

**TWO ESSAYS ON YOUTH CRIMINAL BEHAVIOR  
AND DRUG USE**

**BY**

**ASSALEENUCH LARPCAROEN**

**A DISSERTATION SUBMITTED TO**

**THE GRADUATE SCHOOL AT  
MIDDLE TENNESSEE STATE UNIVERSITY  
IN PARTIAL FULFILLMENT OF  
THE REQUIREMENT FOR THE DEGREE OF**

**DOCTOR OF PHILOSOPHY IN ECONOMICS**

**MURFREESBORO, TENNESSEE**

**MAY 2009**

UMI Number: 3365590

### INFORMATION TO USERS

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleed-through, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.



---

UMI Microform 3365590

Copyright 2009 by ProQuest LLC

All rights reserved. This microform edition is protected against unauthorized copying under Title 17, United States Code.

---

ProQuest LLC  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106-1346

APPROVAL PAGE

TWO ESSAYS ON YOUTH CRIMINAL BEHAVIOR  
AND DRUG USE

BY

ASSALEENUCH LARPCAROEN

A DISSERTATION SUBMITTED  
IN PARTIAL FULFILLMENT OF  
THE REQUIREMENT FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY IN ECONOMICS

MIDDLE TENNESSEE STATE UNIVERSITY

MAY 2009

APPROVED BY:

*Charles Baum*

Dr. Charles Baum, Committee Chair

*Reuben Kyle*

Dr. Reuben Kyle, Committee Member

*Mark Owens*

Dr. Mark Owens, Committee Member

*Anthony Eff*

Dr. Anthon Eff, Committee Member

*Charles Baum*

Dr. Charles Baum, Department Chair, Economics and Finance

*Michael D. Allen*

Dr. Michael D. Allen, Dean, College of Graduate Studies

## ACKNOWLEDGMENTS

I would like to express my gratitude to Dr. Charles Baum for all his constructive comments and support throughout my dissertation research. I would also like to convey my appreciation to Dr. Mark Owens, who was greatly helpful and offered invaluable suggestions. Deep gratitude is also due to Dr. Anthon Eff for his kind support, guidance, and encouragement. I am especially indebted to Dr. Reuben Kyle for continuing to be on my committee after his retirement. I am very grateful for his patience and generous guidance and assistance.

I am also thankful to Dr. Joachim Zietz for his useful advice on my research. I wish to thank Dr. Duane Graddy for providing financial support of my study. In addition, many thanks are extended to my classmates, Tao Gong and Zhijie Qi, for providing ideas and assistance. I would like to acknowledge and thank Bruce Braswell and Professor Joe Mitchell for proofreading the earlier version of the dissertation draft. I am also very grateful to Sally Ham Govan for her assistance in editing the final version of my dissertation.

I wish to express sincere thanks to my beloved brother, Varawut, who made sacrifices to take good care of me during my first difficult year in the U.S. His selfless love and thoughtfulness will never be forgotten. Finally, I am immensely indebted to my mother, Valailuk, for giving me opportunities in life, her support, and her unconditional love. I would not be where I am today if not for her love and devotion. This dissertation is dedicated to her.

## **ABSTRACT**

This dissertation consists of two essays on youth criminal behavior and drug use using data from the National Longitudinal Survey of Youth 1997 (NLSY97). The first essay examines the relationship between youth employment and criminal behavior and drug use allowing for endogeneity of the choice variables. Using a recursive bivariate probit model, the results indicate that whether employment is beneficial or harmful to youths depends on the level of work intensity. While working at high intensity, defined as 20-39 hours per week, encourages involvement in criminal activity and drug use, working at low intensity, defined as 1-9 hours per week, discourages it. The evidence suggests that youths who work are more involved with marijuana use and nonviolent crimes involving drugs and money than violent crimes. Policies designed to limit hours of youth employment or reduce concentration of youths in the workplace in order to minimize negative social interaction can be beneficial to youths who choose to work.

The second essay analyzes the extent to which the School-To-Work (STW) programs impact youth criminal behavior and drug use. In 1994, President Clinton signed the School-To-Work Opportunity Act (STWOA) to address a national skills shortage for students who pursue little or no education beyond high school. Using the Heckman sample selection model, the results indicate four types of program impacts—negative, positive, mixed, and none—where negative indicates a decrease and positive an increase in the probability of engaging in illegal behavior. Mentoring and technical preparation programs lower the probability of committing crimes and

using drugs. Programs deemed unfavorable because participation in those programs is positively associated with crimes and drug use are school-sponsored enterprise and cooperative education programs. Two programs that demonstrate mixed results, a negative impact on crimes but a positive impact on drug use, are the job shadowing and the internship programs. The only program not related to youth criminal behavior and drug use is the career major program.

## **TABLE OF CONTENTS**

|                        |      |
|------------------------|------|
| APPROVAL PAGE .....    | ii   |
| ACKNOWLEDGEMENTS ..... | iii  |
| ABSTRACTS .....        | iv   |
| LIST OF TABLES .....   | viii |
| LIST OF FIGURES .....  | x    |

### **CHAPTER 1. THE IMPACT OF YOUTH EMPLOYMENT ON CRIMINAL BEHAVIOR AND DRUG USE**

|                                 |    |
|---------------------------------|----|
| 1. Introduction .....           | 1  |
| 2. Literature Review .....      | 5  |
| 3. Theoretical Background ..... | 8  |
| 4. Data .....                   | 14 |
| 5. Empirical Model .....        | 19 |
| 6. Results .....                | 21 |
| 7. Conclusion .....             | 24 |
| REFERENCES .....                | 27 |

### **CHAPTER 2. THE IMPACT OF PARTICIPATION IN SCHOOL-TO-WORK (STW) PROGRAMS ON YOUTH CRIMINAL BEHAVIOR AND DRUG USE**

|                            |    |
|----------------------------|----|
| 1. Introduction .....      | 60 |
| 2. Literature Review ..... | 64 |

|                            |    |
|----------------------------|----|
| 3. Theoretical Model ..... | 67 |
| 4. Data .....              | 70 |
| 5. Empirical Model .....   | 75 |
| 6. Results.....            | 77 |
| 7. Conclusion .....        | 81 |
| REFERENCES .....           | 84 |



