 1: Time to Drug Use (All Age Groups)



N=1156 Log-Rank Chi-Square=1.01 p=.31 Wilcoxon Chi-Square=0.88 p=.35

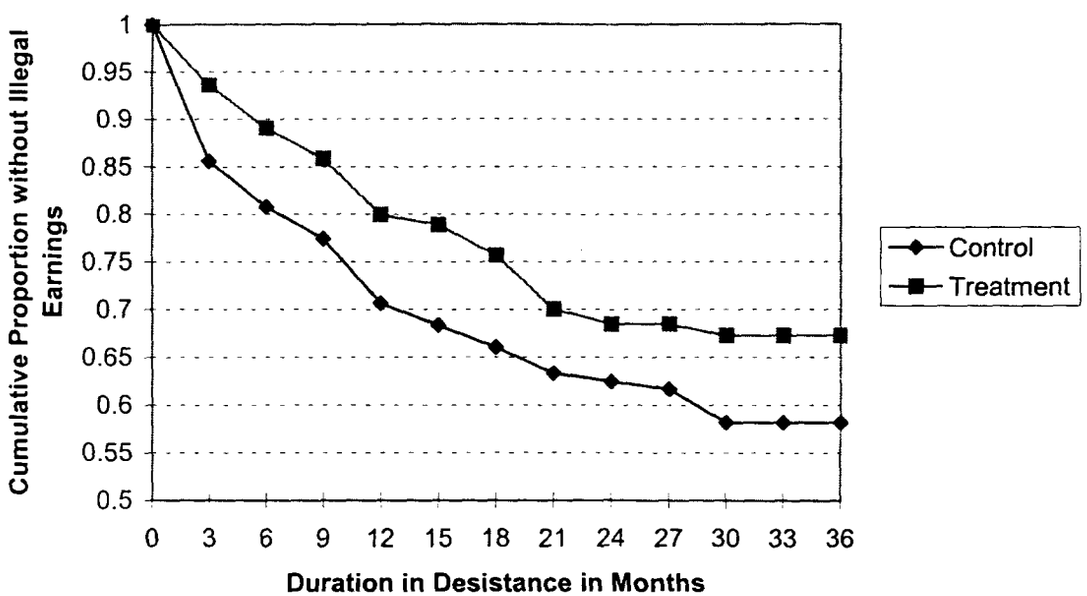
Figure 2 shows the survival curves for time to illegal earnings for experimental and control subjects. Overall, 81% of the experimental subjects survived the first nine months without illegal earnings, while 79% of the control subjects survived. We find a differential of approximately 5% during the first six months of the experiment that dissipates over time. Although the experimental group has a slightly higher rate of survival, the chi-square tests of homogeneity are not significant. Figure 3, however, presents a different picture. The experimental group for addicts aged 28 and over has a consistently higher rate of survival than the control group for illegal earnings. Thus, the older addicts who were assigned to the experimental status are significantly more likely to remain in a state of desistance from illegal earnings than the older addicts in the control group. This analysis suggests an age-graded work effect on illegal earnings, though we failed to identify similar age-by-work interactions with the other dependent variables.

Figure 2: Time to Illegal Earnings (All Age Groups)



N=1156 Log-Rank Chi-Square=0.69 p=.41 Wilcoxon Chi-Square=1.23 p=.27

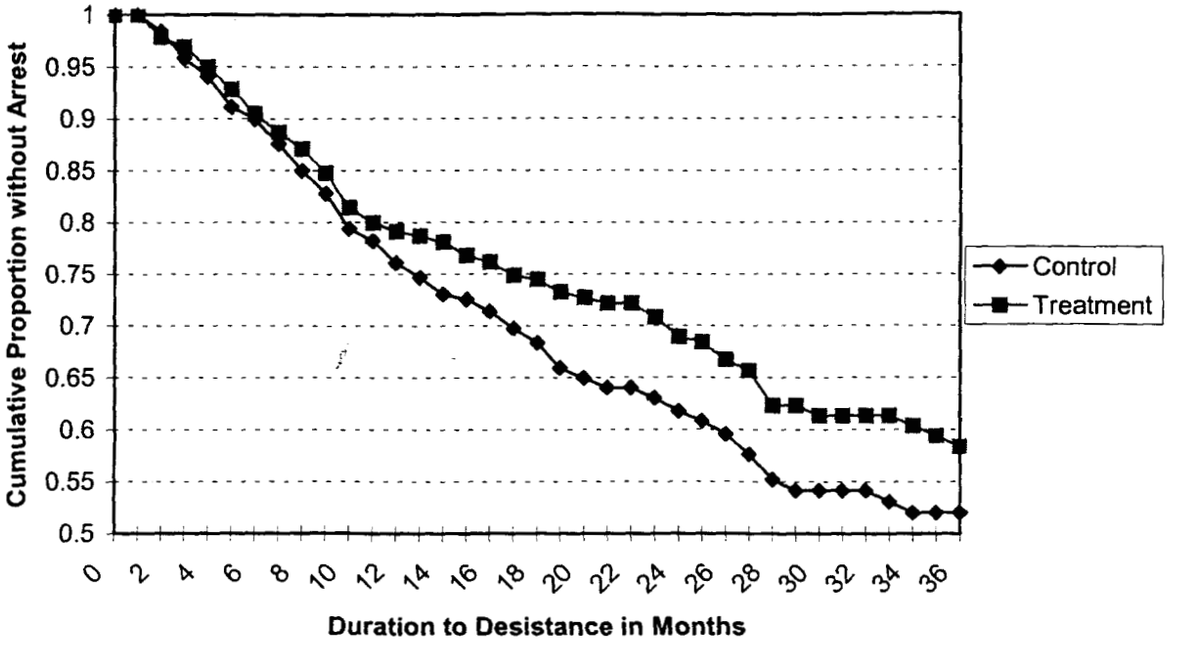
Figure 3: Time to Illegal Earnings (Age 28 and Over)



N=427 Log-Rank Chi-Square=3.94 p=.047 Wilcoxon Chi-Square=4.84 p=.0279

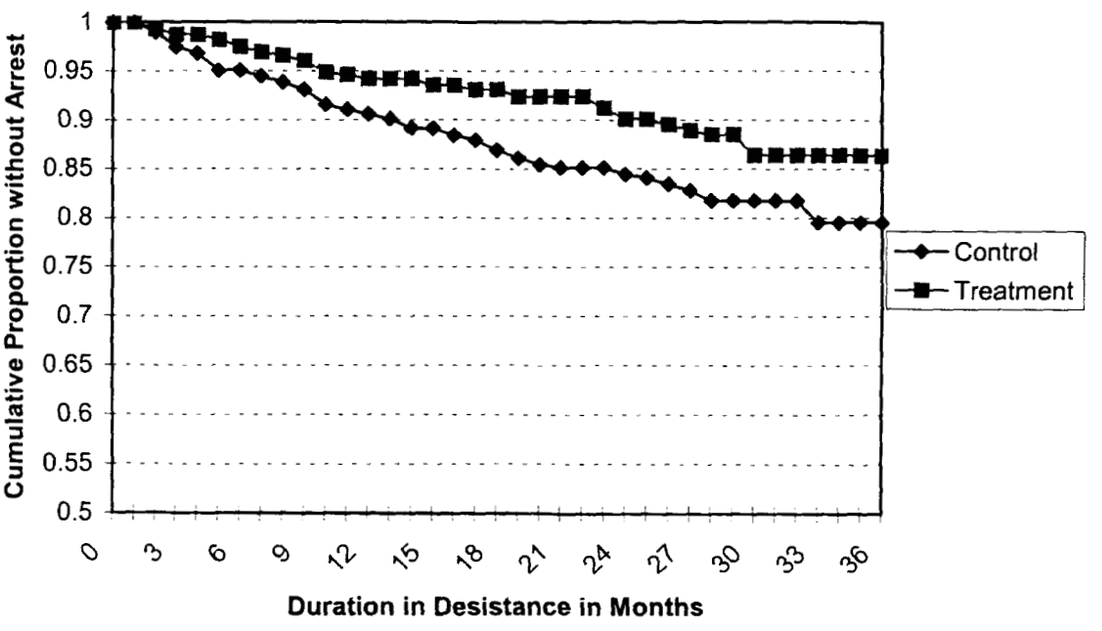
In contrast to the overall results for illegal earnings, the experiment has a statistically significant overall effect on any arrests and arrests for robbery or burglary. Figure 4 shows the survival curves for time to arrest. The curves begin to diverge at about the 9-month mark and the treatment differential widens thereafter. By the end of the eighteenth month, 66% of the control group survived without arrest, while 73% of the experimental group survived in a state of desistance by this measure. The chi-square tests for homogeneity over the two strata are statistically significant at the .05 level; the experimental group is significantly less likely to be arrested than the control group. The same relationship holds for arrests for robbery or burglary, as shown in Figure 5. While 86% of the control group survived through eighteen months, 96% of the experimentals had yet to be arrested for robbery or burglary at this point. This differential is evident almost immediately after program assignment and continues for the entire observation period. The difference in the survival rate is significant at the .01 level of significance. Thus, assigning drug addicts to supported employment treatment significantly reduces the likelihood of arrests for robbery and burglary.

