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GENDER, MENTAL ILLNESS, AND CRIME

Grant No. 2007-IJ-CX-0004

FINAL TECHNICAL REPORT

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EXECUTIVE SUMMARY

This report summarizes our recent examination of the gendered effects of depression, drug use, and treatment on crime and the effects of interaction with the criminal justice system on subsequent depression and drug use. We analyze data gathered in 2004 as part of the National Household Survey on Drug Use and Health (NSDUH), a nationally representative survey of respondents aged 12 years or older. Respondents provided detailed information regarding illegal drug use, criminal activity, depression, and other factors. By examining the gender differences in the relationships between these key variables, we are able to understand how men and women differently experience depression, drug use, and crime.

Criminology, sociology, and criminal justice literature point to an important link between mental illness (particularly depression and drug abuse) and crime; however, the degree to which gender alters these relationships has not yet been demonstrated. This study focuses on the gendered relationships between depression, substance abuse, and crime using data from the NSDUH, given to members of the non-institutionalized U.S. civilian population aged 12 or older. Logistic regression models predicting the odds of crime, drug use, and depression are estimated for male and female respondents; z-tests are then used to formally test for gender differences. Our statistical analyses focus on explaining behavior in the most recent 12 months, emphasizing current factors in the respondents' lives that explain their criminal activity, depression, and drug use. The models also include a measure of deviant behavior from previous years to control for an individual's deviant propensity. The results of this report therefore provide strong evidence regarding the role of gendered drug use, depression, and crime.

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Our analyses were conducted in three separate stages. Stage one highlights how gendered differences in self-reported mental illness and substance abuse affect the self-reported criminal behaviors of theft, drug sales, and/or assault. The second stage focuses on how gendered differences in treatment for depression and substance dependency affect self-reported crime. Because women are significantly more likely to seek psychiatric treatment than men (Hankin 1990), and men are more likely than women to receive treatment for illicit drugs (SAMHSA 2003), it is important to consider how these gender differences in treatment affect criminal behavior. The third stage focuses on how gender differences in interaction with the criminal justice system affects depression and substance use.

Key findings from stage one include:

Illegal Drug Use and Crime

- Use of an illegal drug in the past year significantly increases crime.

- This past year drug use is especially likely to increase crime among women.

- Past year drug users are especially prone to engage in drug sales, and this is equally true for men and women.

- Women who used in the last year are also especially prone to engage in assault.

- Use of an illegal drug historically (prior to one year ago) also tends to increase crime, suggesting that individuals who have a longer history of drug use are particularly prone to engage in crime.

Depression and Crime

- Depressed individuals commit more crime than non-depressed individuals.

- Depression is especially a risk factor for women to engage in crime.

- Depressed women are especially prone to commit assault.

Key findings from stage two include:

Depression, Self-Medication, and Crime

- Individuals who self-medicate by taking illegal substances for their depression are less likely to commit crime than those who do not self-medicate.

- Self-medication reduces women's crime more so than men's.

Drug Dependency, Treatment, and Crime

- Overall, treatment for drug dependency appears to increase crime.

- Drug treatment for older individuals, however, reduces the likelihood of crime.

- There are no apparent gender differences in the effect of drug treatment on crime.

Depression, Treatment, and Crime

- The administration of antidepressants appears to increase crime rates.

- Among older individuals, however, antidepressant medication reduces crime.

- Among younger individuals, antidepressant medication is particularly likely to increase women's likelihood to engage in drug sales.

Key findings from stage three include:

Criminal Justice Contact and Depression

- Individuals who have contact with the criminal justice system via arrest, being arrested more often, and being on probation or parole are more likely to be depressed.

- A history of contact with the criminal justice system increases depression for men more so than for women.

Criminal Justice Contact and Illegal Drug Use

- Individuals who have contact with the criminal justice system via arrest, being arrested more often, and being on probation or parole are more likely to use illegal drugs.

- A history of contact with the criminal justice system increases illegal drug use for women more so than for men.

Discussion and Recommendation for Future Research and Policy

This research demonstrates that being depressed and using illegal substances significantly increases criminal behavior for both men and women, although they are both especially problematic for women. This would seem to imply that the policy recommendation be for additional treatment for drug dependency and depression, particularly to prevent crime among women. This is problematic, however, because this research also finds that treatment for substance dependency and/or depression has little impact on reducing crime, and may instead increase crime rates. The exception to this finding is for older respondents, who are less likely to engage in crime after receiving either depression or substance abuse treatment, and these results are similar for men and women. It appears that one-size-fits all treatment for substance abuse and depression may cause more problems than we might expect. Instead, treatment—at least as antidepressants and substance abuse treatment currently stand—may be useful primarily for older, more emotionally mature individuals. This suggests that future social policy seek age-appropriate treatments for dealing with these mental health difficulties.

We do find that women who self-medicate by treating their depression with illegal substances are considerably less likely to engage in crime than women do not self-medicate. We

believe that, by self-medicating, these women are likely to alleviate some of the most serious symptoms of their depression, resulting in a lower rate of crime compared to those who are depressed but do not self-medicate. Ultimately, however, this positive outcome is unlikely to be sustained as individuals become addicted to these substances and feel the need to engage in additional criminal activity to maintain this addiction. This is something we are unable to examine using these data, however, and future research should continue to examine this relationship between self-medicating and lower rates of crime among women.

This research also demonstrates that individuals who have contact with the criminal justice system tend to be more depressed and more likely to engage in illegal substance use than individuals who have no criminal justice contact. This criminal justice contact is particularly likely to increase men's depression, and women's illegal drug use. These findings therefore point to a need to be aware of the effects of criminal justice interventions on the mental health of offenders. Individuals who are arrested and under correctional supervision are likely to face high levels of stress associated with embarrassment, loss of income, family disapproval, worry regarding pending court cases, and many other factors. This does not mean to suggest that criminal justice interventions should not occur when a crime is committed, but instead, to suggest that future criminal activity may be prevented by efforts to reduce or eliminate as many of these stressors as possible. This might include lower bail, or shorter sentences, allowing these individuals to return to their families, workplaces, or schools as soon as possible.

Future research, using longitudinal data, should be conducted to better understand the sequence and timing of the events examined in this project. Nevertheless, the evidence presented here suggests that depression and illegal drug use increase criminal propensity and that these stressors are particularly important in explaining women's crime. Current treatment efforts do

not appear to address these links between depression, drug use, and crime. Future research and policy should attempt to address the gendered nature of the relationship between mental illness (including depression and drug use) and criminal activity.

GENDER, MENTAL ILLNESS, AND CRIME
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RATIONALE/AIMS FOR THE PROJECT

Criminology, sociology, and criminal justice literature point to an important link between mental illness (particularly depression and drug abuse)[1] and crime; however, the degree to which gender alters these relationships has not yet been demonstrated. This study establishes the role of gender differences in the effect of mental illness on crime. This study builds on previous research noting that corrections officials are significantly more likely to perceive mental illness in violent female offenders as compared to similar male offenders (Thompson 2005). Data from the 2004 National Survey on Drug Use and Health (NSDUH) is used for the analysis. By highlighting the importance of gender as a mediating factor altering the effects of depression and drug use on criminal behavior, the major findings contribute substantially to the administration of justice and public safety.

The available evidence makes it clear that men are much more likely than women to be found in the population of criminal offenders. Volumes of research indicate that while men are typically socialized to act out violently or aggressively against others (often resulting in crime and substance abuse) women are typically socialized to direct distress inward, in a "feminine" manner (often resulting in depression and other mental illnesses). Consequently, previous research indicates that while men typically respond to distress with externalizing behavior, women typically respond with internalizing behavior (Rosenfield 1999; De Coster 2005). What is not yet known, however, is the degree to which mental illness (including depression and

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substance use) alters this relationship between gender and crime. We address these limitations in the literature by directly examining the gendered relationship between mental illness and crime, establishing the effects of depression and substance use on female crime as compared to male crime.

STATE OF CURRENT KNOWLEDGE

Criminal offending, depression, and illegal substance use are recognized as important social problems warranting prevention and intervention efforts. Although there is some evidence for comorbidity between these issues, there is a paucity of research examining these relationships, especially as they pertain to gender differences. The literature that is available has consistently demonstrated that male crime and substance use rates exceed female crime and substance use rates, and that women's rates of depression are considerably higher than men's rates.

Gender and Crime

Together with age, gender is one of the most consistent predictors of crime (Hagan et al. 1985; Farnworth & Teske 1995); men are more involved than women in criminal activity "always and everywhere" (Gottfredson & Hirschi 1990:145). With recent increases in the female percentage of arrests (Steffensmeier & Allan 1996), convictions (Nagal & Johnson 1994), and incarcerations (U.S. Department of Justice 1998), a great deal of attention has focused on the "new" type of criminal: women. This gendered convergence in arrests, however, primarily involves proportionately greater female involvement in minor property crimes (Steffensmeier & Allan 1996).

According to Feeley and Little (1991), women constituted a "substantial portion" of

felony indictments (ranging from larceny to murder) in much of the 18th century. While the

female share of indictments declined thereafter, it appears that other methods of social control

picked up the slack (Feeley & Little 1991; see also Boritch & Hagan 1990). Changing economic

structures removed women from the formal economy and placed them under the supervision of

their husbands (Feeley & Little 1991). At the same time, women increasingly became subject to

the control of insane asylums, with women viewed as "not bad but mad" (Zedner 1991:264).

This "new" conception of female offenders as "feeble-minded" resulted in a significant decline

in the female prison population in the early 20th century (Zedner 1991). To some extent, this

portrayal of women criminals as mentally deficient has endured into contemporary criminal

justice (Worrall 1990; Zedner 1991:296; Thompson 2005).

Gender and Mental Illness

Although there appear to be no gender differences in the overall *rates* of mental disorder,

men and women do differ in the *type* of disorder experienced (Dohrenwend & Dohrenwend

1976; Kessler & McLeod 1984; Hankin 1990; Aneshensel et al. 1991; Rosenfield 1999). With

respect to gender differences for specific diagnoses, women have higher rates of depression and

anxiety disorder (referred to as "internalizing" disorders), while men have higher rates of

substance abuse and antisocial disorders (also called "externalizing" disorders) (Robins et al.

1991; Potts et al. 1991; Kessler & Shanyang 1999; Rosenfield 1999).

Current explanations for these gender differences (internalizing versus externalizing)

refer to divisions in power and responsibilities—women earn less than men, tend to have jobs

with less power and autonomy, and are more responsive to the problems of people in their social

networks—all of which contribute to psychological distress on the part of women (Kessler &

McLeod 1984; Brown & Harris 1989; Rosenfield 1989; Aneshensel et al. 1991; Horwitz et al. 1998; Rosenfield 1999; Thoits 1999; Turner & Lloyd 1999). Although women are encouraged to act out their distress in an emotional or dependent manner, men are socialized into acting out, or externalizing their distress, through substance abuse or antisocial behavior.

Gender, Crime, and Mental Illness

Though complicated, there does appear to be a relationship between gender, crime, depression, and substance use. Available research makes it clear that women are more likely to be depressed than men (Mirowsky 1996); in contrast, men are significantly more likely than women to be involved in substance abuse and crime (Steffensmeier & Allan 1996; Rosenfield 1999). Prior research also suggests that depressed persons are likely to self-medicate with alcohol or drugs, and that women are particularly likely to use these substances to "get away from emotional pain" (Toray et al. 1991:339).