## **LIST OF TABLES**

### **CHAPTER 1. THE IMPACT OF YOUTH EMPLOYMENT ON CRIMINAL BEHAVIOR AND DRUG USE**

|  |    |
|--|----|
| Table 1: Variable Definitions.....   | 43 |
| Table 2a: Sample Means for Crime Sample .....  | 45 |
| Table 2b: Sample Means for Drug Sample .....   | 46 |
| Table 3a: Estimation Results and Marginal Effects for Crime<br>Participation (Overall) .....                     | 47 |
| Table 3b: Estimation Results and Marginal Effects for Drug Use (Overall) .....                                   | 48 |
| Table 4: Estimation Results and Marginal Effects for Crime Participation<br>and Drug Use by Subgroup .....       | 49 |
| Table 5a: Estimation Results for Crime Participation by Crime Type .....   | 50 |
| Table 5b: Estimation Results for Drug Use by Drug Type .....   | 51 |
| Table 6: Estimation Results and Marginal Effects for Crime Participation<br>and Drug Use by Work Intensity ..... | 52 |

### **CHAPTER 2. THE IMPACT OF PARTICIPATION IN SCHOOL-TO-WORK (STW) PROGRAMS ON YOUTH CRIMINAL BEHAVIOR AND DRUG USE**

|  |    |
|--|----|
| Table 1: Variable Definitions.....   | 88 |
| Table 2: Descriptive Statistics .....  | 90 |
| Table 3: Estimated Coefficients for School-To-Work Participation and Crime<br>Participation and Drug Use ..... | 91 |
| Table 4: Marginal Effects for Crime Participation and Drug Use .....   | 92 |
| Table 5a: Estimation Results for Crime Participation by Subgroup for<br>Work-Based Programs .....              | 93 |

|   |     |
|---|-----|
| Table 5b: Estimation Results for Crime Participation by Subgroup for<br>School-Based Programs .....       | 94  |
| Table 6a: Marginal Effects for Crime Participation by Subgroup for<br>Work-Based Programs .....           | 95  |
| Table 6b: Marginal Effects for Crime Participation by Subgroup for<br>School-Based Programs .....         | 96  |
| Table 7a: Estimation Results for Drug Use by Subgroup for<br>Work-Based Programs .....                    | 97  |
| Table 7b: Estimation Results for Drug Use by Subgroup for<br>School-Based Programs .....                  | 98  |
| Table 8a: Marginal Effects for Drug Use by Subgroup for<br>Work-Based Programs .....                      | 99  |
| Table 8b: Marginal Effects for Drug Use by Subgroup for<br>School-Based Programs .....                    | 100 |
| Table 9: Estimated Coefficients for School-To-Work Participation<br>by Crime and Drug Type .....          | 101 |
| Table 10: Marginal Effects for School-To-Work Participation<br>by Crime and Drug Type .....               | 102 |
| Table 11: Summary of the Results for Crime Participation and Drug Use<br>by School-To-Work Programs ..... | 103 |

## **LIST OF FIGURES**

### **CHAPTER 1. THE IMPACT OF YOUTH EMPLOYMENT ON CRIMINAL BEHAVIOR AND DRUG USE**

|  |    |
|--|----|
| Figure 1: Crime Participation and Drug Use by Age.....             | 53 |
| Figure 2: Crime Participation and Drug Use by Race .....           | 54 |
| Figure 2.1: Vandalism and Theft by Race .....                      | 55 |
| Figure 2.2: Assault and Drug Sales by Race.....                    | 56 |
| Figure 2.3: Marijuana and Cocaine and Other Drugs by Race .....    | 57 |
| Figure 3: Crime Participation and Drug Use by Work Industry .....  | 58 |
| Figure 4: Crime Participation and Drug Use by Work Intensity ..... | 59 |

### **CHAPTER 2. THE IMPACT OF PARTICIPATION IN SCHOOL-TO-WORK (STW) PROGRAMS ON YOUTH CRIMINAL BEHAVIOR AND DRUG USE**

|  |     |
|--|-----|
| Figure 1: Crime Participation and Drug Use by Age.....                 | 104 |
| Figure 2: Crime Participation and Drug Use by Race .....               | 105 |
| Figure 3: Crime Participation and Drug Use by Family Arrangement.....  | 106 |
| Figure 4: Crime Participation and Drug Use by GPA in Eighth Grade..... | 107 |
| Figure 5.1: Crime Participation by Program Type.....                   | 108 |
| Figure 5.2: Drug Use by Program Type.....                              | 109 |

# **Chapter 1**

## **The Impact of Youth Employment on Criminal Behavior and Drug Use**

### **1. Introduction**

Although crimes and drug use in the U.S have been declining, participation rates among young people remain high. The Uniform Crime Report (2007) reports that nearly 45 percent of all those arrested in 2007 were people under 25 years of age. Crimes committed by youths from the middle and upper class are growing and drug use is a behavioral problem that is commonly shared by young males and females (Yablonsky, 2000). According to the Juvenile Justice and Delinquency Prevention Act of 2002, juvenile arrests for drug violations dramatically increased 132 percent between 1990 and 1999. In 2007, the National Survey on Drug Use and Health<sup>1</sup> documents that about one in five youths ages 12-17 and one in three youths ages 18-25 use some type of drugs.

Crimes and drug use impose substantial costs on society as well as individuals. The government bears the cost of \$1.7 trillion<sup>2</sup> for crimes and \$15 billion

---

<sup>1</sup> *National Survey on Drug Use and Health*. (2007). Detailed Tables, Tables 1.20B and 1.21B. Office of Applied Studies, Department of Health and Human Services.