Figure 4: Time to Arrest (All Age Groups)



N=1063 Log-Rank Chi-Square=5.22 p=.022 Wilcoxon Chi-Square=3.95 p=.047

Figure 5: Time to Arrest for Robbery or Burglary (All Ages)



N=1063 Log-Rank Chi-Square=9.12 p=.003 Wilcoxon Chi-Square=9.17 p=.003

Multivariate event-history analysis. The next set of results shows other predictors of crime and drug use and models the effect of *participation* in the Supported Work treatment. Because of the randomized design, inferences made in the preceding non-parametric analyses of assignment to Supported Work should inspire greater confidence than inferences made from an otherwise equivalent nonexperimental analysis. However, estimating experimental effects is much more difficult in longitudinal designs than in static designs. Specifically, participation effects are contaminated over time as individuals leave Supported Work employment. During the course of the observation period, criminal propensity or some other factor strongly associated with crime may be associated with attrition. If crime-prone individuals are more likely to abandon their treatment jobs, the pool of "job leavers" will be increasingly comprised of crime-prone persons. Correspondingly, the pool of "job stayers" will be increasingly comprised of less crime-prone individuals. As a result of these selection processes, estimates of the effect of participation in the work program on crime may be biased upward. Therefore, we adjust estimates of participation effects by introducing a time-varying term for having left Supported Work, which captures the status of "job leaving" as a time-varying explanatory variable. Since some of the "job leavers" left the program for better jobs or educational opportunities outside of the program, we further adjust participation effects by including time-varying terms for regular full-time employment and school participation.

A Multivariate Participation Model of Choice, Commitment, and Opportunity. Tables 1 through 4 show results for our full multivariate models of choice, commitment, and opportunity for the four dependent variables. The tables are arranged around five blocks of related variables: (1) time-varying factors for participation in a Supported Work program job, regular work, and school; (2) a time-varying term for cocaine and/or heroin use and a

dichotomous term for having ever used heroin; (3) background characteristics and rational choice indicators; (4) informal social controls in the form of work and family commitments; and, (5) perceived legitimate and illegitimate opportunities. We began with a bivariate model of participation in a Supported Work program job and the dependent variable and then consecutively adding the choice, control and opportunity factors. The full final models are presented for each outcome, although we also show chi-square values for the improvement in fit when each set of variables is added successively.

Drug use. The first table shows results from an event history model predicting the time until self-reported illicit hard drug use. The dependent variable in this model is the hazard of entering a period of cocaine or heroin use. While participation in an experimental Supported Work program job does not have a significant effect in this model, working at a regular job has a significantly negative effect on the hazard for hard drug use. Working at a regular (non-program) job decreases the hazard for illicit drug use by 48% ($1 - e^{-.653}$).

Table 1: Multivariate Model of Time to Cocaine or Heroin Use

Variable	Parameter Estimate	Standard Error	1-Risk Ratio	Model χ^2 (d.f.)[a]
Participation in SWP Job[T]	-0.063	0.158	-6.1%	
Left Program Job[T]	0.116	0.147	12.3%	
In Regular Job[T]	-0.653***	0.238	-47.9%	
In School[T]	-0.152	0.311	-14.1%	
Ever Used Heroin	0.883**	0.364	141.9%	
Age	0.009	0.010	0.9%	
Male	0.043	0.167	4.4%	
White (v. Black)	-0.144	0.183	-13.4%	
Hispanic (v. Black)	0.105	0.218	11.1%	
Early Program Cohort	-0.421***	0.145	-34.4%	
Education (years)	0.035	0.035	3.5%	
Longest Job (years)	-0.000	0.003	0.0%	
Prior Crime for Money	0.076	0.173	7.9%	
Prior Arrests (tens)	-0.051	0.059	4.9%	
Unemployment Rate[T]	-0.036	0.024	-3.5%	
Risk of Prison[T]	0.018	0.042	1.8%	
Monthly Income[T] ($100s)	-0.068	0.249	-6.5%	40.53 (20)[+++]
Living with Spouse/Partner[T]	0.134	0.156	14.3%	
Living with Parent[T]	0.142	0.139	15.3%	
Children	-0.215	0.153	-19.3%	
Risk of Losing Partner[T]	0.033	0.036	3.3%	
Risk of Losing Job[T]	-0.087**	0.043	-8.4%	47.96 (24)
Best Friend Straight[T]	-0.587***	0.135	-44.4%	
Best Friend Working[T]	-0.025	0.134	-2.5%	
Illegal Opportunity[T]	0.101**	0.051	10.7%	
Higher Street Earnings[T]	0.179	0.129	19.6%	
Pay Discrepancy[T] ($100s)	0.001	0.001	0.1%	81.22 (29)[+++]
Number of Cases 1023				

* p<.10 ** p<.05 *** p<.01 ****p<.001

[++] improvement in fit over previous model is significant at .05 level

[+++] improvement in fit over previous model is significant at .01 level

[T]=Time-varying explanatory variable

[a] =Includes dichotomous indicators for missing data

Not surprisingly, heroin use prior to the experiment dramatically increases the risk of using hard drugs by 142%. None of the background factors are significant predictors, though addicts in the early program cohort are significantly less likely to recidivate into hard drug use. Males are only slightly more likely to use drugs, and age is a positive though non-significant predictor.[5] Net of the other variables, the only rational choice or informal social control predictor that significantly affects the hazard for hard drug use is the risk of losing one's job and the inclusion of the five "commitment" predictors fails to improve the overall fit of the basic model. Adding the five opportunity variables, however, significantly improves the fit over the previous choice and commitment model. Having a straight best friend reduces the rate of hard drug use and perceiving more illegal moneymaking opportunities increases it.

In sum, the data partially support the hypothesis that work decreases the hazard of drug use, albeit not through the Supported Work program jobs. Addicts who worked in jobs outside the program were significantly less likely to recidivate into drug use. Addicts in the early program cohorts were much less likely to use hard drugs during the observation period. Consistent with informal social control arguments, addicts who believed they would lose their jobs if imprisoned are significantly less likely to recidivate into hard drug use. Consistent with the differential opportunity portion of the model, a lack of illegal opportunities and the presence of a noncriminal best friend also inhibits drug use.