Illegal drug use is often associated with illegal earnings (ONDCP 2001), with a significant portion of drug use supported by criminal activity (Inciardi & Pottieger 1994; Jacobs 1999; Kowalski & Faupel 1990). Fagan, for example, finds that female crack cocaine users report far more income-generating crime than non-users (1994). Similarly, Johnson and colleagues identify a powerful "direct contribution" of current heroin use to criminal income (1985:159). In conjunction with research indicating that economic factors such as unemployment and low income increase both depression (Dooley et al. 2000) and criminal activity (Uggen & Thompson 2003), further research into the complex relationship between depression, substance use, crime, and gender is necessary.

One possible explanation for women's higher rate of depression, but not crime, is that women are significantly more likely than men to seek psychiatric treatment (Hankin 1990).

Thus, the possible link between depression, self-medication, and crime may be broken by mental health and substance abuse interventions. This link, which has yet to be tested, is examined in greater detail in this study.

Negative Affect and Crime

Agnew's general strain theory of crime suggests that those experiencing negative affect or emotions will be more likely to engage in crime and delinquency (1992). Agnew's theoretical approach focuses on negative relationships and how these negative relationships push individuals into criminal adaptations. Agnew's model suggests that there are three major types of negative relations that cause strain: (1) those that jeopardize the achievement of positively valued goals, (2) those that remove or threaten to remove positively valued stimuli, and (3) those that present one with negatively valued stimuli (Agnew 1992; 1995). Agnew's contention is that, in the face of stress, crime and delinquency serve as effective coping mechanisms. In this study, stress is operationalized as the stress of severe depression or a substance abuse problem; these types of mental disorders are likely to cause all three types of strain Agnew discusses, and will therefore, in the absence of appropriate modifiers, result in a greater likelihood of criminal activity.

THE DATASET AND ANALYTIC STRATEGY

This analysis highlights how gendered differences in self-reported mental illness and substance abuse affect self-reported criminal behavior. Data for this report come from the 2004 *National Survey on Drug Use and Health* (NSDUH) (U.S. Department of Health & Human Services 2006). The 2004 NSDUH is the 24th in a series, with the primary purpose to measure the prevalence and correlates of drug use in the United States. The sample is drawn from the civilian, noninstitutionalized population who were 12 years of age or older at the time of the

survey. The design over-sampled youths and young adults, making it especially likely that this data captures the ages at which youths enter into their highest rates of criminal offending and substance use—the late teens and into the early 20s (see, e.g., Gottfredson and Hirschi 1990). The 2004 NSDUH response rate was a high 91 percent (U.S. DH&HS 2004). Interviews were carried out using computer-assisted interviewing (CAI) methods, designed to provide respondents with a highly private and confidential means of responding to questions, thereby increasing the level of honest reporting of illicit drug use and other sensitive behaviors (U.S. DH&HS 2004). Demographic data are available on the respondents, in addition to self-reported depression, crime, and illegal drug use.

Independent variables

The NSDUH asked respondents many questions about depression and substance use. Due to concerns about the relatively small frequency of illegal substance use when each of the drug use variables are considered separately, this research focuses on three primary groups of illegal substances: marijuana, cocaine/crack, and other illicit drugs; we primarily use a measure of "any illegal drug use." The distribution of these variables enables robust models, even when parceled out into male and female models (see Exhibit 1 on page 15 for the frequencies of the key independent and dependent variables). These indicators are used in conjunction with gender and other important controls for socioeconomic and family statuses to determine their gendered effects on criminal behavior.

Dependent variables

The NSDUH asked respondents to report committing any of three offenses (drug sales, property, or violent crime) within the past twelve months. These three offense categories, in addition to a global indicator of *any* criminal activity, are examined to understand whether

gender interacts with depression and/or substance use to make some offenses particularly likely. Due to the relatively small number of respondents reporting each of these behaviors within the past year, however, most of our analyses focuses on the indicator of *any* crime, which results in a larger number of respondents reporting criminal activity.

Analysis Plan

Logistic regression (for a binary measure of offense presence/absence) models are estimated. These models are estimated separately for females and males, and *z*-tests are used to assess whether the regression coefficients for the independent variables differ across gender (see Paternoster et al. 1998 for the suggested z test equation). Further analyses include interaction terms between demographic variables and key variables such as treatment for depression and substance use. This research focuses on whether depression and substance use play a significantly different role in contributing to property, violent, drug sale, and "all" crime for women as compared to men. We also consider how treatment for these problems affects crime and how criminal justice interventions contribute to subsequent depression and substance use.

The NSDUH is a cross-sectional database that primarily inquired about behavior and characteristics in the past year. Because the sequencing of events is a relevant concern for this research (e.g., does depression come before or after criminal behavior?), we attempt to include the correct temporal ordering in all of our analyses. Our approach to temporal ordering was to, whenever possible, use as independent (predictor) variables measures of lifetime behavior or behavior that occurred more than 12 months ago (prior to the interview). For our dependent variables, we always use measures of past year (as of the interview) behavior. Although not perfect, by using a measure of lifetime depression (for example), we are indicating that the respondent met the criteria for a major depressive episode at some point during their lifetime. In

many instances this depression would have occurred prior to the past 12 months and therefore prior to the criminal behavior of interest in the dependent variable.[2]

DESCRIPTIVE STATISTICS

Descriptive statistics are presented in Exhibit 1. The sample is approximately 52% female and 12% African American. The majority of the non-African American group is white.[3] The sample has a mean age between 26 and 34 years and a mean educational attainment of 12th grade. About 64% of the sample participates in the work force on some level, and the mean income category for respondents is $20,000-30,000 a year. About half (51%) of the respondents are married, and almost a third (30%) have children at home. Depression, measured as a major depressive episode experienced at least once in the respondent's lifetime, affects almost 15% of the sample.

In the 12 months prior to the survey, almost 15% of respondents had used some type of illicit substance at least once. Marijuana was the most commonly used substance, with about 11% of the sample having used it in the last year. Cocaine and other illicit substances were less common, at about 2% and about 7% respectively. When looking at historical use, the numbers are much higher, with about 45% of the sample having used an illicit substance greater than 12 months ago. About 4% of the sample reported committing a crime in the last year. The most common crime was assault, at just over 2%. The second most common was drug sales, at under 2%, followed by theft at just over 1%. About 2% of respondents reported being arrested for a crime in the past year.

Exhibit 1: Descriptive Statistics (N = 34,447 listwise deletion)

Variable	Description	TOTAL Mean/ Percent	Males	Females
Dependent Variables				
Self-reported drug sales	1=Drug sales past year; 0=No drug sales	1.9%	2.8%	1.1%
Self-reported assault	1=Assault past year; 0=No assault	2.2%	2.8%	1.6%
Self-reported theft	1=Theft past year; 0=No theft	1.2%	1.6%	1.0%
Any self-reported crime	1=Any crime past year; 0=No crime	4.1%	5.6%	2.8%
Any current arrest	1=Arrested for any crime in the past 12 months; 0=No arrest in past 12 months	2.0%	3.6%	1.4%
Demographic & Structural Variables				
Female	1=Female; 0=Male	51.6%		
African American	1=African American, non-Hispanic; 0=Other race/ethic group	11.6%	10.7%	12.3%
Age	1=12 years…10=21 years; 11=22 or 23 years; 12=24 or 25 years; 13=26-29 years; 14=30-34 years; 15=35-49 years; 16=50-64 years; 17=65 and older	13.4 (4.1)	13.3 (4.1)	13.5 (4.0)
Education	1=5th grade or less; 2=6th grade… 9=Freshman/13th year; 10=Sophomore/14th year or junior/15th year; 11=Senior/16th year or higher	8.2 (2.5)	8.2 (2.6)	8.2 (2.5)
Married	1=Married;0=divorced, widowed, separated, or never married	50.8%	52.7%	49.0%
Children at home	1=Respondent's children <18 in household; 0=No children of respondent <18 in HH	29.6%	26.6%	32.3%
Work Force	1=Participating in workforce; 0=Not working	63.5%	69.5%	58.0%
Individual income	1=Less than 10,000; 2=10-19,999; 3=20,000-29,999; 4=30,000-39,999; 5=40,000-49,999; 6=50,000-74,999; 7=75,000 or more	3.0 (2.0)	3.5 (2.1)	2.6 (1.8)
Depression and Drug Use Variables				
Lifetime Depression	1=Major depressive episode in lifetime; 0=No major depressive episode in lifetime	14.8%	9.6%	19.6%
Past Year Marijuana Use	1=Use; 0=No use	11.1%	13.7%	8.6%
Past Year Cocaine Use	1=Use; 0=No use	2.4%	3.3%	1.5%
Past Year Other Illicit Substance Use	1=Use; 0=No use	7.3%	8.2%	6.4%
Past Year Any Illicit Substance Use	1=Use; 0=No use	14.9%	17.6%	12.3%
Any drug use more than 12 months ago	1=Use; 0=No use	44.9%	49.8%	40.0%

Note: Standard deviations in parentheses.

STAGE ONE FINDINGS

We use logistic regression models to analyze these data and the results of this analysis are presented in Exhibit 2, which presents both unstandardized logistic coefficients and odds ratios (in parentheses). In this and subsequent Exhibits, the dependent variable is the dichotomous indicator of any self-reported crime, with those respondents reporting any drug sale, assault, or theft in the past 12 months coded as 1, and those not reporting crime coded as 0. Thus, the unstandardized coefficients and odds ratios represent the likelihood of committing a crime in the 12 months preceding the interview.

Demographic and Structural Variables. Before adding the key variables for drug use and depression, the effect of the demographic variables was examined. As the first row in Exhibit 2 demonstrates, the female coefficient is significantly negative in all models. The odds ratio for "female" in Model 1 gives a better idea of what these coefficients represent. A significant odds ratios with a value below 1 indicates that the independent variable reduces the odds of the dependent variable having a value of 1 (crime), and an odds ratio greater than 1 indicates an increase in these odds. Subtracting 1 from the ratio and multiplying by 100 gives the percent change in the odds of the dependent variable having a value of 1. Thus, the odds for females (.45 in Model 1 of Exhibit 2) indicates that, compared to males, being female is associated with a 55 percent decrease in the odds of crime.