<sup>2</sup> Anderson, David A. (1999). "The Aggregate Burden of Crime." *Journal of Law and Economics*, 42(2): 611-642.

for drug abuse<sup>3</sup> annually. Individuals who have criminal records encounter lower employment opportunities and face a wage penalty (Sampson and Laub, 1990; Borland and Hunter, 2000). Evidence reveals that those who have criminal records suffer a 10-30 percent reduction in earnings (Grogger, 1992, 1995; Waldfogel, 1994a,b). Drug use not only causes lowered work productivity and long-lasting harmful effects on health but also costs employers \$100 billion each year due to absenteeism, accidents on the job, and health-care utilization (Bahls, 1998).

Youths in the U.S. participate extensively in the labor market.<sup>4</sup> The amount of time spent at work closely competes with time spent with family or at school. Many high school students spend more time on the job than in the classroom by their senior year (Steinberg et al., 1996). Some youths spend more time at work than in school, interacting more with peers at work than peers at school or parents (Steinberg and Cauffman, 1995). Young workers are reported to have more delinquent friends (Ploeger, 1997; Tanner and Krahn, 1991) and have a higher rate of drug use than those who do not work (22.3 vs. 18 percent).<sup>5</sup> Most drug users are employed in industries that hire a large number of youths (Stoli, 1998; Vance, 2000). According to the Substance Abuse and Mental Health Services Administration (2008), 13 million (75 percent) of current drug users are employed. The industries that represent

---

<sup>3</sup> Executive Office of the President (2004). "The Economic Costs of Drug Abuse in the United States 1992-2002," Washington, D.C.

<sup>4</sup> More than three-quarters of U.S. high school seniors work during the school year, and 40-50 percent of those who are working average more than 20 hours per week (NLSY97, 2005 Press Release).

<sup>5</sup> *National Survey on Drug Use and Health*. (2006). "Substance Use and Employment among Youth Aged 15-17." NSDUH Report, Department of Health and Human Services.

the highest rates of drug use are food services and construction,<sup>6</sup> also the industries most likely to hire youths.

Current research on the relationship between crime and drug participation among youths and their employment is limited. The literature that studies the connection between youth problem behavior and labor market participation is mostly centered in sociological and criminological branches. Of interest to parents and policymakers is the issue of whether youth employment deters or promotes criminal behavior. Employment may deter crimes among the young by enhancing human capital through work experience. On the other hand negative social interaction in the workplace may lead to problem behavior among working youths.

This paper examines the impact of youth employment on illegal behavior, namely criminal activities and drug use. Existing studies consider youth employment as an exogenous factor in determining the relationship with crimes and drug use. The determinants of youth employment (status as well as intensity), however, are not independent of those determining criminal behavior and drug use, leading to an endogeneity problem. This study uses the most current sample from the National Longitudinal Survey of Youth 1997 (NLSY97), designed to be representative of youths ages 12-16 in 1996 and the first to take into account the endogeneity of the employment variable.

---

<sup>6</sup> *Substance Abuse and Mental Health Services Administration (SAMHSA) (2007). "Nationwide Survey Shows Most Illicit Drug Users and Heavy Alcohol Users Are in the Workplace and May Pose Special Problems." SAMHSA News Release, Office of Applied Studies, Department of Health and Human Services.*

Illegal behavior is described by four types of criminal activities (vandalism, theft, assault, and drug sales) and two types of drug use (marijuana and cocaine). The empirical approach relies on a recursive bivariate probit model where two binary variables in the outcome and employment equation are jointly determined (Greene, 2008). Employment is analyzed in terms of status as well as intensity. Employment intensity is categorized by the number of hours worked per week as low (1-9), moderate (10-19), high (20-39), or full-time (40 or more). The calculations are estimated on a full sample and subsamples classified by demographic and socio-economic characteristics.

The results indicate that work increases the probability of committing crimes by four to 12 percentage points and raises the probability of using drugs by five to 14 percentage points. Youths who work are more involved with drug use and nonviolent crimes involving money and drugs. They are three percent more likely to commit theft or sell drugs and nine percent more likely to use marijuana.

Working at high intensity is positively related to crimes and drug use, increasing these probabilities by four and 11 percentage points, respectively. Working at low intensity is negatively related to drug use, decreasing the probability by 18 percentage points.

The remainder of the paper is organized as follows. Section 2 presents a literature review of past research that considers the relationship between youth employment and illegal behavior. Section 3 develops the theoretical background. Section 4 describes the data from NLSY97. Section 5 demonstrates the estimation

methodology. Section 6 discusses the details of empirical results. Section 7 presents the concluding remarks.

## **2. Literature Review**

Most existing research that has focused on determining how youth employment impacts illegal behavior is concentrated in sociology and criminology rather than in economics. The majority of the findings conclude that youths who participate in the labor market are more likely to get involved in criminal activities and drug use.

The seminal sociological research of Greenberger and Steinberg (1986) offers evidence to rebut the public claim to support youth employment from several government panels.<sup>7</sup> They conclude that working is more likely to interfere with schooling, promote precocious maturity, foster cynical attitudes toward work, and increase the rates of criminal activities and drug use. The sample of their study comes from youths in Orange County, California. In 1993, Steinberg and his colleagues conducted another study on 4,400 youths in Wisconsin and Northern California and came to the same conclusion of a negative impact of working, especially for intensive workers (Steinberg et al., 1993).

Other studies using different samples generally confirm the same results (Agnew, 1986; Bachman et al., 2003; Wright et al., 1997). Cullen et al. (1997) find

---

<sup>7</sup> As mentioned in Phillips and Sandstorm's (1990) article, those government panels are the Panel on Youth of the President's Service Advisory Committee (1972), Work-Education Consortium of the National Manpower Institute (1978), Carnegie Council on Policy Studies in Higher Education (1980), and National Commission on Youth (1980).



that problem behavior associated with youth employment arises only when working hours are longer than 18 hours per week. They control for previous problem behavior by including a lag in behavior for the year 1979 in the estimation using year 1980 data from the National Youth Survey (NYS). The research from Tanner and Krahn (1991) studying 2,200 youths in three cities in Canada demonstrates evidence of the detrimental effect of youth employment on criminal behavior but not on drug use. One study by Gottfredson (1985) arrives at a different conclusion. She reports that although working decreases school attendance and parental attachment, it does not induce problem behavior.