Illegal earnings. The event history model predicting the hazard for illegal earnings is important in that it predicts self-reported rather than official property crime. Table 2 presents the model predicting the time until a period of illegal earnings (below we analyze the *amount* of money earned illegally). Here, neither participation in Supported Work program jobs nor regular

[5] We considered alternative age specifications (cf. Uggen 2000), but retain a simple linear age term in these models.

jobs significantly affects entry into illegal earnings. However, participation in a program job is a significant negative predictor of the hazard for illegal earnings for addicts aged 28 and older (analysis not shown). Although the effect for school attendance is large in magnitude, it is not statistically significant because few addicts were attending school. Thus, the data fail to support the hypothesis that jobs will keep addicts in a state of desistance from illegal earnings, net of the choice, commitment, and opportunity factors.

Illicit drug use, measured as a time-varying dependent variable, is a strong, positive predictor of the hazard of illegal earnings. Younger and male respondents are more likely to make money illegally. Our analysis of the amount of illegal earnings below will elaborate this relationship. While the choice factors are not significant under this specification, prior criminality significantly predicts the hazard of illegal earnings. Addicts who have engaged in prior money crimes have a hazard of illegal earnings that is more than double the rate for those who have not engaged in prior money crimes. Likewise, prior arrests increase the hazard of illegal earnings.

Table 2: Multivariate Model of Time to Illegal Earnings

Variable	Parameter Estimate	Standard Error	1-Risk Ratio	Model χ^2 (d.f.)[a]
Participation in SWP Job[T]	-0.217	0.144	-19.5%	
Left Program Job[T]	0.063	0.137	6.5%	
In Regular Job[T]	-0.094	0.183	-9.0%	
In School[T]	-0.451	0.326	-36.3%	
Cocaine/Heroin Use[T]	0.913***	0.150	149.3%	
Ever Used Heroin	0.036	0.273	3.6%	
Age	-0.028***	0.011	-2.8%	
Male	0.534***	0.190	70.5%	
White (v. Black)	0.100	0.165	10.5%	
Hispanic (v. Black)	-0.383*	0.232	-31.8%	
Early Program Cohort	-0.190	0.135	-17.3%	
Education (years)	0.025	0.034	2.5%	
Longest Job (years)	-0.002	0.003	-0.2%	
Prior Crime for Money	0.749***	0.224	111.5%	
Prior Arrests (tens)	0.088*	0.048	9.2%	
Unemployment Rate[T]	0.002	0.024	0.2%	
Risk of Prison[T]	-0.055	0.042	-5.4%	
Monthly Income[T] ($100s)	0.227	0.203	25.4%	135.64 (21)[+++]
Living with Spouse/Partner[T]	0.124	0.157	13.1%	
Living with Parent[T]	-0.222*	0.139	-19.0%	
Children	-0.268*	0.164	-24.9%	
Risk of Losing Partner[T]	-0.002	0.036	-0.2%	
Risk of Losing Job[T]	0.056	0.046	5.8%	137.38 (26)
Best Friend Straight[T]	-0.339**	0.132	-28.7%	
Best Friend Working[T]	-0.152	0.130	-14.1%	
Illegal Opportunity[T]	0.159***	0.052	17.2%	
Higher Street Earnings[T]	0.253*	0.132	28.8%	
Pay Discrepancy[T] ($100s)	0.001	0.001	0.1%	158.39 (31)[+++]
Number of Cases	1072			

* p<.10 ** p<.05 *** p<.01 ****p<.001

[++] improvement in fit over previous model is significant at .05 level

[+++] improvement in fit over previous model is significant at .01 level

[T]=Time-varying explanatory variable

[a] =Includes dichotomous indicators for missing data

Although the informal social control indicators fail to improve the overall fit of the model, two of the five factors are marginally significant. Addicts who lived with a parent or who had children were marginally less likely to leave a state of desistance from illegal earnings. Respondents who lived with a parent or who had children are 19% and 25%, respectively, less likely to recidivate into illegal earnings. Parallelling the drug use results, the illegal opportunities and friendship patterns also predict the hazard of illegal earnings. Addicts with a "straight" best friend have a significantly lower hazard of illegal earnings; having a straight best friend reduces the hazard for entering into illegal earnings by nearly 29%. Perceived illegal money making opportunities significantly increase the hazard for illegal earnings. Additionally, the stated ability to earn more money on the "street" than in a straight job increases the hazard of illegal earnings by 29%.

For self-reported measures of economic crimes, informal social control and structural opportunity factors appear to be more salient in predicting addicts' desistance than either the experimental job or an outside job. The data also show that criminal esperience or "criminal capital" measures,[6] such as prior crimes for money and prior arrests, are strong predictors of self-reported recidivism into illegal earnings. Moreover, illicit hard drug use is a significant predictor of criminal recidivism for addicts.

Arrest. Table 3 shows the effects of our basic model on arrest. Even after the inclusion of the other covariates, participation in a Supported Work program job reduces the rate of arrest by 58%. Working in a regular job and attending school also has strong and significant negative effects

[6] Similar to those employed legitimately, criminal offenders learn technical skills, values, and attitudes, receiving informal tutelage that may translate into increased illicit earnings (Sutherland 1937; Hagan and McCarthy 1997). Through maturation and the accumulation of "criminal capital" (Hagan and McCarthy 1997; Matsueda and Heimer 1997; Grogger 1998), offenders learn more efficient or effective means of obtaining money illegally.

on the hazard for arrest. The significant effect of program employment is noteworthy since it failed to alter the hazard for illegal earnings and drug use (shown in Table 1 and Table 2). If supported employed has no effect on criminal activity, yet reduces likelihood of arrest, does the program insulate its participants from criminal justice enforcement? We return to this issue below in our discussion.

The large magnitude of the effect of illicit hard drug use is also interesting to note in Table 3. While the dichotomous variable for having ever used heroin is nonsignificant, the time-varying effect of cocaine and/or heroin use is a significant positive predictor for the hazard for arrest. Addicts who used heroin and/or cocaine in the prior month are 110% more likely to be arrested. Not surprisingly, age significantly reduces the rate of arrest, while males are significantly more likely (179% more likely) to be arrested.

The choice indicators are inconsistent. While the human capital measures of education and work experience have no significant effect on the hazard for arrest, the criminal capital factor of prior arrest is significantly positive. Contrary to the predictions of a pure economic model, monthly income has a significant, positive effect on the hazard for arrest, net of other employment indicators.

Curiously, none of the five measures for informal social control are significant, and contrary to predictions, the parameter estimates are all positive. We caution that the three measures of living with family members (spouse, partner, or parents) and the presence of children do not measure the strength or quality of the family relationships, as control theories dictate, nor do they measure the partner's or parent's criminality, as differential association theories dictate. The perceived personal risk indicators are more salient to informal social control arguments. These indicators tap the risk of losing one's spouse or partner if imprisoned, and the risk of losing one's job if imprisoned.

Again, contrary to social control theory predictions, the risk of losing one's spouse or job has little effect on the hazard for arrest, net of the other variables in the model.

The differential opportunity factors have uneven effects on arrest, although addicts who perceive more frequent illegal moneymaking opportunities are significantly more likely to be arrested. The most salient predictors of arrest are those measuring addicts' conforming behavior, such as working in a program job, working in a regular job, and attending school, as well as age, sex, and the time-varying hard drug use variable. Thus, addicts who are working or in school are likely to avoid arrest, while those who continue to use hard drugs are more likely to be arrested.