Exhibit 2. Logistic Regression Models Predicting Any Crime in Past 12 Months

Variable	Model 1	Model 2	Model 3	Model 4
Demographic & Structural Variables				
Female	-.80**	-.73**	-.70**	-.79**
	(.45)	(.48)	(.50)	(.45)
African American	.47**	.56**	.56**	.61**
	(1.60)	(1.75)	(1.75)	(1.84)
Age	.45**	.22**	.19**	.20**
	(1.57)	(1.25)	(1.21)	(1.22)
Age-squared	-.03**	-.02**	-.02**	-.02**
	(.97)	(.98)	(.98)	(.98)
Education	-.06**	-.07**	-.08**	-.08**
	(.94)	(.93)	(.92)	(.92)
Married	-.85**	-.58**	-.54**	-.48**
	(.43)	(.56)	(.58)	(.62)
Children at home	.20*	.27**	.20*	.20*
	(1.22)	(1.31)	(1.22)	(1.22)
Work Force	-.20**	-.21**	-.25**	-.24**
	(.82)	(.81)	(.78)	(.79)
Individual income	-.16**	-.15**	-.16**	-.15**
	(.85)	(.86)	(.85)	(.86)
Depression and Drug Use Variables				
Drug use past 12 months		1.91**	1.66**	1.66**
		(6.75)	(5.26)	(5.26)
Drug use more than 12 months ago			.64**	.58**
			(1.90)	(1.79)
Lifetime depression				.55**
				(1.73)
Constant	-2.44	-2.44	-2.39	-2.43
Number of Cases	36,899	36,899	34,870	34,532
-2 Log Likelihood	10649.6**	9616.3**	9023.8**	8873.4**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * $p < .05$ ** $p < .01$

As Exhibit 2, Model 1 reveals, being African American has a positive effect on crime,

consistent with previous studies. Our models include both age and its square to model an

expected curvilinear effect of age: respondents increase their rates of offending as they age into

the highest offending ages (late teens/early 20s), but as they start to age beyond the mid-20s,

their rates of crime decline. Indeed, this is what we find: the main effect of age is significantly

positive, and age-squared (capturing the crime-reducing impact of age as respondents mature) is significantly negative. Education has a negative relationship with crime, suggesting that each additional unit of education decreases one's likelihood of committing crime.

Examining marriage and children in Model 1, we see that being married lowers an individual's likelihood of committing all types of crimes, while having children at home increases the odds of engaging in crime. This analysis also reveals that participating in the workforce has negative impact on crime. Income has also has a negative impact on self-reported criminal activity. Overall, our analysis of demographic and social structural variables tend to agree with previous research suggesting that individuals who have social bonds to family, education, employment, and additional income tend to engage in less crime than those who lack these social bonds. These variables are important controls throughout the analyses, but hereafter we focus on our key measures of drug use and depression.

Depression and Drug Use. Models 2, 3, and 4 of Exhibit 2 add the key independent variables of depression and drug use. Even after these variables are added to the analysis, the demographic and structural controls are consistent in strength and direction. Model 2 adds drug use in the past twelve months. This measure includes the use of any illegal drugs; we find an especially strong effect of recent drug use on crime, with respondents who used drugs 575 percent ($6.75 - 1 \times 100 = 575$) more likely to engage in crime than those who did not use drugs. This effect is slightly smaller (but still quite large) in Model 3, which controls for a history of drug use (greater than 12 months ago). The inclusion of a dummy for drug use more than 12 months ago serves to control for individual propensity for deviant behavior. This corrects for bias in parameter estimates due to the omission of unmeasured, stable characteristics of

individuals (Kessler and Greenberg 1981; De Coster 2005). Controlling for deviant propensity, we still find an especially strong effect of current drug use on self-reported crime.

Keeping these controls for drug use (both current and historically), we find strong evidence of a positive relationship between a major depressive episode and self-reported crime (see Model 4). Respondents who have a history of depression (at any point in the respondent's lifetime) are 73 percent more likely to engage in criminal activity than respondents who have no history of depression. We explore these drug use and depression effects in greater detail—by examining gender differences—in the following exhibits.

Gendered Effects of Drug Use and Depression on Crime

We further examine the gendered effects of the independent variables on crime by modeling separate regressions of female and male sub-samples (in Exhibit 3 and subsequent Exhibits). For every independent variable, we conducted a z-test to formally test whether the effect of the coefficient is significantly different for male and female respondents. Statistically significant gender differences are shaded in our exhibits.

The first two columns of Exhibit 3 demonstrate that male and female respondents appear similar in terms of the effects of race, age, marriage, employment, income, and past drug use on crime. There are statistically significant differences, however, in the impacts of educational attainment, children, depression, and recent drug use. Compared to men, educational attainment has a significantly different effect on women. Each additional increment of education for women reduces the odds of self-reported crime by 16 percent, whereas the effect of educational attainment is not significant for men. The effect of children is significant only for men, with male respondents who have children significantly more likely to engage in crime; children have little impact on women's crime. Depression also presents a gendered impact: generally depression

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increases both men's and women's rates of criminal activity, but this effect is particularly strong for women. Men who are depressed increase their odds of crime by 49 percent whereas women who are depressed increase their odds of criminal activity by over 116 percent. Recent drug use similarly has a particularly large effect on women's crime, although it also raises the odds of crime by men.

Exhibit 3. Logistic Regression Models Predicting Any Self-Reported Crime or Arrest in the Past 12 Months

Variable	Any Self-Reported Crime		Any Arrest	
	Women	Men	Women	Men
Demographic & Structural Variables				
African American	.70**	.59**	.26	.46**
	(2.01)	(1.80)	(1.30)	(1.58)
Age	.22**	.19**	.72**	.49**
	(1.25)	(1.21)	(2.05)	(1.63)
Age-squared	-.02**	-.02**	-.04**	-.02**
	(.98)	(.98)	(.96)	(.98)
Education	-.17**	-.03	-.23**	-.17**
	(.84)	(.97)	(.79)	(.84)
Married	-.53**	-.46**	-1.09**	-.96**
	(.59)	(.63)	(.34)	(.38)
Respondent Kids in HH	-.01	.35**	.90**	.18
	(.99)	(1.42)	(2.46)	(1.20)
Work force	-.16	-.27**	-.85**	.18
	(.85)	(.76)	(.43)	(1.20)
Individual income	-.20**	-.14**	-.15*	-.27**
	(.82)	(.87)	(.86)	(.76)
Depression and Drug Use Variables				
Lifetime depression	.77**	.40**	.01	.09
	(2.16)	(1.49)	(1.01)	(1.09)
Drug use past 12 months	1.89**	1.54**	2.02**	.93**
	(6.62)	(4.66)	(7.54)	(2.54)
Drug use more than 12 months ago	.39*	.71**	.51*	1.38**
	(1.48)	(2.03)	(1.67)	(3.97)
Constant	-3.00	-2.61	-5.88	-4.66
Number of Cases	17,698	16,834	17,473	16,410
-2 Log Likelihood	3415.8**	5411.6**	1866.393**	4250.612**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * p < .05 ** p < .01
Shaded cells indicate statistically significant gender differences using z-tests.

Depression, Drug Use, and Any Arrest

In addition to our analysis of the predictors of self-reported crime, we also considered the gendered effect of depression and drug use on arrests. Most of our analyses concentrated on self-reported behavior because using arrests as the outcome of interest has serious limitations, including concerns that it represents offenders who were *caught*, not necessarily an accurate indication of actual criminal behavior. Using arrests as an outcome is perhaps a better indicator of the behavior of police than a strict measure of the criminal propensity of offenders. Nevertheless, because the NSDUH asked more detailed questions about arrest than it did about self-reported criminal behavior, we also considered arrests as an outcome for supplemental analyses. The NSDUH inquired about past year arrest for violent offenses (including rape, murder, robbery, assault, and aggravated assault), property offenses (motor vehicle theft, arson, burglary, larceny/theft, and fraud/stolen goods), drug sales, and "other" offenses (including prostitution, weapons possession, DUI, and sex offenses not including rape or prostitution). We consider each of these types of arrests as dependent variables, in addition to a measure of any arrest in the past year.

Our analysis of gender differences in arrest is presented in the last two columns of Exhibit 3. Compared to the self-reported crime analysis in the first two columns, we find a few differences, including educational attainment, which does not have a gendered effect in this analysis, and age-squared, which does have a gendered age effect, particularly decreasing the odds of arrest for women.

Examining the key variables of depression and drug use, we find that lifetime depression does not have a gendered effect in this model, nor is it statistically significant for either males or females, as it was for self-reported crime. This suggests that, although depression appears to

have a significant effect on criminal behavior—particularly for women—it does not appear to affect the likelihood of the respondent being arrested. Past and recent drug use does present a gendered impact: generally drug use increases the odds of arrest for both males and females, but the effect for recent use is particularly strong for females, and past use is particularly strong for males. This historical use was not significantly different for men and women in the self-reported crime analysis.

Females who used drugs more than 12 months ago increase their odds of arrest by 66 percent whereas males who used more than 12 months ago increase their odds of arrest by approximately 297 percent. Recent drug use has a particularly large effect on women's arrest, although it also raises the odds of arrest by men.

Drug-Specific Analyses

Three categories of illicit substances were individually examined to determine their differential impact on crime: marijuana, cocaine, and other illicit substances; we also control for historical use of any illegal substance (and consequently an approximation of deviant propensity) in these analyses. Overall, past year use of each of the illegal substances has a strong positive effect on crime, as can be seen in the first two columns of Exhibit 4. In most cases, the effect of these substances on men and women is very similar.

Exhibit 4. Logistic Regression Models Predicting Any Crime in Past 12 Months

	Any Self-Reported Crime		Any Arrest	
Variable	**Women**	**Men**	**Women**	**Men**
Demographic & Structural Variables				
African American	.84**	.76**	.36*	.59**
	(2.32)	(2.14)	(1.43)	(1.80)
Age	.16*	.14*	.63**	.46**
	(1.17)	(1.15)	(1.88)	(1.58)
Age-squared	-.01**	-.02**	-.03**	-.02**
	(.99)	(.98)	(.97)	(.98)
Education	-.17**	-.03	-.23**	-.17**
	(.84)	(.97)	(.79)	(.84)
Married	-.46**	-.38**	-1.03**	-.95**
	(.63)	(.68)	(.36)	(.39)
Respondent Kids in HH	.09	.40**	1.11**	.19
	(1.09)	(1.49)	(3.03)	(1.21)
Work force	-.09	-.27**	-.76**	-.20
	(.91)	(.76)	(.47)	(.82)
Individual income	-.19**	-.14**	-.12	-.27**
	(.83)	(.87)	(.89)	(.76)
Depression and Drug Use Variables				
Lifetime depression	.74**	.41**	-.05	.07
	(2.10)	(1.51)	(.95)	(1.07)
Marijuana use past 12 months	1.14**	1.13**	1.42**	.41**
	(3.13)	(3.10)	(4.14)	(1.51)
Cocaine use past 12 months	.84**	.88**	.87**	.77**
	(2.32)	(2.41)	(2.39)	(2.16)
Any other illicit drug use past 12 months	1.14**	.89**	.90**	.48**
	(3.13)	(2.44)	(2.46)	(1.62)
Drug use more than 12 months ago	.55**	.71**	.63**	1.49**
	(1.73)	(2.03)	(1.88)	(4.44)
Constant	-2.88	-2.46	-5.58	-4.57
Number of Cases	17,698	16,834	17,473	16,410
-2 Log Likelihood	3347.2**	5226.8**	1821.69**	4222.47**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * p < .05 ** p < .01
Shaded cells indicate statistically significant gender differences using z-tests.

The first two columns of Exhibit 4 demonstrate that use of marijuana appears to exert the strongest effect on criminal activity—for both men and women. All illegal substances, however, strongly increase the odds of criminal activity, despite our inclusion of a control for previous deviant activity—drug use more than 12 months ago. By adding this measure of prior use we still find that recent use has the largest impact on crime. Again, despite multiple controls for various

types of drug use, we still find statistically significant gender differences in the impact on depression on criminal activity. Women who are depressed are significantly more likely to engage in crime than are depressed men.