The evidence from the two economic studies is not consistent. Leung (2004) asserts that the workplace is a social institution that exerts a negative social influence on youths. Youths who have work experience between the ages of 14 and 16 years are more likely to report criminal activities at the age of 17. His sample consists of at-risk males in Montreal. In contrast, Merlo and Wolpin (2008) claim a different conclusion. They use data from the NLSY97 for black male youths to study the relationship between working at age 16 and criminal activities at age 19-22. Accounting for any unobserved heterogeneity, youths are categorized into four groups based on their criminal propensity, and the results find that crime rates of youths who worked at age 16 are lower than those who did not, regardless of the criminal propensity group to which they belong.

Previous research suffers from shortcomings that make it difficult to determine the net effects of youth employment. First, except for the study of Merlo

and Wolpin (2008), most data sets tend to be rather old and nonrepresentative. This raises the question of whether the generalization of conclusions can be applied to the current population of youths. Second, the employment of youths is taken as exogenous, and the problem of the endogeneity of the employment variables has largely been ignored. An individual's decision to work and the decision to participate in illegal activities may be influenced by the unobserved factors. In addition, the relationship between employment and illegal behavior decisions may be recursive, directly influencing each other. Place of employment may be one of the environments that induce youths to experiment with drugs from exposure to drug users in the workplace. On the other hand, youths who are drug users may be more likely to work or work intensively to earn money to acquire drugs.

Using data from the NLSY97, this study improves on the current literature in the following ways. First, the NLSY97 data set contains representative data from the most current generation of young people. The sample covers youths who were 12 to 16 years old in 1996 and continuously interviewed each year. Second, this research attempts to address the issues of reverse causality and simultaneity by using recursive bivariate probit methodology on eight years of data for which the potential problems of endogeneity can be mitigated. The estimates derived from the study should provide reliable conclusion that can be applied to present-day youths.

### **3. Theoretical Background**

An individual commits crimes if the expected utility from committing crimes exceeds the utility he could get from participating in legitimate activities (Becker, 1968). One of the most important determinants of criminal behavior is the opportunity cost (Becker, 1968; Glaeser et al., 1996). Human capital theory indicates that enhancement of human capital reduces crimes by raising the opportunity cost of committing crimes (Lochner, 1999). Individuals with more human capital earn higher wages and have a higher opportunity cost of committing crimes in terms of income forgone if incarcerated. An individual can acquire human capital through education and training as well as work experience (Becker, 1964). Employed youths increase their human capital from work experience. As a result, their higher opportunity cost should lower the probability of engaging in illegal activities. However, whether young people choose to work because they intend to gain human capital through work experience is questionable. Mortimer (2003) and Ruhm (1995) find that most youths participate in the labor market not to accumulate human capital but for short-term consumption.

Other crucial factors that determine the behavior of an individual are social. Besides economic factors, social forces influence the choices of individuals because they desire respect and acceptance of family, friends, peers, and others (Becker, 1996; Bernheim, 1994; Falk and Fischbacher, 2002; Manski, 2000; Soetevent, 2006). Levitt and Venkatesh (2000) study the behavior of low-level gang members and conclude that their behavior does not conform to optimizing economic agents but is explained

by social factors. They are willing to participate in street drug trades even if they face a high probability of being killed and receive compensation just above the minimum wage.

Despite individual differences in character, many people suppress their individuality and conform with peers in a social network when they deem acceptance by their social group sufficiently important (Akerlof, 1997; Bernheim, 1994). Social interaction within a peer network determines youth social behavior including criminal activities (Manski, 2000). Sutherland (1947) asserts that criminal behavior is a learned behavior and peers are regarded as a stimulus for crimes by social interaction within an intimate group. Young people especially are influenced by peers in all types of behavior including delinquency. They make decisions largely based upon social factors; in fact, crimes committed by young people have a higher degree of social interaction (Glaeser et al., 1996; Jacob and Lefgren, 2003).

The influence of peers or peer pressure is defined as the preference of one person affecting the preferences of others (Brock and Durlauf, 2001; Krauth, 2006; Kremer and Levy, 2008). Becker (1996) asserts that peer pressure on youths arises from the dependence between a person's social capital and his social behavior. The stock of social capital reinforces the activities that are complements to that capital and deters those that are substitutes. For example, an individual may start to experiment with drugs because his friends do so. Social capital and investment in capital are strong complements. Becker (1996) states that peer pressure has a larger effect on the demand for drugs when drug habits are stronger.

Youths are often surrounded by people their own age with little adult supervision in their workplace. The concentration of young people in unstructured and unsupervised environments encourages social interaction inside and outside the work settings (Greenberger and Steinberg, 1986; Jacob and Lefgren, 2003; Report on the Youth Labor Force, 2000; Ruggiero et al., 1982). Warr (1993) indicates that by the mid-teenage years, youths are likely to acquire at least some delinquent friends. Criminological theory also states that working long hours underlies criminal propensity (Gottfredson and Hirschi, 1990). Youth employment is induced by insufficient impulse control, and working long hours is an expression of criminal propensity linked to impulsivity or inability to delay gratification.

Many studies find that peer effects are statistically important.<sup>8</sup> Youths with delinquent friends develop more conduct problems than those who have fewer delinquent friends (Steinberg et al., 1996). High prevalence of drug use in the workplace promotes adverse influence on youths by social interaction. Research finds that young workers feel more comfortable using drugs and increase their demand for drugs when surrounded by other drug users (Bachman et al., 1981; Bahls, 1998).

---

<sup>8</sup> Evan et al. (1992) find evidence of peer effects on teenage pregnancy and school dropout behavior when using a single-equation model. Kremer and Levy (2008) indicate that a male student paired with a roommate who drinks while in high school obtains a lower GPA than one paired with a nondrinking roommate. Sacerdote (2001), Stinebrickner and Stinebrickner (2006), and Zimmerman (2003) demonstrate that a college student with a roommate of superior academic performance attains higher educational outcomes. Falk and Ichino (2006) find evidence of peer effects in pair treatments whereby outputs are larger for subjects working in pairs than working alone.