Table 3: Multivariate Model of Time to Arrest

Variable	Parameter Estimate	Standard Error	1-Risk Ratio	Model χ^2 (d.f.)[a]
Participation in SWP Job[T]	-0.858***	0.190	-57.6%	
Left Program Job[T]	0.071	0.132	7.4%	
In Regular Job[T]	-1.28***	0.221	-72.1%	
In School[T]	-0.686*	0.386	-49.7%	
Cocaine/Heroin Use[T]	0.743***	0.150	110.1%	
Ever Used Heroin	0.086	0.265	9.0%	
Age	-0.029***	0.011	-2.9%	
Male	1.03***	0.222	178.8%	
White (v. Black)	-0.032	0.169	-3.1%	
Hispanic (v. Black)	-0.038	0.216	-3.7%	
Early Program Cohort	-0.143	0.149	-13.3%	
Education (years)	0.005	0.035	0.5%	
Longest Job (years)	-0.002	0.003	-0.2%	
Prior Crime for Money	0.259	0.187	29.5%	
Prior Arrests (tens)	0.167***	0.050	18.1%	
Unemployment Rate[T]	0.020	0.024	2.0%	
Risk of Prison[T]	-0.054	0.045	-5.6%	
Monthly Income[T] ($100s)	0.399**	0.197	49.0%	211.67 (21)[+++]
Living with Spouse/Partner[T]	0.043	0.168	4.4%	
Living with Parent[T]	0.191	0.137	21.1%	
Children	0.014	0.166	1.4%	
Risk of Losing Partner[T]	0.037	0.036	3.8%	
Risk of Losing Job[T]	0.031	0.046	3.1%	213.39 (26)
Best Friend Straight[T]	-0.061	0.140	-5.9%	
Best Friend Working[T]	0.202	0.140	22.4%	
Illegal Opportunity[T]	0.134**	0.053	14.4%	
Higher Street Earnings[T]	-0.05	0.130	-5.3%	
Pay Discrepancy[T] ($100s)	0.001	0.001	0.1%	223.41 (31)[+]
Number of Cases	1023			

* p<.10 ** p<.05 *** p<.01 ****p<.001

[+] improvement in fit over previous model is significant at .10 level

[++] improvement in fit over previous model is significant at .05 level

[+++] improvement in fit over previous model is significant at .01 level

[T]=Time-varying explanatory variable

[a] =Includes dichotomous indicators for missing data

Robbery and Burglary Arrest. Finally, Table 4 presents the model of choice, commitment, and opportunity for robbery or burglary arrests. We analyzed robbery and burglary separately to isolate arrests for more serious economic crimes. Even after adjusting for all covariates, participation in a Supported Work program job retains a significant negative effect on the robbery/burglary arrest rate. Addicts participating in a program job or a regular job have about one-third the risk of being arrested for robbery or burglary than addicts who are not working.

The time-varying cocaine or heroin use factor again has a significantly positive effect on the risk of arrest for robbery or burglary. Addicts who used cocaine or heroin in the previous month are about 83% more likely to be arrested for robbery or burglary. Younger addicts and males are also more likely to be arrested for these crimes.

Unlike the model for any arrest, the only choice factor that significantly affects arrest for robbery or burglary is the perceived risk of prison, which has a *positive* effect. Respondents who perceived greater risks of going to prison are more likely to be arrested for robbery or burglary than those who perceive lesser risks. This may reflect an accurate perception, because those perceiving high risks may be actively contemplating (or committing) robberies and burglaries. Several apparently large effects are non-significant in the final model due to the rarity of arrests for robbery and burglary.

Table 4: Multivariate Model of Time to Arrest for Robbery/Burglary

Variable	Parameter Estimate	Standard Error	1-Risk Ratio	Model χ^2 (d.f.)[a]
Participation in SWP Job[T]	-1.14***	0.401	-68.1%	
Left Program Job[T]	-0.271	0.223	23.7%	
In Regular Job[T]	-1.17***	0.429	-68.9%	
In School[T]	-0.136	0.518	-12.7%	
Cocaine/Heroin Use[T]	0.603**	0.268	82.8%	
Ever Used Heroin	0.342	0.439	40.8%	
Age	-0.070***	0.021	-6.7%	
Male	1.56***	0.481	374.8%	
White (v. Black)	-0.021	0.281	-2.1%	
Hispanic (v. Black)	-0.315	0.384	-27.0%	
Early Program Cohort	-0.262	0.260	-23.0%	
Education (years)	-0.015	0.060	-1.5%	
Longest Job (years)	-0.007	0.006	-0.7%	
Prior Crime for Money	0.298	0.311	34.7%	
Prior Arrests (tens)	0.055	0.094	5.7%	
Unemployment Rate[T]	-0.015	0.041	-1.5%	
Risk of Prison[T]	0.159**	0.079	17.3%	
Monthly Income[T] ($100s)	-0.657	0.490	-48.2%	176.15 (21)[+++]
Living with Spouse/Partner[T]	0.031	0.287	3.1%	
Living with Parent[T]	0.175	0.223	19.1%	
Children	-0.100	0.340	9.5%	
Risk of Losing Partner[T]	0.000	0.061	0.0%	
Risk of Losing Job[T]	-0.045	0.072	-4.4%	176.01 (26)
Best Friend Straight[T]	0.120	0.233	12.8%	
Best Friend Working[T]	-0.161	0.220	-14.8%	
Illegal Opportunity[T]	0.208**	0.090	23.1%	
Higher Street Earnings[T]	-0.285	0.214	-24.8%	
Pay Discrepancy[T] ($100s)	0.001	0.001	0.1%	171.50 (31)
Number of Cases	1023			

* p<.10 ** p<.05 *** p<.01 ****p<.001

[++] improvement in fit over previous model is significant at .05 level

[+++] improvement in fit over previous model is significant at .01 level

[T]=Time-varying explanatory variable

Similar to the model for any arrest, none of the informal social control factors are statistically significant, and living with a spouse/partner or parent actually increases the hazard for arrest for robbery or burglary. The opportunity factors for arrest for robbery or burglary are also similar to the model for any arrest. The perception of more illegal money making opportunities has a significantly positive effect on the hazard for robbery or burglary. As in the arrest model, it appears that the addicts' conforming work behavior, either in a program job or a regular job, is the most salient factor in predicting remaining in a state of desistance from arrest for robbery or burglary. However, addicts who recidivate into illicit hard drug use are more likely to leave a state of desistance from arrest for robbery or burglary.

Summary: Work and Recidivism to Crime and Drug Use

These analyses of drugs, work, and crime modeled the effects of employment on recidivism to self-reported drug use, self-reported crime, and arrest. We estimated a multivariate model of desistance based on rational choice, informal social control, and differential opportunity theories. The nonparametric results showed strong work effects on the two arrest outcomes: providing addicts with employment increased the likelihood that they will remain in a state of desistance by more than 10%. By this standard, the program can be viewed as successfully reintegrating addicts. Unfortunately, the program's effect on self-reported illegal earnings was age-graded and much weaker. Addicts aged 28 and older assigned to the treatment group were significantly more likely to desist than members of the control group aged 28 and older, but the program failed to affect younger addicts. Most distressingly, the program failed to reduce drug use.

The multivariate model provides clues to the discrepant effects of employment on drug use and criminal activity. Perhaps the Supported Work model of peer support had unintended negative consequences for drug use. Addicts in program jobs were placed in work crews with other addicts, so that if one member "fell off the wagon," it may have affected others in the group. The good news is that addicts who found their own jobs outside the Supported Work program were significantly less likely to recidivate into hard drug use. Thus, employment clearly encourages recidivism from drug use, but it is difficult to determine causality because addicts self-select into regular jobs. The analysis to follow attempts to address some of these selectivity processes by analyzing changes in work, crime, and drug use.

Among the strongest predictors in all the models is perceived illegal opportunities. For self-reported crime and drug use, "straight" rather than deviant associates also facilitate desistance. As measured in the study, the informal social control factors are generally inconsequential. While these results provide useful knowledge concerning the effect of providing employment for ex-addicts, we have only examined the time until the first crime, arrest, or period of drug use. The next section considers subsequent illegal activity. In particular we examine changes in illegal earnings within persons, explicitly modeling careers in crime and substance use in the short term.