Depression, Types of Drug Use, and Any Arrest

We again conducted supplementary analyses where we examined the effect of social and economic factors, depression, and drug use on the dependent variable of arrest. We present these results in the final two columns of Exhibit 4. Compared to the first two columns, we find several differences. These differences include the impact of educational attainment, children, and being a part of the work force. Among our primary variables of interest, we find that depression has little effect on arrests, but past year marijuana use has a significant gendered effect. Females who used marijuana in the past 12 months increased their odds of arrest by over 313 percent. Men who used marijuana also had higher odds of arrest, but this only increases the odds of arrest by 51 percent. Drug use more than 12 months ago also has a significant gendered difference on arrest: it increases the odds of arrest for men and women, but much more so for males, increasing their odds of arrest by 344 percent.

Offense Specific Analyses

We were also curious about the impact of depression and drug use on various types of criminal activity. Therefore, we separated out our "any crime" models to focus on the three different types of self-reported criminal activity asked about in the NHDUH survey: drug sales, assault, and theft. These results are presented in Exhibit 5.

Exhibit 5. Logistic Regression Models Predicting Three Types of Crime in Past 12 Months

Variable	Drug Sales		Assault		Theft	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Depression and Drug Use Variables						
Lifetime depression	.30	-.05	1.13**	.69**	.57**	.20
	(1.35)	(.95)	(3.10)	(1.99)	(1.77)	(1.22)
Drug use in past 12 months	2.33**	2.28**	1.76**	.78**	1.51**	1.32**
	(10.28)	(9.78)	(5.81)	(2.18)	(4.53)	(3.74)
Drug use more than 12 months ago	.80**	.68**	.12	.66**	.60*	.61**
	(2.23)	(1.97)	(1.13)	(1.93)	(1.82)	(1.84)
Constant	-5.86	-5.20	-2.86	-3.04	-4.64	-3.23
Number of Cases	17,681	16,798	17,688	16,824	17,684	16,819
-2 Log Likelihood	1521.4**	3076.4**	2292.3**	3379.5**	1276.8**	2235.7**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * p < .05 ** p < .01
Shaded cells indicate statistically significant gender differences using z-tests.
Models also control for African American, age, age^2, married, children, workforce, education, married, and
individual income.

In Exhibit 5 we find gender differences in the predictors for the various offense types. In

the interest of parsimony, we only present the key independent variables, and list the controls we

included in each model at the bottom of the Exhibit. The positive relationship between

depression and crime is larger for women, compared to men, and this is particularly true for

assault. The odds of committing assault for depressed women is more than three times as high as

the odds for women who are not depressed, while depression increases men's odds of

committing an assault by only 99 percent. However, for the other offense types (drug sales and

theft), although the depression coefficient is larger for women and suggestive of a greater impact

on women, we fail to find that depression raises women's drug sale and theft rates significantly

more than it raises men's.

The use of any illegal drug (including marijuana, cocaine, heroin, and other illicit

substances) during the past year has a very strong positive effect on all types of crime, even

when controlling for other factors such as historical drug use. The effect is similar on men and

women for drug sales and theft, but the impact of past year drug use is stronger on women's

assault than on men's assault. The odds of committing assault for women who have recently used illicit substances are nearly 6 times the odds for other women, while the odds for men who have recently used are only 118 percent higher than the odds for other men. Our analysis points to a complex gendered relationship between assault and drug use: the effect of recent use on assault is stronger for women, although the effect of drug use more than 12 months ago is stronger for men.

Depression, Drugs, and Arrest Types

We also examined the key independent variables and gender differences in their impact on the four arrest types available in this dataset. These models are presented in Exhibit 6. Our dependent variables for this exhibit include: arrests for past year violent crime (rape, murder, robbery, assault, and aggravated assault), property crime (arson, burglary, larceny, motor vehicle theft, and fraud or stolen goods), drug sales (including possession, manufacture, or sale of drugs), and other crimes (driving under the influence of alcohol or drugs, drunkenness, possession of tobacco, prostitution, and other sex offenses not including rape or prostitution). Generally, we note little impact of depression on arrest types, but we do find a statistically significant gender difference in the effect of depression on other crimes: depression does not seem to increase the odds of arrest for "other" crimes for women, but it does for men.

Exhibit 6 also demonstrates that there are statistically significant gender differences in the effects of current (past 12 months) and past (more than 12 months ago) illicit drug use on violent arrests. Females who used drugs within the past 12 months have especially high odds of being arrested for violent crime when compared to males. Historical drug use, however, has the opposite effect on women. Drug use more than 12 months ago results in females lowering their

odds of arrest for a violent crime by 87 percent, but for males, it increases their odds of arrest for

violence by 610 percent.

Exhibit 6. Logistic Regression Models Predicting Four Types of Arrest in Past 12 Months

	Violent Arrest		Property Arrest		Drug Sale Arrest		Other Crime Arrest	
Variable	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**
Depression and Drug Use Variables								
Lifetime depression	.05	.29	.17	.04	.43	-.27	-.25	.35*
	(1.05)	(1.34)	(1.19)	(1.04)	(1.54)	(.76)	(.78)	(1.42)
Drug use in past 12 months	3.84**	.24	1.09**	.56**	2.41**	2.60**	2.25**	.95**
	(46.53)	(1.27)	(2.97)	(1.75)	(11.13)	(13.46)	(9.49)	(2.59)
Drug use more than 12 months ago	-2.04**	1.96**	1.71**	1.78**	3.38*	.91	1.11*	1.15**
	(.13)	(7.10)	(5.53)	(5.93)	(29.37)	(2.48)	(3.03)	(3.16)
Constant	-5.97	-5.57	-5.71	-4.49	-10.83	-8.41	-7.32	-5.81
Number of cases	17,474	16,411	17,475	16,410	17,474	16,411	17,475	16,412
-2 Log-Likelihood	738.6**	1523.5**	753.1**	1532.9**	367.8**	1092.9**	776.1**	2556.9**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * p < .05 ** p < .01
Shaded cells indicate statistically significant gender differences using z-tests.
Models also control for African American, age, age^2, married, children, workforce, education, married, and
individual income.

We believe that these significant gender differences in the impact of historical drug use

may be at least partially explained by internalizing versus externalizing socialization of men and

women. Because these models are also controlling for current substance use, the impact of the

historical drug use variable is essentially an indicator of propensity for deviance, and the

respondent's degree of entrenchment in drug use. Thus, the violent crime analysis suggests that

the stress of long-term substance use and addiction is unlikely to increase women's rates of

violence (or at least their rates of arrest for violence), but it does for men. Instead, women may

direct this stress of long-term drug use inwardly—as women tend to be socialized to do; men,

however, tend to be socialized to direct this stress outwardly, and to act violently (or at least be

arrested for this violence).

Two-Stage Least Squares Regression Analysis

Thus far, this report has assumed that the mental illness indicators of depression and substance abuse are modeled appropriately as occurring prior to the dependent variable of crime.[4] We further worked to model this assumption by using past year crime as our dependent variable, and lifetime depression and a measure of drug use greater than twelve months ago as our key independent variables. This was done to approximate correct temporal ordering to the extent possible using this cross-sectional dataset.

Nevertheless, there may still be concerns about the correct ordering of the mental illness and crime relationship, so we also examined the ordering of the drug use and criminal activity for men and women. Thus, we estimated two-stage least-squares (2SLS) models to shed light on the question of whether (a) drug use causes crime or (b) crime causes mental illness (see Hagan 1997; Hagan & Foster 2003). This analysis makes use of the data structure regarding the timing of drug use to approximate a longitudinal dataset, by creating "time 1" and "time 2" variables. "Time 1" variables consist of drug use behaviors reported to occur more than 12 months earlier whereas "time 2" behaviors have occurred within the past 12 months (as of the interview date).[5] In these models, time 1 values of substance use are used as instrumental variables to define the reciprocal paths between drug use and crime. Using 2SLS, the reciprocal effects at time 2 can be estimated (see Kessler & Greenberg 1981), which represents the sum of the lagged and contemporaneous relationships between crime and drug use (see Hagan & Foster 2003). The coefficients from these reciprocal models (modeling for men and for women) therefore indicate the strength of the two relationships: drug use on crime and crime on mental illness.

Using 2SLS, we find evidence supportive of these relationships working in both directions. We find evidence of a reciprocal effect: illegal drug use significantly increasing the

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likelihood of crime, and criminal behavior significantly increasing the likelihood of additional drug use. [6] These relationships are apparent for both men and women, although the path leading from crime to drug use is larger for all respondents and is significantly larger for women than it is for men. Thus, we find evidence that these relationships are not unidirectional, but instead are reciprocal, with drug use increasing crime rates, and criminal activity increasing rates of drug use; this second path is particularly important for women. We analyze this effect of crime (and interaction with the criminal justice system) on drug use in stage three of this report.

Summary of Stage One Findings

Our evidence points to robustly positive effects of depression and drug use on criminal behavior. In general, being depressed and using illegal substances significantly increases the odds of crime, for both men and women. We believe that the negative affects associated with depression and drug use create strain that respondents seek to alleviate via criminal behavior. Depressed people may act out—especially via assault—in an attempt to deal with their negative emotions. Recent drug use especially increases criminal activity for women, and this is especially apparent for assault. We suspect that part of this gender difference is due to a saturation effect—the rate of assault is already considerably higher for men compared to women. Thus, each additional stressor, such as drug use, is not likely to raise the odds of male drug use much above their preexisting high level. Among women, however, their comparatively lower rates of aggressive behavior means that the additional stressor (via a "masculine" behavior like drug use) has potential to create previously unlikely assaultive behavior.

STAGE TWO FINDINGS

Because stage one demonstrates significant effects of depression and drug use on crime,

it seems evident that an examination of the impact of substance abuse and mental health

treatment on crime is warranted. We examine these topics in stage two. New variables used in

this stage are presented in Exhibit 7. Because a diagnosis of drug dependency is more stringent,

and is perhaps a necessity before expecting drug treatment, we alter our modeling of drug use in

this stage. We now consider a dichotomous indicator of dependency on any illicit substance; this

variable indicates which respondents meet the *Diagnostic and Statistical Manual of Mental*

Disorders (DSM) criteria for substance dependence (APA 1994). This was chosen because not

all individuals who use an illegal substance are considered addicted and in need of treatment.

We also consider several measures of treatment in this stage. Because we wanted to

maintain the correct temporal ordering to the extent possible using these data, we made several

decisions regarding the correct variable to use. First, because treatment for drug dependency is

likely to require a period of time before any results can reasonably be expected, we chose to use

an indicator of drug treatment more than 12 months ago as our measure of substance treatment.

This was particularly important because the dependent variable of interest refers to self-reported

crime in the past 12 months. Therefore use of this measure ensures that any drug dependency

treatment occurs prior to criminal activity. In contrast, our second decision had to do with

treatment for depression. Although antidepressants typically require a brief adjustment period,

they are generally expected to only be effective when an individual is actively taking them. Thus,

our measure of depression treatment refers to past year treatment. We similarly consider a

measure of any treatment for depression (medication, therapy, or other) in the past year. We use

this second depression treatment measure less often, however, because our analyses demonstrate

little significant effect of this variable on crime.

Exhibit 7. Descriptive Statistics (N =35,455 listwise deletion)

Variable	Description	Weighted Mean/Percent
Drug dependency	1=High dependence on any one of nine drug types (marijuana, cocaine, heroin, hallucinogen, inhalant, prescription pain killer, tranquilizer, stimulant, sedative); 0=No dependence on any of the above substances.	16.0%
Drug treatment greater than 12 months ago	1=Any form of treatment for substance dependence; 0=No treatment	3.0%
Depression Rx last yr	1=Antidepressant treatment; 0=No treatment	4.0%
Depression treatment last year	1=Any form of treatment for depression; 0=No treatment	6.0%

Note: Standard deviations in parentheses.