Not only is employment a breeding ground for negative social interaction, but income from working also provides youths a mean to acquire drugs. The majority of youths do not work to support their families but for their own consumption (Committee, 1998; Greenberger and Steinberg, 1986). Extra income increases their demand for consumption of normal goods including drugs.

The following section represents a two-period economic model using a human (social) capital framework. The model includes two types of human capital: work ( $H^j$ ) and crime ( $H^c$ ). For each period, an individual optimally allocates time to legal market work ( $j_1, j_2$ ), criminal activities ( $c_1, c_2$ ), or both.

An individual is endowed with initial skill level ( $H_0$ ), learning ability ( $A$ ), and criminal ability ( $\theta$ ). Following Lochner (2004), the production of human capital model can be written as

$$H_2^k = h^k(H_1^k, I_1^k, A) \quad \text{where } k = j, c$$

$$\frac{\partial H_2^k}{\partial I_1^k} > 0, \quad \frac{\partial H_2^k}{\partial A} > 0, \quad \frac{\partial^2 H_2^k}{\partial I_1^k \partial A} > 0$$

where the function  $h(\cdot)$  is increasing and concave in its arguments. An individual with higher learning ability earns a higher rate of return on human capital investment.

If a person commits a crime, the return to crime function is expressed as

$$r = r(\theta, H^c, c)$$

$$(1) \quad \frac{\partial r}{\partial \theta} > 0, \quad \frac{\partial r}{\partial c} > 0, \quad \frac{\partial r}{\partial H^c} > 0$$

$$(2) \quad \frac{\partial^2 r}{\partial \theta^2} < 0, \quad \frac{\partial^2 r}{\partial c^2} < 0$$

$$(3) \quad \frac{\partial^2 r}{\partial \theta \partial c} > 0, \quad \frac{\partial^2 r}{\partial c \partial H^c} > 0$$

where  $r$  is the net return from crime and  $r(\cdot)$  is increasing and concave in  $c$ ,  $H^c$ , and  $\theta$ .

A person with higher criminal ability receives a higher rate of return on crime. He faces the probability of being arrested equal to  $p$ . The wage rate for labor market work is  $w$ . For simplicity, the probability of getting caught ( $p$ ) and the wage rate ( $w$ ) are assumed to be the same for both periods. An individual maximizes the expected discounted lifetime earnings with a discount rate  $\beta$ . The objective function is formulated as

$$\text{Max } U = Y_1 + \beta Y_2$$

Subject to

$$c_t + j_t = 1 \quad \text{where } t = 1, 2$$

$$Y_1 = p \cdot [wH_1^j j_1] + (1-p) \cdot [wH_1^j j_1 + r(\theta, H_1^c, c_1)]$$

$$Y_2 = p \cdot [wH_2^j j_2] + (1-p) \cdot [wH_2^j j_2 + r(\theta, H_2^c, c_2)]$$

$$H_2^c = h^c(H_1^c, I_1^c, A)$$

$$H_2^j = h^j(H_1^j, I_1^j, A)$$

$Y_1$  and  $Y_2$  denote the earnings in periods 1 and 2, respectively. The total time endowment is normalized to be equal to one. For a given level of human capital for crimes, criminal ability, and time allocated to criminal activities in that period,  $r$  is the net return from crime. The individual does not obtain illegal income if he is arrested. The human capital in period 2 is accumulated through an increasing function of the stock of human capital in the last period, human capital investment, and learning ability. After substituting all the constraints into the objective function, the model is described as

$$\begin{aligned} \text{Max } U = & p \cdot [wH_1^j(1-c_1)] + (1-p) \cdot [wH_1^j(1-c_1) + r(\theta, H_1^c, c_1)] \\ & + \beta \{ p \cdot [wh^j(H_1^j, I_1^j, A) \cdot (1-c_2)] + (1-p) \cdot [wh^j(H_1^j, I_1^j, A) \cdot (1-c_2) \\ & + r(\theta, h^c(H_1^c, I_1^c, A), c_2)] \} \end{aligned}$$

The first-order conditions for  $c_1$  and  $c_2$  are given as follows:

$$(4) \quad \mathcal{E}_{c1} : (1-p) r'_{c1}(\theta, H_1^c, c_1) = wH_1^j$$

$$(5) \quad \mathcal{E}_{c2} : (1-p) r'_{c2}(\theta, h^c(H_1^c, I_1^c, A), c_2) = wH_2^j$$

The left side of equations (4) and (5) denotes the marginal revenue of criminal activities if a person is successful in committing a crime in periods 1 and 2, respectively. The marginal revenue from participating in legal activities represented on the right side of equations (4) and (5) embodies the market wage rate. The first-



order conditions state that at the optimum, the marginal revenue of criminal activities must equal the marginal revenue of working in the labor market.

Substituting  $H_2^c$  for  $h^c(H_1^c, I_1^c, A)$ , the first-order condition for  $c_2$  is rewritten as

$$(5') \quad \varepsilon_{c2} : (1-p) r'_{c2}(\theta, H_2^c, c_2) = wH_2^j$$

The term  $wH_2^j$  on the right side is constant since it is determined by choices in period 1. Thus, if  $H_2^c$  in the term  $r'_{c2}(\theta, H_2^c, c_2)$  on the left side increases,  $c_2$  must increase for the equality to be maintained. Equation (3) expresses an increase of the marginal return to crime with respect to an increase in human capital for crime. If human capital for crime increases, to balance the equation time spent in criminal activities ( $c_2$ ) has to increase, since Equation (2) states that more time spent in criminal activities reduces the marginal return to crime. The model implies that an individual with more human capital for crimes will spend more time committing crimes and less time in the labor market.

#### 4. Data

The data come from the NLSY97, the most current sample of the National Longitudinal Surveys (NLS) program. The sample contains 8,984 youths and is designed to be representative of the population ages 12 to 16 as of December 1996.

The NLSY97 survey collects information about employment, education, criminal behavior, and drug use for the NLSY97 cohort annually. The NLSY97 also gathers a wide range of background information, which allows researchers to include relevant control variables for their studies.