STATE OF CURRENT KNOWLEDGE – CHANGES IN DRUG USE AND ILLEGAL EARNINGS

Empirical Findings

The issue of drug use and its relation to crime has recently assumed a position of prominence in public discourse (Beckett 1997). Social scientists have begun to incorporate drug consumption in conceptual models of legal and illegal earnings and to refine some basic

empirical generalizations relating drugs to earnings. In studies of the general public, marijuana and cocaine use appear to have age-graded effects on legitimate earnings. Cross-sectional studies modeling drug consumption and wages as endogenous processes generally report that drug use increases wages in the early career (Gill and Michaels 1992; Kaestner 1991), but has inconsistent (Kaestner 1994) or negative (Kandel, Chen, and Gill 1995) effects in longer-term longitudinal studies. Kandel et al. (1995) suggest that users are likely to take jobs early in their careers that offer high starting wages, but with little potential for wage growth. It is difficult to determine from existing research whether this pattern is due to selectivity (e.g. persons with low self-control select into drug use and jobs with high starting salaries) or a drug-induced earnings requirement.

Consumption of cocaine or heroin is likely to have a different social meaning for addicts who organize their lives around the activity than for recreational users who consume drugs as they would any other commodity. Investigations sampling frequent users of cocaine and heroin generally report less ambiguous drug effects on legal and illegal earnings. Fagan (1994) finds that women using crack cocaine report significantly more income-generating crime than non-users. In a sample of New York City heroin users, Johnson and colleagues find a very strong "direct contribution" (1985:159) of current heroin use to criminal income. The resumption of drug use among those with addiction histories is likely to create a strong earnings imperative that directly impels remunerative crime.

Although models of legal earnings are rarely applied to the study of illegal activity, legitimate and criminal economic behaviors are intimately intertwined. A recent analysis of a national probability sample of young adults showed that falling real wages may have contributed to rising youth crime rates in the 1970s and 1980s and that wage differentials are linked to the

age and race distribution of crime (Grogger 1998). Studies of prisoners generally show that they "moonlight" in a variety of legal and illegal income-generating activities, but that returns to illegal work are typically quite low (US Department of Justice 1993; Wilson and Abrahamse 1992). In perhaps the most comprehensive analysis of illegal earnings to date, Matsueda, Gartner, Piliavin, and Polakowski (1992) identify age, gender, drug use, criminal history, and the prestige criminals accord to deviant occupations as significant predictors of the presence and amount of money that addicts and offenders earned illegally.

Because reliable illegal earnings data are so difficult to obtain, most studies of illegal income have been cross-sectional. Unfortunately, studies based on cross-sectional data are better suited to describing differences across persons than to isolating the causes of earnings. Pre-existing differences in unmeasured factors (such as ambition or impulsiveness) may affect levels of both illegal earnings and independent variables such as drug use and legal income, biasing estimates of their effects in standard regression models. Across-person biases in the honesty or accuracy of self-reports could also bias estimated drug effects on crime. Our within-person analysis, however, is only subject to biases *within* persons. That is, if respondents grow to trust their interviewers over time and suddenly confess drug use and crime simultaneously, this would be manifest in an artificially high correlation between the two phenomena. This does not appear to be the case, however, as we find the risk of drug use and crime to be the highest at the beginning of the study period.

Investigators studying legal earnings (England, Farkas, Kilbourne, and Dou 1988; Waldfogel 1997) have estimated fixed-effects or first difference models to adjust estimates for across-person unobserved heterogeneity. Although similar techniques have been applied to participation in criminal offending (Horney, Osgood, and Marshall 1995), or the frequency of

criminal and deviant acts (Bushway, Brame, and Paternoster 1999; Osgood et al. 1996) we are unaware of any investigation that examines within-person changes in illegal earnings.

Our Theoretical Approach

This omission in the illegal earnings literature hinders the advancement of important scientific and policy debates. First, in the absence of within-person analysis, it is difficult to determine whether factors such as drug use are causes or spurious correlates of criminal returns. As Akers succinctly summarizes the problem,

> The research is characterized by disagreement over what causes what and lack of data to answer the question adequately. A specifically drug-produced motivation to commit crime *that was not present prior to using drugs* has not been established... drugs/alcohol and crime/delinquency are highly related but cannot be said to cause one another (Akers 1992:69 emphasis added).

Are offenders stealing to support their habits or do crime and drug use both result from an underlying propensity for deviance (Gottfredson and Hirschi 1990)? If they steal primarily to support their habit, an economic mechanism connects drug use and crime in a causal chain. If drug use is merely a surface manifestation of low self-control or some other propensity, however, drugs and crime are spurious by a common or correlated cause.

Second, the empirical analysis of illegal earnings is only now emerging as an area of research interest (Fagan 1997; Grogger 1998; McCarthy and Hagan 1999; Wilson and Abrahamse 1992). Do criminals decrease their illegal activities in response to increases in legal earnings and income? If so, programs such as Supported Work that provide legitimate income to offenders may play an important role in reducing crime. If not, such programs would have to be justified on grounds other than their crime-reductive capabilities.

ANALYTIC STRATEGY – CHANGES IN DRUG USE AND ILLEGAL EARNINGS

Measures for Earnings Analysis

For the illegal earnings analysis, we use the entire Supported Work sample (addicts, offenders, and youth) because we found few subgroup differences in the levels of the independent variables or their effects on the earnings outcomes. In addition, this enables us to explore the more general process of illegal earnings determination, rather than focusing on a specific subgroup (as with the addicts in the event history analysis above). Unlike the event history analysis, the multivariate models below do not include regressors such as race or sex, since all fixed or stable characteristics will be statistically controlled by the within-person analytic approach. The time-varying independent variables include self-reported use of cocaine and/or heroin, self-reported monthly legal earnings (in 1998 dollars), and self-reported monthly unearned legal income (including Social Security and Welfare). We expect drug use to increase respondents' illegal earnings and legal income to decrease them. Opportunity structure measures include a dichotomous indicator of incarceration in prison or jail, which should dramatically decrease illegal earnings, and the unemployment rate for the site location, which constrains legitimate opportunities and is likely to increase illegal earnings.

Methods -- Pooled Cross-Sectional Time Series

One major problem with standard across-person analyses is that they fail to adequately account for unmeasured factors that may be driving both drug use and criminal behavior. For example, drug users may have a greater taste for risk, may have greater opportunities to obtain drugs, or may have previously learned the behavior from their parents. While we can attempt to

name, measure, and "control for" these characteristics (Sobel 1996), myriad other factors may still elude us. Therefore, a model that nets out *all* stable individual differences is necessary to ensure that such unmeasured characteristics are not biasing the results.

We estimate fixed effects models in which each variable is expressed as a deviation from its person-specific mean value (England et al. 1988; Johnson 1995; Waldfogel 1997). In order to ensure the correct temporal ordering of these data, we lag all independent variables one month, with the exception of incarceration status. This fixed effects pooled time series estimator helps to correct for selectivity biases resulting from stable characteristics that may be driving both drug use (or other independent variables) and illegal earnings. Unchanging factors such as genetic endowment, cohort, or prior upbringing are statistically controlled because the model assesses changes within persons, rather than comparing the levels of variables across persons. The fixed effects remove all stable between-person differences in illegal earnings, leaving within-person variation to be explained by drug use and other independent variables. The estimated effect of drug use is therefore the amount that drugs raise or lower illegal earnings above that person's own baseline level.