Exhibit 8 demonstrates significant gender differences in the effect of depression and self-medication for depression (our depression $\times$ dependence scale measure) on self-reported criminal behavior. Depression generally increases crime (as was reported in stage one), and it especially increases criminal behavior for women. Respondents who are depressed and who also meet the DSM criteria for substance dependence (what we term "self-medicating") actually appear to mediate the effects of their strain and generally have lower rates of crime; this is especially true for women. We find no significant effects of depression or substance abuse treatment, however.

Exhibit 8. Logistic Regression Models Predicting Any Crime in Past 12 Months

Variable	Combined	Female	Male
Depression and Drugs			
Depression (lifetime)	.95**	1.35**	.52**
	(2.59)	(3.86)	(1.68)
Substance Dependence Scale	5.42**	5.54**	5.37**
	(225.88)	(254.68)	(214.86)
Depression × Dependence Scale	-1.99**	-2.79**	-.96
	(.14)	(.06)	(.38)
Criminal History			
History of arrest	.87**	1.22**	.72**
	(2.39)	(3.39)	(2.05)
Treatment			
Depression treatment	.07	.05	.08
	(1.07)	(1.05)	(1.08)
Drug treatment	.17	.19	.17
	(1.19)	(1.21)	(1.19)
Constant	-3.13	-3.70	-3.26
Number of Cases	35,749	18,333	17,089
-2 Log Likelihood	8787.1**	3373.0**	5357.1**

Note: Unstandardized logistic coefficients with odds ratios in parentheses. $* p < .05 ** p < .01$
Shaded cells indicate significant difference between sexes using a z-test.
Models also control for female (combined model only), African American, age, age^2, married, children, workforce, education, married, and individual income.

Because we find little effect of substance dependence and/or depression treatment on crime in Exhibit 8, we examine treatment in more detail in the subsequent exhibits. Exhibit 9 examines the interaction between age and treatment for substance dependency on crime.

Exhibit 9. Logistic Regression Models Predicting Any Crime in Past 12 Months

Variable	Combined	Female	Male
Drugs and Treatment			
Age × drug treatment > 12 mo. ago	-.08**	-.03	-.10**
	(.92)	(.97)	(.90)
Drug treatment > 12 mo. ago	1.11**	.52	1.36**
	(3.03)	(1.68)	(3.90)
Substance dependency	4.93**	4.75**	5.05**
	(138.38)	(115.58)	(156.02)
Criminal History			
History of arrest	1.05**	1.34**	.94**
	(2.86)	(3.82)	(2.56)
Demographics			
Age	-.15**	-.11**	-.18**
	(.86)	(.90)	(.84)
Constant	-2.209	-2.577	-2.382
Number of Cases	53,821	28,202	25,619
-2 Log Likelihood	13405.488**	5296.190**	8047.578**

Note: Unstandardized logistic coefficients with odds ratios in parentheses. * $p < .05$ ** $p < .01$
Shaded cells indicate significant difference between sexes using a z-test.
Models also control for female (combined model only), African American, education, married, children at home, and individual income.

In Exhibit 9, we find no significant gender differences in the effect of treatment, but we do find a significant age effect of treatment. Older respondents who received drug treatment have significantly lower odds of self-reported crime. Among younger respondents, however, the effect of drug treatment appears to be positive, suggesting that these respondents are perhaps not mature enough to benefit from treatment.[7] This finding suggests that a one-size-fits-all drug treatment model may not be meeting the needs of youth. Finally, the substance dependency variable indicates that respondents with substance dependency who have not experienced treatment have much greater odds of crime.[8]

Exhibit 10 examines depression and treatment for depression in greater detail. From our age × depression medication interaction, we find that older respondents who take antidepressants

have significantly reduced odds of crime. The main effect of depression medication indicates that younger respondents who take antidepressants are more likely to engage in crime.

Exhibit 10. Logistic Regression Models Predicting Any Crime in Past 12 Months

Variable	Combined	Female	Male
Depression and Treatment			
Age × depression medication	-.08**	-.08**	-.08*
	(.92)	(.92)	(.92)
Depression medication	.95**	.99**	.87**
	(2.59)	(2.69)	(2.39)
Lifetime depression	.85**	1.00**	.70**
	(2.34)	(2.72)	(2.01)
Demographics			
Age	.38**	.39**	.38**
	(1.46)	(1.48)	(1.46)
Constant	-2.71	-3.25	-2.63
Number of Cases	36,436	18,742	17,694
-2 Log Likelihood	19828.3**	7944.0**	11839.7**

Note: Unstandardized logistic coefficients with odds ratios in parentheses. $* p < .05 ** p < .01$
Shaded cells indicate significant difference between sexes using a z-test.
Models also control for age^2, female (combined model only), African American, education, married, children, arrest history, and individual income.

In Exhibit 10, the effect of lifetime depression indicates that depressed respondents who do not receive treatment (in the form of antidepressants) are significantly more likely to engage in crime, and this is particularly true for women. This suggests that depression treatment (at the least, antidepressant medication) is important for reducing crime rates, but this is particularly true for older respondents; [9] and among those who do not receive treatment, women are particularly burdened and appear to experience the highest levels of strain, leading to especially high rates of crime.

Exhibits 11 through 13 re-present the results from Exhibits 8, 9, and 10, but with offense-specific dependent variables. Exhibit 11 focuses on depression and the substance dependence scale, controlling for treatment for depression and drugs.

Exhibit 11. Logistic Regression Models Predicting Three Types of Crime in Past 12 Months

Variable	Drug Sales		Assault		Theft	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
Depression and Drugs						
Depression (lifetime)	.78**	.60**	1.43**	1.01**	.86**	.73**
	(2.18)	(1.82)	(4.18)	(2.75)	(2.36)	(2.08)
Substance Dependence Scale	6.57**	6.31**	3.52**	2.93**	3.58**	3.79**
	(713.37)	(550.04)	(33.78)	(18.73)	(35.87)	(44.26)
Depression × Dependence Scale	-1.66**	-1.67**	-1.78**	-1.67**	-.68	-1.70**
	(.19)	(.19)	(.17)	(.19)	(.51)	(.18)
Depression and Drug Use Variables						
Any depression treatment	.14	-.18	.31*	.45**	.31	.30
	(1.15)	(.84)	(1.36)	(1.57)	(1.36)	(1.35)
Any drug use treatment	.10	.47**	.06	.05	-.15	-.79**
	(1.11)	(1.60)	(1.06)	(1.05)	(.86)	(.45)
Constant	-6.90	-6.18	-3.85	-3.35	-5.00	-4.20
Number of Cases	18,311	17,048	18,317	17,075	18,315	17,073
-2 Log Likelihood	2691.5**	4860.5**	4930.6**	7756.2**	3010.7**	4677.0**

Note: Unstandardized logistic coefficients with odds ratios in parentheses. * $p < .05$ ** $p < .01$
Shaded cells indicate statistically significant gender differences using z-tests.
Models also control for African American, Age, Age^2, Education, Married, Children, arrest history, and Individual income.

In Exhibit 11 we find a few differences compared to Exhibit 8, which used "any self-reported crime" as the dependent variable. For example, depression and drug treatment had little effect on crime in Exhibit 8. But when we consider the specific types of crime, we find that treatment for depression appears to increase the odds of assaultive behavior for men and women, but it has little effect on drug sales or theft. Additionally, drug use treatment appears to increase the odds of drug sales for men, but it significantly decreases the odds of theft for men. We see few gender differences, with the exception of the models focusing on assault. Controlling for those who self-medicate (respondents with depression who have a substance dependence), we

find that those with major depressive disorder who do not have a substance dependence are
significantly more likely to engage in assault; this is particularly true for women.

Exhibit 12 examines drug use and treatment measures and their impact on the three
specific criminal offenses. This Exhibit suggests that, although there are no apparent gender
differences, there are apparent offense-type differences in the impact of treatment for substance
dependency. Older respondents who undergo treatment for their substance dependence are
particularly likely to have decreased odds of drug sales. In contrast, younger respondents who
experience drug treatment (indicated by the main effect of "drug treatment") appear to be
particularly prone to engage in drug sales. Finally, respondents who meet the DSM criteria for
substance dependence are particularly prone to engage in all forms of illegal behavior, but this
effect is particularly large for drug sales.

Exhibit 12. Logistic Regression Models Predicting Three Types of Crime in Past 12 Months

	Drug Sales		Assault		Theft	
Variable	**Women**	**Men**	**Women**	**Men**	**Women**	**Men**
Drugs and Treatment						
Age × drug treatment	-.14*	-.19**	-.03	-.05	-.07	-.09
	(.87)	(.83)	(.97)	(.95)	(.93)	(.91)
Drug treatment	1.70**	2.28**	.47	.43	.45	.22
	(5.47)	(9.78)	(1.60)	(1.54)	(1.57)	(1.25)
Substance dependency	6.08**	5.72**	3.09**	2.67**	3.64**	3.40**
	(437.03)	(304.90)	(21.98)	(14.44)	(38.09)	(29.96)
Demographic & Structural Variables						
Age	-.03	-.07**	-.16**	-.16**	-.14**	-.16**
	(.97)	(.93)	(.85)	(.85)	(.87)	(.85)
Constant	-5.86	-4.46	-2.85	-2.45	-3.81	-3.31
Number of Cases	28,180	25,568	28,188	25,600	28,188	25,602
-2 Log Likelihood	4155.5**	7499.0**	6624.1**	10351.6**	4018.1**	6134.0**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * $p < .05$ ** $p < .01$
Shaded cells indicate statistically significant gender differences using z-tests.
Models also include controls for African American, education, married, children, arrest history, and individual
income.

Exhibit 13 considers the effects of depression and treatment for depression on the three offense-types. Controlling for the interaction effect of age and antidepressant medication—which tends to result in lower odds of crime—we find that younger respondents who are taking antidepressants tend to be much more likely to engage in criminal activity. This is especially true for women engaging in drug sales. Generally, those who meet the DSM criteria for major depressive episode (MDE) are more likely to engage in all types of crime, but Exhibit 13 suggests that MDE is particularly likely to lead to women's assaultive and theft-related behavior.

Exhibit 13. Logistic Regression Models Predicting Three Types of Crime in Past 12 Months

	Drug Sales		Assault		Theft	
Variable	Women	Men	Women	Men	Women	Men
Depression and Treatment						
Age × depression medication	-.13**	-.003	-.02	-.09*	-.06	-.08
	(.88)	(1.00)	(.98)	(.91)	(.94)	(.92)
Depression medication	1.51**	.13	.60*	.85**	.71	1.01*
	(4.53)	(1.14)	(1.82)	(2.34)	(2.03)	(2.75)
Lifetime depression	.60**	.40**	1.16**	.83**	.86**	.52**
	(1.82)	(1.49)	(3.19)	(2.29)	(2.36)	(1.68)
Demographic & Structural Variables						
Age	.77**	.76**	.25**	.30**	.42**	.25**
	(2.16)	(2.14)	(1.28)	(1.35)	(1.52)	(1.28)
Constant	-5.79	-5.31	-3.32	-2.95	-4.58	-3.63
Number of Cases	18,726	17,657	18,733	17,685	18,728	17,681
-2 Log Likelihood	3544.5**	6175.4**	5360.3**	8411.8**	3412.2**	5305.5**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * p < .05 ** p < .01
Shaded cells indicate statistically significant gender differences using z-tests.
Models also control for African American, age^2, education, married, children, arrest history, and individual income.