The study includes data from 1998-2005 to analyze the relationship between youth employment and criminal behavior and drug use.<sup>9</sup> Beginning in 2004, the crime questions are asked only of respondents who ever reported being arrested and also of a control group for comparison (*NLSY97 User's Guide*, 2007). The drug questions are still asked of every respondent. As a result, two separate samples are created for crimes and drugs in order to utilize more information on drug use.

The criminal behavior data contain the information about individuals who (1) commit vandalism, (2) steal less than \$50, (3) steal more than \$50 including a car, (4) commit other property crimes including fencing stolen property, possessing or receiving stolen property, or selling something for more than it is worth, (5) attack or assault someone, or (6) sell illegal drugs. The data on drugs includes the use of (1) marijuana and (2) cocaine and other drugs including crack, heroin, and other substances not prescribed by a doctor. If the individual answers "yes" to the corresponding question, then the value of the dependent variable is set equal to one, and zero otherwise. Three types of criminal activities (2), (3), and (4) are combined into one variable, *theft*. Two additional qualitative variables are created for

---

<sup>9</sup> Although the survey started in 1997, information about cocaine and other drug use was not collected before 1998. For that reason, the study omits data from 1997 in order to include more extensive types of drug use.

individuals who commit any crime and for those who use any drug. Nonresponses for any reason are dropped.

The key explanatory variables are the work variables, which include employment status as well as work intensity. The work variables focus on employee-type jobs—defined as jobs in which the respondent has an ongoing relationship with a specific employer. Youths ages 14 and older are asked questions about their jobs, while the NLSY97 staff creates the event history variables including accumulated annual weeks worked and annual hours worked (*NLSY97 User's Guide*, 2007).

Hours worked per week are calculated using annual hours worked divided by annual weeks worked. A qualitative variable for employment status is created with the value one if a respondent reports any positive hours, and zero otherwise. The work intensity variables are defined as low for working one to nine hours per week, moderate for working 10 to 19 hours per week, high for working 20 to 39 hours per week, and full-time for working 40 or more hours per week. Table 1 describes the variable definitions.

The fundamental control variables included are relevant to criminality and delinquency as indicated in the criminological and sociological theories and other literature. The control variables include age, gender, race, parental education, family structure, and urban living (Agnew, 2003; Antecol et al., 2001; Blumstein, 2002; Dilulio, 1996; England, 1970; Glueck and Glueck, 1934; Hagan, 1991; Healy and Bronner, 1926; Kosterman et al., 2000; Ludwig, 2001; Narayan and Smyth, 2004; Snyder, 1999; Steinberg, 1987 and 2000; Sutherland et al., 1992; Trojannowicz,

1978; Weatherburn and Lind, 1998; West, 1967; Wright et al., 1997; Yablonsky, 2000; Yamaguchi and Kandel, 1984). Figure 1 depicts the relationship of age with crime participation and drug use. Crime participation increases with age until the early adolescent years and then declines rapidly afterward (Grogger, 1998). Compared to crime participation, drug use peaks later and declines less rapidly.

Cognitive intelligence and academic excellence discourage antisocial behavior (Bachman et al., 1981; Brofrenbrenner et al., 1996; Farrington, 1996; Hagan, 1991; Leung, 2004; Newcomb et al., 1986).). These factors are accounted for by Armed Services Vocational Aptitude Battery (ASVAB) score and grade point average (GPA) in eighth grade. The variable *asvab* is the percentile score, ranging from 1 to 99, of ASVAB score, which measures knowledge and skills like Armed Forces Qualifying Test (AFQT) score and is comparable among age groups. The variable *GPA\_eighth\_grade* measures the grade point average in eighth grade on a 4.0 scale.

Also added are variables for job industries to proxy for the quality of employment and the hourly *wage* variable to control for income effects from working. The variable *bully* indicates whether a respondent was bullied before age 12. Bullying has been found to be connected with criminal behavior (U.S. Department of Justice, 2001).

Figure 2 compares crime participation and drug use by race. White youths are more likely to commit crimes and use drugs than black or Hispanic youths. When the rates of crime participation and drug use are analyzed by type in Figures 2.1 to 2.3, it reveals that black youths assault someone (as shown in Figure 2.2) more often than

youths of other races. White youths have the highest rates of participation in all types of drug use and crimes other than assault. Figure 3 presents crime participation and drug use by work industry. Youths who work in retail have the highest rates of crimes and drug use, while those who work in professional industries have the lowest rates. Figure 4 reveals that the participation rates for both crimes and drug use are highest for high-intensity workers and lowest for low-intensity workers.

Tables 2a and 2b report sample means for the crime and drug samples, respectively. The statistics indicate that criminal offenders are less likely to work than non-criminal offenders but drug users are more likely to be in the labor market than non-drug users. This simple comparison does not take into account other factors that are also determinants of criminal behavior and drug use. Males are more likely than females to be criminal offenders and drug users. The wage rates of criminal offenders are lower than those of non-criminal offenders. Grogger (1995) states that the wage differential is one reason for the disparity in crime rates among different demographic groups. Drug users, on the contrary, earn higher hourly wage rates than non-drug users. This partly explains the higher rate of drug use for employed youths due to income effects of job earnings.

The sample includes youths who are at least 14 years old, the minimum age at which youths can be employed in most non-agricultural work, and younger than 25. The final sample contains 39,356 person-year observations for crimes (7,700 criminal offenders vs. 31,656 non-criminal offenders) and 47,725 person-year observations for

drug use (11,771 drug users vs. 35,954 non-drug users). The standard errors are adjusted for heterogeneity and clustered at the individual level.

## **5. Empirical Model**

The goal of this study is to estimate the causal effect of youth employment on crimes and drug use. When the key variables on the right side of the equations are not exogenous, the estimations become more complicated. Since both the outcome variables of interest (CRIME/DRUG) and the key explanatory variables on the right side (WORK) of the equations are choice variables, the decision to participate in one activity (e.g., working or working at high intensity) may not be independent of the other activities (e.g., using drugs). These cause endogeneity problems. The first problem is reverse causality, whereby a left-side outcome and a right-side variable may directly influence each other. The second problem is simultaneity, whereby the decision to participate in crimes or drug use and the decision to work are simultaneously determined by unobserved characteristics such as personality traits or culture. These endogeneity problems will cause the error terms in CRIME/DRUG and WORK equations to be related. As a result, a single equation standard probit will yield biased estimates if the correlation of the error terms is disregarded.