Functional Form of Earnings and Zero Earners

Whereas the event history models predicted the *presence* of illegal earnings, the analysis below models the actual amount of money earned illegally. The proper functional form of earnings has been debated on both conceptual and methodological grounds in studies of legitimate attainment (Hauser 1980; Hodson 1985; Peterson 1989; Portes and Zhou 1996). Specifically, researchers' choice of raw dollars or the natural logarithm of dollars appears to affect results in both the segmented labor markets (Beck, Horan, and Tolbert 1978; Hauser 1980)

and immigrant attainment literatures (Borjas 1990; Portes and Zhou 1996). The benefit gained from logging dollars is a less skewed distribution, reducing the influence of outliers, and generally improving the fit of models. The estimated coefficients in logged models must then be interpreted as the average percentage changes associated with a unit change on the independent variables.

Conversely, the benefit gained from using raw dollars is that this method preserves the influence of outliers, which may be substantively important for the analysis. In fact, some effects may only be detected when using the full earnings range (Portes and Zhou 1996) of legal behavior or the full frequency range (Elliott and Ageton 1980) of illegal behavior. Coefficients are also easier to interpret in these models, as dollar increases or decreases associated with a unit change on the independent variables. In light of this debate and the associated benefits of both methods, we estimated both types of models, but report the raw dollar analyses for ease of interpretation. All differences between the raw and logged specifications are discussed in the text or footnotes.[7]

The treatment of persons with no earnings is also an important specification decision (Hauser 1980). In legal earnings research, zero earners give the distribution an extreme negative skew. Earnings researchers have addressed this problem by limiting their research to those earning at least $1 (Portes and Zhou 1996), $100 (Hodson 1985), or some other threshold. Our analysis, however, includes the zero earners since the transition from $0 to $1 earned illegally is conceptually important. Since the high number of zero earners in our sample produces a skewed earnings distribution, however, we also conduct all analyses on a sub-sample of "earners only,"

[7] Of course, it is important that a handful of observations not drive the overall results. Since we find similar results under both logged and unlogged specifications, we have greater confidence that our findings reflect general trends rather than the influence of a few extreme observations.

those who earned at least $1 illegally at some point in the study period. Again, we report differences between the "earners" and the total sample in the text or notes.

FINDINGS – CHANGES IN DRUG USE AND ILLEGAL EARNINGS

Descriptive Statistics

Descriptive statistics for the baseline cross-sectional sample and the pooled sample are shown in panels A and B of Table 5. Panel A shows that most Supported Work participants were male (89.3%) African-Americans (76.1%) with little education (10.2 average years). Only 13.3% were married at baseline and few had children. Panel B indicates that participants averaged approximately $320 in illegal earnings per month in the 12 months prior to entering Supported Work (the baseline value) and throughout their time in the program, although there was great variation around these means in both instances. Only about 8% of the sample reported using heroin or cocaine during the observation period. Monthly legal earnings were relatively low, though average earnings were higher during the program than prior to Supported Work.

Table 5A: Variable Descriptions, Fixed Characteristics

Variable	Baseline Value(t_1)
Fixed Characteristics	
Male	89.3%
African American	76.1%
White	10.8%
Hispanic or other	13.1%
Experimental sample	48.5%
Youth sample	25.2%
Addict sample	28.6%
Offender sample	46.2%
Years of education	10.2
	(1.7)
Married	13.3%
Number of children	0.19
	(.71)
Number of cases	4,927

Table 5B: Variable Descriptions, Time-Varying Characteristics

Variable	Description	Coding	Baseline Value (t_1)	Pooled Value ($t_{1\text{-}36}$)
Drugs and Money				
Earned illegal income	Total monthly dollar amount calculated from monthly array of acts, frequency, and amount.	Dollars (1998)	$317.57 ($2,144.74)	$333.00[a] ($1,860.20)
Drug use	Monthly indicator for any cocaine or heroin use.	0 = no 1 = yes		7.7%[b]
Earned legal income	Total dollar amount of money earned legally.	Dollars (1998)	$631.32 ($772.56)	$669.80 ($1,026.99)
Unearned legal income	Total monthly unearned income (Social Security, Welfare, Unemployment Insurance, etc.).	Dollars (1998)	$163.37 ($324.99)	$198.57 ($341.55)
Opportunity Structure				
Incarceration	Indicator variable for months spent in jail and/or prison	0 = no 1 = yes	4.0%	11.8%
Unemployment	Percent unemployed in each site, measured at three-month intervals.	Percent	9.09 (2.31)	7.72 (2.55)
Number of cases			4,927	93,636

[a] Average illegal earnings among those with some illegal earnings is $1,102.76 (s.d. $3,230.25). The range is $0-$80,128.

[b] 3.8% were using heroin and 4.9% were using cocaine.

Comparison of Across-Person and Within-Person Predictors of Illegal Earnings

Our multivariate findings are presented in Table 6. Our primary interest is in the fixed-effects model, although we present results from the standard "across-person" ordinary least squares (OLS) equation for comparison. The dependent variable in the OLS equation is the average monthly earnings in months 10-18. In this OLS model, the independent variables include the *proportion* of time using drugs in months 1 through 9, the *average* legal earned and unearned monthly income for months 1 through 9, along with the *proportion* of time incarcerated. The unemployment rate in the 9th month is the final independent variable in the OLS equation. For the within-person model, the independent variables are the actual monthly values for each characteristic. The across-person estimates are additionally adjusted for sex, race, sample group, experimental status, years of education, and number of children at baseline.

Table 6 shows the results of the multivariable models that include a lagged drug use variable, lagged legal earnings, lagged legal unearned income, and contemporaneous incarceration measures.[8] The use of cocaine or heroin had a strong and significant positive effect on the following period's illegal earnings. In the OLS model, use of cocaine or heroin increased monthly illegal earnings approximately $800. The fixed effects model, in contrast, shows a $678 within-person increase in illegal earnings in the month following drug use. In the fixed effects model, legal earnings emerge as a significant negative predictor of illegal earnings, so that every dollar earned legally reduced illegal earnings by 7 cents. Though incarceration dramatically reduces illegal earnings within persons, even this effect is less powerful than the positive effect of drug use: incapacitating offenders does not decrease criminal activity as much as drug use increases it. The unemployment rate is also a strong positive predictor within persons. The OLS

model suggests that people in cities with high unemployment have no more illegal earnings on average, but the fixed effects results show that people adjust their crime upward when their city unemployment rate is high. Each percentage increase in the unemployment rate corresponds to a $25 increase in monthly illegal income. Although drug use remains difficult to disentangle from prior criminality, the unemployment rate is likely to be exogenously determined. The fixed effects model therefore provides strong evidence for the effect of local labor market conditions on illegal earnings.

Table 6. Across-Person OLS and Fixed Effects Estimates of Monthly Illegal Earnings – Total Sample

	Across-Person OLS Model	Within-Person Fixed Effects
Drugs and Money		
Cocaine or heroin use	798.21**	678.23**
	(113.95)	(25.99)
Earned legal income ($)	-.04	-.07**
	(.03)	(.01)
Unearned legal income ($)	-.12	-.04
	(.10)	(.02)
Opportunity Structure		
Incarceration status	32.18	-469.20**
	(113.04)	(24.52)
Unemployment rate	2.42	25.45**
	(11.19)	(3.99)
Adjusted R^2	.029	.412
Number of observations	2,786	77,627

* $p < .05$ ** $p < .01$ (two-tailed tests)

Note: The dependent variable in the OLS models is the average monthly illegal earnings in months 10-18. The OLS estimates are adjusted for sex, race, years education, sample group, experimental status, and number of children at baseline.

[8] We present a more completely specified model of illegal earnings with other time varying covariates elsewhere (Uggen and Thompson 1999). Our drug effects in both models are of comparable size and significance.