Treatment Providers and Completion of Treatment

In our stage two we also considered several additional factors, which we ultimately found had little impact on the outcomes of interest. These independent variables included additional detail regarding the type of mental health treatment the respondent received, including outpatient/inpatient care, help from a social worker or spiritual advisor, treatment in prison/jail,

or other mental health services. We also created new analyses grouping types of treatment: medical/professional (including prescription medication, and outpatient or inpatient services provided by a trained mental health professional). Generally, we found that these indicators had little impact on criminal behavior, although in several instances treatment (both specialty and non-specialty) appeared to increase the odds of criminal behavior, particularly for women.

We also examined additional indicators of the effect of substance abuse treatment on self-reported crime. We generally found that our various indicators of substance abuse treatment significantly increase the odds of criminal behavior. We considered the impact of currently being in treatment for substance abuse at the time of the interview. These respondents were significantly more likely to report crime than those not currently in treatment; this was particularly true for women. Because we suspected these respondents might be finding their way into treatment via the criminal justice system, we included controls for arrest history and still find a significantly positive effect of treatment on crime.

We also considered the impact of having successfully completed substance abuse treatment on crime. Again, we find that successful completion of a treatment program corresponds to greater odds of crime, for both men and women, despite inclusion of controls for substance dependency. Thus, this analysis is not picking up the effect of the most severely addicted respondents who are the most prone to engage in crime. Instead, we seem to find evidence that substance abuse treatment actually increases the odds of criminal activity. Finally, we re-estimated all of the above analyses after selecting only respondents who have a history of illegal drug use; we still tend to find significantly positive effects of treatment for substance abuse on self-reported criminal behavior.

Sample Selection Models

In most cases, a mental illness (either depression or substance dependence) is necessary for receipt of mental health treatment.[10] The most obvious way of estimating this treatment/crime relationship, then, would be to simply eliminate all respondents without a mental disorder who would therefore not have needed treatment. This might, however, obscure important unmeasured factors affecting both mental health treatment and crime, such as a risk-taking personality. It would also eliminate anyone who received "unnecessary" psychiatric treatment. Nevertheless, we did estimate these models (not shown) for substance abuse treatment. We estimated supplementary models sampling only respondents with a history of illegal drug use.[11] Our results were essentially the same as those presented above, with treatment increasing the odds of crime generally, but decreasing crime rates for older respondents.

To account for concerns that by eliminating non-users in this supplementary analysis we biased the outcome, we also modeled the effect of treatment using a correction model for sample-selection. We estimated two-equation probit models that allow for interdependence in the factors leading to both depression/substance abuse treatment and criminal behavior. The first equation predicts the likelihood of crime and the second equation models the selection process predicting treatment.

The results of our sample-selection models are equivalent to those presented above in Exhibits 9 and 10. Despite controlling for the selection into treatment, we continue to see that, in general, individuals who receive depression medication are significantly more likely to engage in criminal behavior. But we also find that older respondents who receive this treatment reduce their odds of crime. This is true for men and women. For substance abuse treatment, older recipients (particularly men) reduce their odds of crime, whereas substance abuse treatment

generally increases the odds of crime for younger recipients. Again, this is particularly true for men.

Summary of Stage Two Findings

Our best evidence points to little impact of treatment for depression on reducing criminal behavior, with the exception of antidepressant medication, which appears to decrease the odds of crime for older respondents. Generally, substance abuse treatment appears to significantly increase the odds of crime, but this appears to be primarily driven by younger respondents who are perhaps not yet mature enough to benefit from treatment. These younger recipients of substance abuse treatment may actually see treatment as an opportunity to make deviant contacts, or may be ordered into treatment by the criminal justice system or other entities, resulting in a low level of commitment, and therefore little effect of treatment on reducing crime rates.

STAGE THREE FINDINGS

Stage three of the research focused on the gender differences in interaction with the criminal justice system, and how these interactions affect subsequent depression and substance use. In Exhibit 14, we present the new independent variables considered in this stage.

Exhibit 14. Descriptive Statistics (N =55,443 listwise deletion)

Variable	Description	Weighted Mean/Percent
History of arrest	1=Any arrest, lifetime; 0=no history of arrest	15.9%
Number of times arrested in past year	0=0; 1=1; 2=2; 3=3 times or more	0.07 (.33)
Probation or parole	1=Respondent on probation or parole in the past year; 0=respondent not on probation/parole	4.0%

Note: Standard deviations in parentheses.

Exhibit 15 shows our prediction of past year major depressive disorder using the criminal justice variables of history of arrest, the number of times arrested in the past year, and whether the respondent was on probation or parole in the past year; we also control for substance dependency. We find that a history of arrest and the number of times arrested in the past year both have positive and significant effects on depression. Being on probation/parole has a positive but weak and non-significant effect.

Exhibit 15. Logistic Regression Models Predicting Depression in Past 12 Months

Variable	Model 1	Model 2	Model 3	Model 4
Drug dependency	2.30**	2.49**	2.68**	
	(9.97)	(12.06)	(14.59)	
History of arrest (lifetime)	.63**			.75**
	(1.88)			(2.12)
Number of times arrest past year		.36**		
		(1.43)		
Probation or parole past year			.11	
			(1.12)	
Constant	-3.411	-3.338	-3.317	-2.976
Number of Cases	36,417	35,905	36,431	36,442
-2 Log Likelihood	19330.0**	19304.3**	19493.0**	19533.7**

Note: Unstandardized logistic coefficients with odds ratios in parentheses. * $p < .05$ ** $p < .01$
Models include controls for female, African American, age, education, married, children, work force, and individual income.

Our subsequent analyses primarily rely on the dichotomous "history of arrest" variable because it comes closest to capturing the time sequence, since it includes arrests that happened prior to this year and thus before the depressive episode. Exhibit 15 shows that respondents with a substance dependency are particularly likely to have a major depressive disorder.

Exhibit 16 considers the predictors of past year drug use. We find that each criminal justice variable has a very strong positive, significant effect on past year drug use. Depressed

respondents are significantly more likely to engage in illegal drug use than are non-depressed

respondents.

Exhibit 16. Logistic Regression Models Predicting Drug Use in Past 12 Months

Variable	Model 1	Model 2	Model 3
Depression (lifetime)	.62**	.69**	.71**
	(1.86)	(1.99)	(2.03)
History of arrest (lifetime)	1.39**		
	(4.02)		
Number of times arrested past year		1.08**	
		(2.95)	
Probation or parole past year			1.22**
			(3.39)
Constant	-1.372	-1.082	-1.178**
Number of Cases	36,492	35,978	36,506
-2 Log Likelihood	26029.4**	26505.4**	27101.5**

Note: Unstandardized logistic coefficients with odds ratios in parentheses. $* p < .05 ** p < .01$
Models include controls for female, African American, age, education, married, children, work force, and individual income.

As Exhibit 17 demonstrates, past use of illegal drugs has a strong, positive, significant

effect on both men's and women's depression. Drug dependency has a significantly larger effect

on women's depression than on men's. A history of arrest is positive and significant in all

models, although it exerts a stronger impact on men's depression than on women's depression.

Exhibit 17. Logistic Regression Models Predicting Depression in Past 12 Months

Variable	Combined	Female	Male
Drug use greater than 12 mo. ago	.87**	.85**	.83**
	(2.39)	(2.34)	(2.29)
Drug dependency	1.76**	2.16**	1.30**
	(5.81)	(8.67)	(3.67)
History of arrest	.39**	.22**	.53**
	(1.48)	(1.25)	(1.70)
Constant	-3.559	-2.716	-3.626
Number of Cases	34,412	17,641	16,771
-2 Log Likelihood	18458.5**	11604.0**	6776.8

Note: Unstandardized logistic coefficients with odds ratios in parentheses. $* p < .05 ** p < .01$
Models also include controls for female (combined model only), African American, age, educational attainment, married, children at home, work force, and individual income.
Shaded cells indicate significant difference between genders according to z-test.

As seen in Exhibit 18, a history of arrests is statistically significant for men and women, but it exerts a significantly larger influence on women's drug use. We believe that this relationship suggests greater stigmatization associated with criminal justice intervention for women, as compared to men. Statistically, arrest is a relatively common occurrence in the lives of men. Among women, however, this is rarer, suggesting that these women will be perceived even more deviant than men who are arrested. This may lead to strain and further entrenchment into deviant behavior, including drug use. Depression is also particularly likely to lead to women's drug use, suggesting that women are more prone to self-medicate than are men.

Exhibit 18. Logistic Regression Models Predicting Drug Use in Past 12 Months

Variable	Combined	Female	Male
Depression (lifetime)	.62**	.69**	.51**
	(1.86)	(1.99)	(1.67)
History of arrest	1.39**	1.60**	1.25**
	(4.01)	(4.95)	(3.49)
Constant	-1.372	-1.508	-1.516
Number of Cases	36492	18770	17722
-2 Log Likelihood	26029.4**	11792.2**	14156.0**

Note: Unstandardized logistic coefficients with odds ratios in parentheses.   * p < .05 ** p < .01
Shaded cells indicate significant difference between genders according to z-test.
Models also control for female (combined only), African American, age, children, married, education, work force, and individual income.

We also considered the effect of arrest history for respondents with children (not shown). This was examined because we hypothesized that respondents with children would be especially likely to perceive arrests as negatively affecting their children. Thus, we believed that arrested respondents with children would be especially prone to depression. We estimated gender-specific models in which we included interaction effects of children × history of arrest. In these analyses, we found that the main effect of arrest history (those without children at home) is positive and

significant for both men's and women's depression. The main effect of having children at home (those without a history of arrest) significantly increases women's depression but does not affect men's depression. The interaction between having kids at home and arrest history is not statistically significant for men or women. Thus, we find little evidence to support the suggestion that women with children will be especially prone to depression when they get arrested because they are removed from, or fearful for, their children.

Sample Selection Models

We also estimated a sample-selection correction model because in most cases a criminal offense is necessary for criminal justice intervention.[12] The most obvious way of estimating this crime/intervention relationship, then, would be to simply eliminate all respondents without a self-reported crime for which to possibly be arrested, convicted, and imprisoned. This might, however, obscure important unmeasured factors affecting both mental illness and criminal justice intervention. It would also eliminate anyone who received "unnecessary" criminal justice intervention. This research therefore estimates two-equation probit models that allow for interdependence in the factors leading to mental illness and criminal justice intervention. The first equation predicts the likelihood of depression/substance use and the second equation models the selection process predicting arrest/criminal justice intervention.

The results of our sample-selection models are similar to those presented in Exhibits 17 and 18. We find that, despite controlling for the selection into criminal justice intervention, those who have in their lifetime experienced an arrest are significantly more likely to have used illegal substances in the past year. This is true for both men and women. We similarly find, after controlling for selection into criminal justice intervention, those who have been arrested are significantly more likely to meet the criteria for major depressive disorder. This is particularly

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true for men.