Greene (2008) proposes a recursive bivariate probit model to measure the relationship between the two binary decision processes where one or more of the right-side variables is endogenous, using log-likelihood estimation. Bivariate probit

is a two-equation model where the two binary variables are simultaneously determined and the correlation of error terms between the two equations,  $\rho$ , is accounted for. The recursive structure builds on a first reduced-form equation for the endogenous binary variable and a second structural-form equation determining the outcome of interest.

The specification for a two-equation model is

$$\text{CRIME/DRUG} = \beta_0 + \beta_1 \mathbf{X}_1 + \beta_2 \text{WORK} + \varepsilon_1$$

$$\text{WORK} = \alpha_0 + \alpha_2 \mathbf{X}_2 + \mathbf{Z} + \varepsilon_2$$

$$E[\varepsilon_1 | \mathbf{X}_1, \mathbf{X}_2, \mathbf{Z}] = E[\varepsilon_2 | \mathbf{X}_1, \mathbf{X}_2, \mathbf{Z}] = 0$$

$$\text{Var}[\varepsilon_1 | \mathbf{X}_1, \mathbf{X}_2, \mathbf{Z}] = \text{Var}[\varepsilon_2 | \mathbf{X}_1, \mathbf{X}_2, \mathbf{Z}] = 1$$

$$\text{Cov}[\varepsilon_1, \varepsilon_2 | \mathbf{X}_1, \mathbf{X}_2, \mathbf{Z}] = \rho$$

where CRIME/DRUG and WORK are (0,1) indicators for crime participation or drug use and labor force participation, respectively. The WORK variable denotes labor-force status as well as intensity of employment.  $\mathbf{X}_1$  represents a vector of control variables that includes individual characteristics, family background, and job quality.  $\mathbf{X}_2$  contains some variables contained in  $\mathbf{X}_1$  that are relevant to the WORK equation.  $\mathbf{Z}$  is the lagged WORK variable, an exogenous variable that is directly related to the

WORK equation but not correlated with the CRIME/DRUG equation.<sup>10</sup>  $\varepsilon_1$  and  $\varepsilon_2$  are the error terms.  $\rho$  (rho) measures the correlation of the error terms from the two equations. If  $\rho$  is zero, the correlation of the error terms is not present and the error terms in both equations are random. In that case, the model can be consistently estimated with a single-equation probit.

## 6. Results

Tables 3a and 3b give the results for overall crime and drug equations, respectively. Model 1 estimates crime and drug equations without any control variables. Model 2 accounts for age effects by including dummy variables for each age group. Model 3 adds gender and race, and Model 4 includes dummy variables for the industries that employ youths as additional control. Model 5 has a full set of control variables.

Model 1 in Table 3a reveals that work is negatively related to crimes when other relevant factors are not taken into consideration. The estimated coefficients (Panel A) and marginal effects (Panel B) become significantly positive with quantitatively equal size in Models 2, 3, 4, and 5 when the control variables are included. In the drug models, on the other hand, the estimated coefficients of the work variable are significantly positive across all models but vary substantially among the different models, as shown in Table 3b. The marginal effects are quantitatively smallest when all control variables are included in Model 5.

---

<sup>10</sup> The lagged value of WORK is chosen because what happened in the past should not be related to an occurrence in the present. The p-value of the lagged WORK variable in the WORK equation is significant at the conventional level.



Table 4 estimates the results by subgroup, namely gender, race, age, household income, ASVAB score, and GPA in eighth grade. The results in column 3 specify that work increases the probability of committing crimes for all groups except youths who are black, age 20 years or over, or from a middle-income family. In addition, work does not increase the probability of committing crimes for youths with low ASVAB scores or low GPAs in eighth grade. Youths who work are four to 12 percent more likely to commit crimes than those who do not work. According to the results in Column 4, working is positively associated with drug use for all groups, increasing the probability of using drugs by five to 14 percentage points.

Although the preliminary analysis indicates that work is positively related to crimes and drug use, the findings do not differentiate the type of criminal activities and drug use. Accordingly, the models are re-estimated using four types of criminal activities and two types of drug use as dependent variables (Tables 5a and 5b). The results for crimes reported in Panel A of Table 5a demonstrate that the positive estimated coefficients of the work variable are significant for theft and drug sales but not for vandalism and assault. The marginal effects in Panel B indicate that youths who work are three percent more likely to commit theft or sell drugs. The results for drugs in Table 5b show that work is significantly and positively related to marijuana use but not to cocaine and other drug use (Panel A). Work increases the probability of youths using marijuana by nine percentage points (Panel B).

The previous results indicate that the adverse impact of working is more common for nonviolent crimes involving drugs and money, i.e., theft, drug sales, and

marijuana use, but not for violent crimes, i.e., vandalism and assault. These results apply to youths who work any number of hours but do not differentiate between youths who work at different intensities. In order to examine the impacts of different types of work intensity, the crime and drug equations are re-estimated in Table 6 using four categories of work intensity, i.e., low, moderate, high, and full-time. The estimated coefficients are shown in columns 1 and 2 for crimes and drugs, respectively.

The results in Table 6, columns 3 and 4, indicate that the detrimental effects of working, in terms of increasing the probability of committing crimes and using drugs, apply only to youths who work at high intensity, defined as 20-39 hours per week. Youths who work at high intensity are four percent more likely to commit crimes and 11 percent more likely to use drugs. Working at low intensity, defined as 1-9 hours per week, on the other hand, reduces the probability of using drugs by 18 percentage points but has no significant effect on the probability of committing crimes. Working at moderate intensity, defined as 10-19 hours per week, and working full-time, defined as 40 or more hours per week, do not produce significant effects on either crimes or drug use.<sup>11</sup> These results imply that when considered collectively working does not have a causal effect on committing crimes or using drugs. However, when examining work separately by intensity, high-intensity work significantly increases the probabilities of committing crimes and using drugs.