Difference Specifications

An alternative way to address concerns about unobserved factors influencing *both* drug use and illegal earnings is to use a difference specification:

$$\Delta\$illeg_i = \Delta\alpha_i + \Delta drug_i + \Delta\$leg_i + incarc_i + \Delta\, unemploy_i + \Delta\, \$unearn_i + \Delta\mu_i$$

where $\Delta\$illeg_i$ equals the change in illegal earnings between the current month and the previous month, or ($\$illeg_{it}$-$\$illeg_{it-1}$), $\Delta drug_i$ equals ($drug_{it-1}$-$drug_{it-2}$), and so on, and where α_i is an individual fixed effect and μ_i is a disturbance term. This model also controls for unobserved heterogeneity since all fixed characteristics drop out of the model by definition.

To explore differences in the lag structure of drug use and crime, we use both a standard short first-difference model (in which one month elapses between observations) and a range of longer difference models (in which two to eleven months elapse). A one- or two-month interval may not be sufficient to capture the effect of drug use on illegal earnings because the length of the "habit" may be critical in determining the amount and likelihood of illegal activity and because the effects may cumulate over time.

In the five difference models summarized in Table 7, a clear pattern emerges: the greater the difference, the smaller the estimated effect of drug use on illegal earnings. Model 1 of Table 7 indicates that using drugs in month (t-1), increases illegal earnings by $238 among those who were not using drugs in the previous month. In Model 2, this drug effect is reduced to $206 earned illegally for those not using in month (t-3), but using in (t-1). This implies that drug use has a large immediate effect on illegal activity, and that the duration of the drug habit is significant in predicting illegal activity. Nevertheless, illegal earnings are best explained by the preceding month's drug use.

Table 7. Coefficients from Difference Models Regressing Differences in Monthly Illegal Earnings Over Time on Differences in Selected Variables.

	Model and Number of Months between Observations				
	Model 1 (1-2 Months)	Model 2 (1-3 Months)	Model 3 (1-4 Months)	Model 4 (1-5 Months)	Model 5 (1-12 Months)
Drugs	238.39**	206.42**	168.05**	101.77**	-5.59
Earned	-.02**	-.01*	-.01*	-.01*	-.005
Unearned	.04	.02	.006	.002	-.003
Number of Observations	72,879	68,413	63,980	59,563	33,814

Note: Coefficients are from difference models in which the dependent variable is the difference between the illegal earnings for an individual in one month and the illegal earnings for that individual in the comparison month. The independent variables are expressed as differences as well (but are lagged one additional month to ensure correct temporal ordering) and include drug use, earnings, unearned income, and incarceration status.

* $p < .05$ ** $p < .01$ (two-tailed tests)

Although the drug effects remain strong and significant in the difference models, they are much smaller in magnitude than under the fixed effects specification. To investigate these differences, we disaggregate the drug use variable and examine both logged and raw earnings. In Panel A of Table 8, we compare effects of drug use in the fixed effects and first difference models with logged and unlogged dollars. Note that the logged estimates are more stable, with the fixed effects and first differences estimates much closer in magnitude. Table 8 also provides some evidence against a "disinhibition" mechanism connecting drug use and crime. Note that cocaine and heroin use have comparable effects on illegal earnings despite their vastly different physiological effects. The similarity of these amounts among users of stimulants and depressants suggests an economic rather than a biological mechanism connecting drug use and illegal earnings.

Table 8A: Estimated Illegal Earnings Associated with Drug Use

	Logged		Unlogged	
	FE	FD	FE	FD
Cocaine	$603 (181%)	$416 (125%)	$500	$65
Heroin	$769 (231%)	$470 (141%)	$797	$331
Either	$699 (210%)	$446 (134%)	$678	$238

Note: Estimates for the effect of drug use were taken from regression models that included legal earnings, unearned legal income, incarceration, and unemployment rate. Estimates for logged models were computed at mean.
Key: FE = Fixed Effects; FD = First Differences

Drug Use as an Earnings Imperative

We believe that drug use creates an immediate earnings imperative, the need for ready funds to ensure an adequate supply, which increases the motivation to commit economic crimes. How closely do our estimated drug effects of approximately $400-$700 per month approximate the actual economic need for serious drug users? In order to gauge economic need, we examined estimated monthly expenditures on cocaine and heroin from research by Bruce Johnson and colleagues (1985) and more recent Drug Use Forecasting (DUF) data (ONDCP 1995) (see Table 8B). According to the DUF, hardcore cocaine users spent about $1,000 per month (in 1998 dollars) and heroin users spent $1,175 per month. In Johnson et al.'s New York sample, the addicts consumed an average of $372 worth of cocaine monthly and $1,600 worth of heroin. Even though Johnson et al. sampled heroin users, (which may explain the comparatively small amount of money spent on cocaine), the income needs of both groups are sizable.

To further validate self-reported illegal income, we would need previous research on self-reported illegal earnings. While such research has been exceedingly rare, one study of the financial records of a large, now-defunct street gang provides detailed information about gang

members' income from drug sales (U.S. Department of Justice 1999). Based on one's level within the gang, wages varied enormously, from $200 per month for "foot soldiers" to $10,900 per month for a gang leader (U.S. Department of Justice 1999). In addition, these gang workers were allowed to sell some drugs outside of the gang structure, enabling them to gain even greater earnings. Although these wages were based solely on drug sales, they are roughly comparable to our monthly illegal earnings figures, lending some support to the validity of our estimates.

Table 8B: Estimated Monthly User Expenditures on Drugs – 1998 Dollars

	DUF (1995) (Median Cost)	DUF (1995) (Mean Cost)	Johnson (1985) (Mean Use)	Johnson (1985) (Mean Cost)
Cocaine	$1,009	$1,929	$372	$267
Heroin	$1,175	$2,248	$1,600	$1,043

Note: Estimates for user expenditures on drugs were taken from Drug Use Forecasting data on arrestees in 24 cities (ONDCP 1995: A-19) and a sample of 201 heroin users in New York City (Johnson et al. 1985:40).

Taken together, these findings demonstrate the importance of drug use as a "foreground" factor (Hagan and McCarthy 1997; Katz 1988) in explaining criminal behavior. We argue that the drug effect is not epiphenomenal, but rather that drug use has its own direct effect on criminal earnings. The drug habit creates a need for additional cash that is analogous to hunger: a biological, psychological and social imperative. Apart from its statistical significance, the *magnitude* of the drug effect is striking in these models. While incarceration clearly reduces illegal earnings, drug use increases criminal activity at an even greater rate than incarceration reduces it. Of course, we do not wish to imply that illegal income does not occur without drug use, only that illegal income increases significantly when addicts, offenders, and youth dropouts are using drugs relative to periods when they are not using drugs.

Summary: Changes in Drug Use and Illegal Earnings

We began this section by discussing the difficulties of isolating the effects of drug use and employment on illegal earnings. When controlling for stable differences across persons and the structure of opportunity, we find strong evidence that drug use dramatically raises criminal earnings and legal earnings decrease them. In addition, disaggregating the effects of heroin and drug use indicates a similar earnings imperative for users of both types of drugs. Regardless of the type of drug, or the specification under which it is examined, hard drug use dramatically increases illegal earnings.

SUMMARY AND RECOMMENDATIONS

Principal Findings

These results have yielded several potentially important findings. First, we note the significant experimental work effects on arrest among the ex-addict group. The provision of employment increased the likelihood that ex-addicts would remain free of arrest. In addition, addicts who found their own employment, outside of the program, were significantly less likely to recidivate into hard drug use. Unfortunately, however, supported employment failed to reduce drug use among this group.

Second, our analysis of the pooled cross-sectional time series data provides some evidence for a causal relationship between heroin and cocaine use and illegal earnings. Specifically, people raise their illegal earnings following serious drug use by approximately $500 per month. We believe that drug use is a basic cause of crime, rather than a mere epiphenomenon, although it remains difficult to disentangle the phenomena. Within-person analysis shows that "foreground" factors such as drug use, hunger (Hagan and McCarthy 1997),

and other situational factors appear to be important *causes* of crime, rather than simply correlates of criminal activity or surface manifestations of underlying properties.