Summary of Stage Three Findings

Our major findings from stage three focus on the effect of criminal justice interventions on drug use and depression. We find that individuals who have had contact with the criminal justice system—via arrest or community corrections—tend to be much more depressed and more prone to use illegal drugs. Men who interact with the criminal justice system are especially prone to become depressed whereas similar women are especially prone to engage in drug use. We suspect these gender differences might be due to a "saturation effect" (Widom, Ireland, and Glynn 1995). Because women's rates of depression are already significantly higher than men's, and men's rates of illegal drug use tend to be significantly higher than women's, the stress of an arrest and subsequent interaction with the criminal justice system is unlikely to have an additional effect on men's drug use or women's depression. This stressor might, however, elevate the risk of experiencing symptoms/disorders that would not otherwise occur, in this case, depression for men and substance use for women (see Horwitz et al. 2001).

LINKING KEY FINDINGS TO THE LITERATURE

Since several of the key findings from this project raise additional questions regarding the nature of crime and mental illness, we conducted additional investigations into the literature to place our results within the context of prior research.

Depression, Drug Use, and Crime

First, we investigated the relationship between mental illness (in particular, depression) and crime in the literature. The social stress literature in both mental health and criminology (Agnew 1992; Aneshensel 1992; Cullen 1994; Pearlin 1989; Thoits 1995; De Coster 2005)

provide arguments of the relationship between negative emotional states and further negative outcomes including crime and delinquency. The literature in this area focuses on the role stressful life events and social support play in producing emotional and behavior outcomes. Consistently, researchers who focus on social stress find that stressful life events and social support contribute to the onset and course of mental disorder (Aneshensel 1992; Lin et al. 1999; Thoits 1995; Turner and Lloyd 1999; Sigfusdottir, Farkas, and Silver 2004). A large body of criminological research and theory also suggests that stressful life events and social support are important links in the pathways that produce delinquency (Agnew 1992; Colvin et al. 2002; Cullen 1994; Hirschi 1969). Depression and substance abuse (considered to be mental illnesses by the APA) both interfere with social relationships and, from criminological and mental health perspectives, are vital to the prevention of crime and the encouragement of desistance from criminal activity (Laub and Sampson 2003). Together, these literatures suggest that both mental health and crime/delinquency are in part determined by the stress and support contexts within which individuals live (Sigfusdottir et al 2004). In particular for depression, the literature demonstrates a relationship between depressed mood and delinquency, primarily because depressed individuals may feel pressure to relieve their suffering through delinquency (Berkowitz 1986).

Prior research has demonstrated strong positive relationships between the mental disorders of drug use and depression and criminal behavior (Kandel and Davies 1982; Scheier and Botvin 1997; Hoffmann and Su 1997; Knox, Carey, and Kim 2003; Hagan and Foster 2003; Uggen and Thompson 2003; Sigfusdottir, Farkas, and Silver 2004), although an understanding of how gender alters these relationships is largely absent. The few studies of these gendered differences focus primarily on adolescents (see Hoffmann and Su 1997; Hagan and Foster 2003;

DeCoster 2005; Obeidallah and Earls 1999), and do not provide an understanding of how substance abuse and depression affect male and female crime among non-adolescents. Nevertheless, there is prior evidence suggesting that, because depression is more prevalent in females—and this gender gap tends to emerge in early adolescence—its impact on criminal behavior may exert a gendered effect (Obeidallah and Earls 1999; Mirwosky 1996). Obeidallah and Earls (1999) suggest that there are three ways in which depressed feelings may underlie girls' antisocial behavior: (1) depressed feelings may feed girls' indifference regarding their own personal safety and the consequences of their actions—increasing the likelihood of gravitating toward delinquency; (2) depressed adolescents tend to be withdrawn, have limited interests, and suffer low self-esteem, leadings to rejection by prosocial peers, which tends to lead to delinquency; and (3) depression promotes a lack of interest and difficulty concentrating—leading to withdrawal from prosocial activities and institutions, thus increasing the likelihood of antisocial behavior.

It is also important to note that depressed mood has been shown to co-occur with anger in children and adolescents (Compas and Hammen 1994; Evans and Frank 2004). Researchers have argued that symptoms of irritability and anger are so common in depressed children/adolescents that both should be included in the DSM diagnostic criteria for depression (Sigfusdottir et al. 2004). Menaghan (1999) explains that depressed mood—marked by withdrawal from interaction, and feelings of hopelessness toward the future—is often accompanied by outbursts of anger and aggression (see Renouf and Harter 1990; Sigfusdottir et al. 2004). Thus, the "corrective action" of crime or delinquency (Agnew 1992) might be particularly influenced by the anger that accompanies depression, rather than depression alone (see Sigfusdottir et al. 2004). Some evidence also suggests that depression is especially likely to lead to aggression among females

(Knox, Carey, and Kim 2003). Knox et al. (2003) suggest that this gender difference is due to females being more likely to view aggression as a loss of control over themselves when overcome by a negative emotion; in contrast, males tend to view aggression as a rational and objective act of taking control over others—and therefore less likely to be caused by negative emotional states. Thus, depression appears to lead to higher rates of female aggression, but to have little impact on rates of male aggression (Campbell et al. 1999; Knox et al. 2003). This prior research is supported by our stage one findings that depressed women are especially prone to commit assault.

The findings we present in this report do fit within previous theoretical and research findings in both criminology and mental health, demonstrating a statistical relationship between depression and criminal activity. We find, as others have shown, that depressed individuals appear to be more prone to alleviate their negative emotional state by engaging in criminal activity. We also find gender differences with respect to the impact of depression: depression tends to exert a larger effect on female than on male criminal activity. Part of the gender gap may be explained by the larger number of females who experience depression, but another explanation may be based in the three arguments by Obeidallah and Earls (1999), presented above, that focus on self-esteem, personal safety, and attachment to prosocial institutions and activities. While important for all individuals, these attachments may be particularly vital for the prevention of female crime and delinquency. As De Coster (2005) demonstrates, females appear to be more vulnerable than males to peer stresses: "females are socialized to be more concerned than males with forming connections with others and thereby are more affected by communal or relational stresses" (De Coster 2005:170).

In contrast to our stage one findings, there is some literature suggesting that rather than preceding crime and delinquency, instead depression tends to appear after criminal behavior. One explanation for this timing is that involvement in delinquency can interfere with socioeconomic attainment, disrupt entry into adult social roles, and that the repercussion of these disruptions can lead to depression (Hagan and Foster 2003; Lanctôt, Cernkovich, and Giordano 2007; Siennick 2007). Indeed, this is our argument for stage three results: individuals who have had contact with the criminal justice system tend to be more depression and to use illegal drugs more often than those without this contact. In our stage one analyses we attempt to ensure the correct temporal ordering to appropriately examine the depression/crime link. Nevertheless, we also cannot rule out the possibility of earlier delinquency contributing to our measure of depression (which we use as an independent variable in stage one), and then the depression subsequently leading to higher odds of criminal activity. Despite this possibility, there is still strong evidence that depression (even if partially caused by prior levels of delinquency) promotes higher odds of crime, and that this is particularly influential for female respondents.

In sum, our results regarding the relationship between mental illness (depression and illegal drug use) do fit within previous research and theory, both in the criminology and the mental health literatures. Unlike many prior studies, we were able to examine older individuals experiencing depression and substance abuse and to examine the impact of social relationships and ties to conventional lifestyles. Because older adults with mental disorders are likely to have previously experienced legal problems, and to be behind their peers in educational attainment, employment, and social relationships, they are particularly likely to be distressed by their negative mental states of depression and substance abuse (see Hagan and Foster 2003). Unlike many previous studies, the results presented here were obtained using a large sample of males

and females; this sample also provides data on both adolescents and adults. The fact that we use a large dataset that is nationally representative of the non-institutionalized population age 12 and older provides even stronger evidence of the validity of these findings.

Self-Medication and Crime

Our stage two analyses demonstrated several surprising relationships between treatment and criminal activity. The first such finding was that self-medication, by taking illegal drugs for depression, appears to reduce the odds of criminal activity. In examining the literature, we found evidence to support our finding, notably from Khantzian (1985:7) who argues that rather than "simply seeking escape, euphoria, or self-destruction," drug users are "attempting to medicate themselves for a range of psychiatric problems and painful emotion states." Although these attempts to self-medicate are "eventually doomed" given the hazards of long-term drug use (Khantzian 1985), in the short-term the effects of their drugs of choice help them to relieve distress associated with depression and to cope with distressful emotional states that otherwise would be considered unmanageable or overwhelming (Ayerst 1999; Baron 1999; Diego et al. 2003; Hill and Angel 2005). Thus, these research findings appear to lend support to our finding that self-medication reduces the odds of criminal activity (at least in the short term). But, since we have no measures of the length of the drug use habit, we cannot consider the long-term implications of such behavior. We suspect that if the NSDUH dataset had data available on the length of the self-medication habit, we would find that these respondents would—after a longer period of time—actually start to demonstrate higher odds of crime.

Treatment and Crime

A second finding from our stage two analysis was that treatment (antidepressants and drug dependency treatment) appears to increase the odds of crime, but this seems particularly to

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be the case among younger individuals (approximately age 12-25). In fact, antidepressants and drug dependency treatment successfully decrease the odds of crime among older individuals (age 25 and older). Part of the explanation for the difficulties in treating adolescents may be comorbidity between substance abuse and other forms of mental illness. Evans and Frank (2004:1) explain that from a treatment perspective "comorbidity presents a serious dilemma: do you separately target each type of problem or is a qualitatively different approach to treatment needed?" This is especially a concern for younger respondents since conservative estimates suggest that at least a third of all adolescents hospitalized for psychiatric conditions simultaneously present with depression and conduct disorder (Puig-Antich 1982; Ryan et al. 1987).

A second explanation for these apparently contradictory treatment findings with respect to young respondents has to do with measurement issues in the NSDUH dataset. The available data provide no information on dosage, detail regarding type of treatment, treatment dosage, side effects, medication/treatment compliance, and many other factors. Available evidence suggests that, among depressed individuals, older respondents tend to be more compliant with medication and other forms of treatment (Bailargeon et al. 2002), which would seem to explain age differences in the effect of treatment on crime; because the NSDUH does not provide compliance information, however, we were unable to examine this possibility using these data. Further, different types of antidepressant medications have dramatically different side effects and costs, which also affect compliance with antidepressant compliance (Bailargeon et al. 2002; Holt 2007). Similarly, for substance abuse treatment, non-compliance is a concern, especially among clients who either perceive little/no benefit, who or are afraid of the stigmatization associated with a "drug addict" label (Holt 2007). Again, because the NSDUH data have no available

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information on compliance and the reasons for non-compliance, we cannot test these possibilities in the current analysis. Future research should consider factors such as non-compliance, side effects, cost, stigmatization, and dosage as possible explanations for why we find little effect of substance abuse and antidepressant treatment on crime reduction, particularly among younger respondents.

A final possibility regarding the positive effect of antidepressants on crime is the apparently unique effect of antidepressants on adolescents. Recently, there has been some concern that the use of antidepressant medications themselves may induce worsening in depression, the emergence of suicidal thinking or behavior, or unusual changes in behavior, such as sleeplessness, agitation, or withdrawal from normal social situations (Möler et al. 2008; Dudley et al. 2008). These concerns caused the U.S. Food and Drug Administration (FDA) to issue a public warning (i.e., a "black box" label) in October 2004 that antidepressants might, for unknown reasons, trigger an increased risk for agitation and abnormal behavior in children and adolescents (NIMH 2008). In 2006, an advisory committee to the FDA recommended that the agency extend the warning to include young adults up to age 25 (NIMH 2008). Thus, rather than reducing the negative emotional states that, from a strain perspective, motivate respondents to engage in crime, antidepressants may in fact make these emotional problems worse and increase the odds of crime. The data are not yet clear regarding the efficacy of antidepressants for adolescents, however (NIMH 2008; Möler et al. 2008; Dudley et al. 2008) and this possibility should be examined in future research.

LIMITATIONS OF THE DATA AND THE ANALYSIS

This research benefits from the large sample size of the NSDUH dataset; previous research on gender and crime/substance use has been limited largely due to the relatively small number of females engaging in these deviant activities. Indeed, we do find relatively few respondents who engage in illegal activity, and an especially small percentage of the NSDUH women who do so. This large dataset, however, does provides a sufficient number of female respondents involved in crime and substance use to enable statistical analysis.

Ideally, a longitudinal dataset would be available to allow for inclusion of all lagged dependent variables, rather than solely using the substance abuse lag. This project makes the most out of a cross-sectional dataset by including a measure of drug use greater than 12 months ago, but ideally, we would also have access to information regarding historical depression and criminal activity. The best we are able to do is to approximate historical depression with a measure of "lifetime depression" (any period of depression in one's lifetime) and to use this as a measure occurring before the dependent variable of crime in the past 12 months; this approximates the correct temporal ordering, but not entirely. A longitudinal dataset sufficiently large enough to adequately document female deviance (especially drug abuse and violence) does not exist, however. Thus, this project used the large NSDUH dataset which does allow for one control for prior deviant behavior, and therefore provides the best evidence to date of how gender moderates the relationships between substance use, depression, and crime. By estimating two separate models (one for men and another for women), and using z-tests to formally test for gender differences, this research highlights the gendered nature of these relationships.

Indicators for substance use and crime are derived from self-report, thus raising reliability and validity concerns. However, research has shown that "well-administered household surveys

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have high interrater reliability and validity compared with clinical measures" (Pollack and Reuter 2006:2025), and the NSDUH methodology includes procedures which ensure high data quality and minimize under-reporting of drug use and crime. Audio computer-assisted self-interviewing (ACASI) has been used for the NSDUH since 1999 which was "designed to provide respondents with a highly private and confidential means of responding to questions and to increase the level of honest reporting of illicit drug use and other sensitive behaviors" (U.S. DH&HS 2004:2). In this process the respondent listens to the questions with headphones and enters his or her answers into the computer, without the interviewer or anyone else seeing the respondent's answers. This method replaced pencil and paper self-interviewing after experiments confirmed increased reporting of illicit activities with the computerized method. Debriefing questions revealed that respondents preferred the computer-assisted method, found it easier to use, and perceived greater confidentiality as compared to the pencil and paper method (Lessler et al. 2000). This method has been noted to have especially improved data collected from adolescents whose confidentiality may be threatened by the presence of parents and who may have limited reading skills (Lessler et al. 2000).

CONCLUSIONS AND IMPLICATIONS OF FINDINGS

This research demonstrates that, for men and women, being depressed and using illegal substances significantly increases crime; both are especially problematic for women. This implies that, were women more prone to illicit substance use—on par with male use for example—we might see female crime rates similar to if not higher than male crime rates. Nevertheless, despite or perhaps because of their lower rates of illicit drug use, women are especially susceptible to the negative consequences of drug use. These women are considered

deviant (especially drug-using mothers), they experience high levels of stress, and are often faced with pervasive economic disadvantages and social stigma. Consequently, these female respondents are especially prone to turn these stresses into criminal behavior. Social policy should therefore consider gender responsive strategies to reduce the social harm associated with illicit substance use.

We find that women who have a lifetime history of depression are much more likely than men with a similar history of depression to have committed a crime within the past 12 months. Among women, the strong positive relationship between depression and all types of crime, particularly assault, points to an important implication: that law violation may help assuage depressive symptoms for women by serving as a coping mechanism in the face of stress (see Agnew 1985; 1992; Brezina 1996; 2000).

These results would seem to imply that the policy recommendation be for additional treatment for drug dependency and depression, particularly to prevent crime among women. This is problematic, however, because this research also finds that treatment for substance dependency and/or depression has little impact on reducing crime, and may instead increase crime rates. The exception to this finding is for older respondents, who are less likely to engage in crime after receiving either depression or substance abuse treatment, and these results are similar for men and women. It appears that one-size-fits all treatment for substance abuse and depression may cause more problems than we might expect. Instead, treatment—at least as antidepressants and substance abuse treatment currently stand—may be useful primarily for older, more emotionally mature individuals. Because women commit considerably less crime than men, therapists may ignore or fail to recognize the high risk of crime associated with depression and drug use among women. This could result in insufficient treatment for women. It

may therefore be useful to provide training to therapists who work with higher risk individuals regarding gender differences in the effect of depression and substance use on crime. Our research suggests that future social policy and research should seek age-appropriate and gender-specific treatments for dealing with these mental health difficulties.

We do find that women who self-medicate by treating their depression with illegal substances are considerably less likely to engage in crime than women do not self-medicate. We believe that, by self-medicating, these women are likely to alleviate some of the most serious symptoms of their depression, resulting in a lower rate of crime compared to those who are depressed but do not self-medicate. Ultimately, however, this positive outcome is unlikely to be sustained as individuals become addicted to these substances and feel the need to engage in additional criminal activity to maintain this addiction. This is something we are unable to examine using these data, however, and future research should continue to examine this relationship between self-medicating and rates of crime for men and women.

This research also demonstrates that individuals who have contact with the criminal justice system tend to be more depressed and more likely to engage in illegal substance use than individuals who have no criminal justice contact. Individuals who are arrested and under correctional supervision are likely to face high levels of stress associated with embarrassment, loss of income, interruption of educational trajectories, family disruption, worry regarding pending court cases, and many other factors.

This criminal justice contact is particularly likely to increase men's depression, and women's illegal drug use. These findings therefore point to a need to be aware of the effects of criminal justice interventions on the mental health of offenders. This should also have a gendered focus, providing intensive services to prevent depression among men and drug use among

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women. These gender-responsive therapies should be examined further, but if it is the case that arrest and criminal justice supervision lead to men's depression via an interruption in the social controls of work and family, policies might include programs to help offenders find jobs, marital/family counseling, and education. Among women, a policy recommendation might be to seek means to avoid stigmatizing and socially excluding women who have been involved with the criminal justice system; this might involve maintaining these women's access to their children, and seeing that they are not unduly punished by the criminal justice system for being a drug using mother. This does not mean to suggest that criminal justice interventions should not occur when a crime is committed, but instead, to suggest that future criminal activity may be prevented by efforts to reduce or eliminate as many of these stressors as possible. This might include lower bail or shorter sentence to allow arrested individuals to return to their families, workplaces, or schools as soon as possible while awaiting trial or providing additional services for prison/jail inmates to assist with their successful reentry into society.

Future research, using longitudinal data, should be conducted to better understand the sequence and timing of the events examined in this project. Nevertheless, the evidence presented here suggests that depression and illegal drug use increase criminal propensity and that these stressors are particularly important in explaining women's crime. Current treatment efforts do not appear to address these links between depression, drug use, and crime. Criminal justice interventions appear to exacerbate these relationships, with these inventions making men more prone to depression and women more prone to engage in illegal drug use. Clearly, these factors are interwoven, pointing to a need for additional research on the gendered relationships between depression, drug use, and crime and the best means of intervening to prevent future negative outcomes.

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ENDNOTES

[1]For ease of explanation, throughout this report, the term "mental illness" is used to refer to *both* depression and substance abuse indicators since both are considered to be mental illnesses according to the American Psychiatric Association (1994); in the statistical analyses, however, these variables are kept as separate measures to identify the effect of "internalizing" versus "externalizing" disorders and their gendered implications.

[2] We also conducted many supplementary analyses wherein we used "past year" measures for both independent and dependent variables. Generally, these results were similar to those presented in this report, although the past year independent variables tended to exert a larger effect on the dependent variables than did the lifetime (or more than 12 months ago) measures. Because of this, we rely primarily on the "lifetime" or "more than 12 months ago" measures since they are closer to approximating the correct temporal ordering.

[3] The remainder of the NSDUH sample is: 70% white, 1% or less of Native American, Pacific Island, or Alaskan, 4% Asian, and 13% Hispanic.

[4] This assumption is based on Revised Strain Theory's emphasis on negative emotional states increasing delinquency (Agnew 1985) and the classic stress process model in the sociology of mental illness (see Pearlin et al. 1981), with delinquency as an adaptation to stress.

[5] The two-stage least-squares model can only be estimated using "time 1" and "time 2" substance use, since this is the only behavior for which the NSDUH specifically asked whether it occurred within the past 12 months or more than 12 months ago. Therefore this is a good statistical control for ordering the substance use/crime relationship, but cannot be used to examine the sequencing of the depression/crime relationship. Given the strong positive relationship between drug use and depression, we can only speculate that depression will react similar to drug use, but must rely on future research using longitudinal data to definitely address this topic.

[6] Because the dataset lacks any instrumental variables other than a prior measure of illegal drug use, we could not conduct a complete analysis of the sequencing of depression, drug use, and crime. We approximated this by conducting 2SLS analyses using "lifetime depression" (major depressive episode at any time in the respondent's lifetime) but this is not truly an instrumental variable. Nevertheless, the results of these analyses examining the depression/crime sequencing also suggested that there is a reciprocal relationship between depression and crime. Our results presented here are suggestive, but should not be considered definitive, regarding the ordering of these relationships.

[7] In supplementary analyses, we determined that the best age cut-off between "younger" and "older" respondents appears to be 25. This age cut-off is chosen because it best separates out two groups, one of which corresponds to higher crime rates associated with treatment and the second of which corresponds to lower crime rates associated with treatment. Twenty-five also represents the approximate age when criminal activity, depression, and illicit substance use begins to dramatically decline for typical survey respondents. At the same time, age 25 is approximately

when most respondents begin to age into the conventional activities of full time employment, marriage, and parenthood.

[8] In our supplementary analyses where we use arrest (rather than self-reported crime) as the dependent variable, we find that this main effect of substance dependency has a significant gender difference: not receiving treatment for substance dependent respondents raises the odds of arrest significantly more for women than for men.

[9] Similar to footnote #7 above, we conducted supplementary analyses and determined that the best age cut-off between "younger" and "older" respondents appears to be 25. This age cut-off is chosen because it best separates out two groups, one of which corresponds to higher crime rates associated with treatment and the second of which corresponds to lower crime rates associated with treatment.

[10] Of course, this is not always the case. As Phelan & Link (1999) discuss, approximately 33 percent of people receiving treatment in the mental health system do not meet the criteria for a mental disorder (see also Kessler et al. 1994; Shapiro et al. 1984). These so-called "worried well" seek out treatment even when diagnostic criteria fail to demonstrate a mental illness.

[11] A similar supplementary analysis eliminating anyone who did not have depression historically was not possible because the NSDUH did not have a historical depression variable.

[12] Of course, this is not always the case. Research on the disproportionate arrest, conviction, and imprisonment rates of African Americans, for example, often makes the case that social factors, as opposed to criminal factors, explain at least part of criminal justice processing (see Steffensmsier et al. 1998).