While our methodology represents an improvement over existing research, we acknowledge that the current study is not definitive with respect to causality. Short of implementing a program that randomly assigns people to drug use, the causal link between drugs and crime will be very difficult to establish. Nevertheless, our results enable us to make predictions about the effect of employment and drug use on illegal activity. Even in the absence of a causal link, this correlational evidence is useful for policy purposes, such as predicting future criminal behavior under various employment and drug use scenarios.

Finally, our multivariate results point to a number of factors that predict recidivism to crime and drug use as well as month-to-month changes in illegal earnings. The recidivism results suggest that differentials in criminal opportunities affect the likelihood of recidivism. The within-person analysis, however, shows that changes in drug use are at least as important as illegal opportunities in explaining illegal earnings. Together, these results suggest that changing life circumstances may alter perceptions of legal and illegal opportunities, which, in turn, affect the likelihood and amount of criminal behavior.

How do our results relate to the original research findings? Since all previous analysis of these data involved across-person analysis, our across-person event history analysis is most consistent with previous findings. For example, we replicated the original researchers' findings regarding work effects on recidivism in the addict group, though our model allowed us to estimate the time-varying effects of both program work and regular work. Also similar to previous research, we find little reduction in drug use due to program effects. One aspect not previously reported is the age-graded effect of the program on illegal earnings. This age-based

relationship has previously been noted for the ex-offender (MDRC 1980; Uggen 2000), but not the ex-addict sample.

The multivariate models support the previously reported (Piliavin et al. 1986) importance of opportunity and reward components of rational-choice models of crime, but for the most part failed to support the risk component. The lone exception was for the risk of losing one's job, which decreased the rate of drug use. The four multivariate recidivism models point to an interesting difference in the effect of program employment. While Supported work did not decrease the time until illegal earnings or drug use, it decreased the risk of arrest. This puzzling finding is at least partially explained by understanding the hazard functions of the recidivism measures. While the rate of first rearrest rises during the first 9 months and begins an uneven decline thereafter, the illegal earnings hazard is monotonically decreasing throughout the entire period of study (Uggen 2000). One possible interpretation of this result is that of a delayed criminal justice response; parole or probation officers may not respond to law violation until the activity is sustained or repeated. Similarly, to the extent that these criminal justice workers use discretion, it would likely favor employed persons. While the across-person analysis points to a reduction in crime with Supported Work participation, it shows no such effect for drug use.

Previous Supported Work research has not explored within-person differences in predictors of illegal earnings. Our fixed-effects analysis provides strong evidence that changes in individuals' legal income and drug use affect illegal earnings. Taken together, our analyses point to an economic mechanism, an earnings imperative, connecting crime and drug use among addicts. When participants are working, the need for drug money is at least partially fulfilled, reducing the motivation to commit monetary crime. This notion is further supported by the large

drug effect on illegal earnings within-persons: no other factor is so closely linked to the amount of money criminals earn.

Recommendations for Future Research

Some limitations of the current analysis must be addressed through additional research. First, these data were collected in the late-1970s and generalizations beyond this period may be problematic (e.g. our data predate the widespread use of urinalysis and crack cocaine). Nevertheless, the similarity of estimates for powder cocaine and heroin suggests a strong and robust drug effect. Second, evidence from self-reported crime and drug use data must be replicated with official outcomes. Third, for our across-person analysis, we cannot rule out possible unobserved factors influencing drug use and crime outcomes. For example, the favorable impact of having a "straight best friend" on the time until recidivism may not be causal; instead, the desire to go straight may cause one to refrain from criminal activity and to associate with straight friends. Fourth, while our fixed effects analysis addressed some limitations of the across-person analysis, the model's assumption that all unmeasured differences within persons are unchanging may be untenable. Fifth, we must reiterate that this study involved a selected population of low-income, almost entirely minority drug users who participated in an unusual set of programs. Finally, our analysis has conceptualized remunerative crime as a general phenomenon. Additional research is necessary to disaggregate criminal activities in order to distinguish drug sales from personal crimes and other property offenses.

Despite these important caveats, the current investigation has refined knowledge of the relation between work, drug use, and crime by showing experimental work effects on crime (but

not drug use) and strong drug effects on illegal earnings. Based on our findings, we suggest two avenues for future research: (1) a study of released offenders that would identify the changing life circumstances associated with desistance; and (2) further pilot experiments to test the effect of employment on recidivism, perhaps in combination with family support services (Sampson and Laub 1993). Research linking drug use to the new fatherhood programs (Popenoe 1996) and fragile families initiatives (U.S. Department of Justice 1998; Vosler and Robertson 1998) would be especially worthwhile. Ideally this research should move beyond the scope of this report to integrate ethnographic and quantitative research involving the complex interactions between drug use, crime, employment, and family relationships.

While the constraining effect of legal income on illegal earnings appears disappointingly small ($70 per $1,000 earned legally as compared to $678 for drug use), it is an attractive point for intervention since it is much more manipulable than drug use or the city unemployment rate (see Uggen and Piliavin 1998). While the magnitude of legal earnings appears small when compared to the drug effect, this significant legal earnings effect (for *all* sub-groups) is sizable relative to the original Supported Work results, which found inconsistent employment effects on crime.

Policy Recommendations

Our analysis suggests that employment programs may play an important role in breaking the cycle between crime and drug use. While provision of employment reduces arrest and criminal activity, the Supported Work model must be modified in order to reduce drug use. In general, we believe that opening up employment programs to broader disadvantaged populations could prove beneficial in reducing crime and drug use among offenders and addicts. Although

the cost-benefit analysis of Supported Work by Kemper, Long and Thornton (1984) indicated that measured benefits fell short of costs, this picture might improve if effective drug treatment had been implemented, which would have reduced illegal earnings. Additionally, this research raises questions about whether to terminate participants who use drugs from employment programs such as Supported Work. While the program had little effect on drug use, it still benefitted participants and society by reducing criminal activity and the social harm associated with it.

Perhaps policies for addicts would be most effective if they are embedded in a more comprehensive employment and training strategy (Levitan and Gallo 1988). First, we believe that the stigmatizing effects of program participation would be minimized to the extent that non-addicts are also served (see also Wilson 1987). Second, non-addicts provide models for conformist behavior. Third, the social status of subsidized employment is enhanced if it is seen as a real job, rather than a make-work task for unskilled ex-addicts. Fourth, extending high quality opportunities to the "least deserving" addicts is better justified on equity grounds when such opportunities are also available to other groups.

The second part of our analysis demonstrates that cocaine and heroin use have sizable effects on short-term changes in illegal earnings and the social harm associated with crime. This highlights the importance of keeping offenders off drugs and justifies greater investment in effective drug treatment programs. Further, respondents reduced their criminal offending during periods of low unemployment and high legal earnings.

We also note that the within-person picture of short-term changes is much different than the across-person picture of desistance or recidivism. One way to think about these differences is that information gained from the across-person picture allows for "statistical discrimination"

(Becker 1957) based on group means and the within-person picture points to interventions associated with changes in individual behavior. Across persons, for example, we find that legal earnings have little effect on criminal activity. Within persons, in contrast, we find that individuals reduce their illegal income when earning more legally. Similarly, the across person model suggests that people in cities with high unemployment have no more illegal earnings on average, but the fixed effects results show that people adjust their crime upward when their city unemployment rate is high.

In general, we see a need for research and policy that places greater emphasis on desistance from crime and drug use among identified offenders. Approximately 500,000 individuals emerge from the nation's prisons each year with a high probability of reoffense. We are only beginning to learn about their adult lives and the interventions that may help them to desist from crime. Nevertheless, this research suggests that employment is one factor that may help to break the cycle between drug use and crime.

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