---

<sup>11</sup> Although the estimated coefficient of working at moderate intensity is significant at the 10 percent level, the level of significance disappears when marginal effects are calculated.

## 7. Conclusion

The impact of youths' employment during school years has received considerable policy attention over the past few decades (*Report on the Youth Labor Force*, 2000). Research on youth employment and involvement with crimes and drugs is confined more to sociology and criminology than economics. This paper improves on the current literature by taking into account the choice variables' nonrandom nature, which establishes endogeneity problems.

The preliminary results reveal that working is positively related to both crimes and drug use. In more detailed analysis of subgroups, the results demonstrate that work increases the probability of committing crimes by four to 12 percentage points for all groups except youths who are black, at least 20 years of age, or from a middle-income family. In addition, work does not increase the probability of committing crimes for youths who have low ASVAB scores or low GPAs in eighth grade. Work increases the probability of using drugs by five to 14 percent across all groups.

Youths who work are more involved with drug use and nonviolent crimes involving drugs and money than violent crimes. Employed youths are three percent more likely to commit theft or sell drugs and nine percent more likely to use marijuana than unemployed youths. This finding is consistent with the fact that young offenders are usually involved with crimes for material gain or excitement (Cullen et al., 1985; Farrington, 1996). The effects of working on drug use are also supported by the high prevalence of drugs in the working environment, exposing

youths to drugs and encouraging drug consumption by peer example (Bachman et al., 1981; Bahls, 1998; Ministry of Public Health of Belgium, 2002; Warr, 1993).

When working variables are categorized by intensity, results show that only high-intensity working is positively related to crimes and drug use, increasing the probability by four and 11 percentage points, respectively. In contrast, working at low intensity is negatively related to drug use, decreasing the probability by 18 percentage points. Ploeger (1997) asserts that not only is employment status associated with delinquent behavior but the intensity of employment creates an additional effect on delinquency as well. Working at moderate intensity or full-time has no significant effect on crimes and drug use.

The possible explanation could be that social interaction increases with the level of work intensity and does not influence behavior until a certain number of hours worked is reached, i.e., 20 hours per week. The positive association with theft and drug sales could be the consequence of the positive effects of working on drug use. Many drug users also deal drugs on the side or steal to acquire drugs. Youths working at low intensity do not have enough exposure to negative social interaction for it to influence their behavior, but they may learn the unfavorable consequences of drugs from their coworkers and try to avoid them, resulting in lower probability of using drugs. Working full-time has no significant impact on any criminal activities or drug use. Older youths are less susceptible to peer effects than younger ones. More than 50 percent of youths in the sample who work full-time are at least 20 years old.

It can be concluded that whether youth employment is beneficial or harmful depends on work intensity. While working at high intensity encourages involvement in criminal activities and drug use, working at low intensity discourages it. Policies designed to minimize the harmful effects of employment would be valuable to youths who choose to work, because peer pressure is the most powerful influence in determining youths' social behavior. It is a widely held belief that youths who commit crime will likely reoffend in the future (Soler, 2001). Once youths engage in crimes and especially drug use, they are more likely to continue as adults (Yablonsky, 2000). The impacts are long-lasting to the individuals and society as a whole. Califano (2006) notes that youths who reach 21 years of age without using drugs will almost certainly never do so later in life.

According to the Office of Juvenile Justice and Delinquency Prevention (2002), the cost to society of allowing one youth to leave school and enter a life of crimes and drugs is \$1.7 to 2.3 million annually. Prevention of the early introduction to drugs by employment can be one vehicle to curb the high rate of drug problems among youths in the U.S. Suggested approaches to preventing introduction to drugs could be limiting the number of hours youths can work or lowering youth concentration in the workplace in order to reduce negative social interaction. Structuring contact between young workers and management in order to maintain the young-to-adult worker ratio is another possibility (Greenberger and Steinberg, 1986).

## References:

Agnew, Robert. (1986). "Work and Delinquency among Juveniles Attending School." *Journal of Crime and Justice*, 9(1): 9-41.

Agnew, Robert. (2003). "An Integrated Theory of the Adolescent Peak in Offending." *Youth and Society*, 34(3): 263-299.

Akerlof, George A. (1997). "Social Distance and Social Decisions." *Econometrica*, 65(5): 1005-1027.

Anderson, David A. (1999). "The Aggregate Burden of Crime." *Journal of Law and Economics*, 42(2): 611-642.

Antecol, Heather, Kelly Bedard, and Eric Helland. (2001). "Does Single Parenthood Increase the Probability of Teenage Promiscuity, Drug Use, and Crime? Evidence from Divorce Law Changes." *Working Paper No. 1022*, Department of Economics, University of California, Santa Barbara.

Bachman, Jerald G., Deborah J. Safron, Susan Rogala Sy, and John E. Schlenberg. (2003). "Wishing to Work: New Perspective on How Adolescents' Part-Time Work Intensity is Linked to Educational Disengagement, Substance, and

Other Problem Behaviours.” *International Journal of Behavioral Development*, 27(4): 301-315.

Bachman, Jerald G., Lloyd D. Johnston, and Patrick M. O’Malley. (1981). “Smoking, Drinking, and Drug Use among American High School Students: Correlates and Trends, 1975-1979.” *American Journal of Public Health*, 71(1): 59-69.

Bahls, Jane Easter. (1998). “Drugs in the Workplace.” *HR Magazine*, 43(2): 80-87.

Becker, Gary S. (1964). *Human capital: a theoretical and empirical analysis, with special reference to education*. New York: Columbia University Press.

Becker, Gary S. (1968). “Crime and Punishment: An Economic Approach.” *Journal of Political Economy*, 76(2): 169-217.

Becker, Gary S. (1996). *Accounting for Tastes*. Cambridge, Massachusetts: Harvard University Press.

Bernheim, Douglas B. (1994). “A Theory of Conformity.” *Journal of Political Economy*, 102(5): 841-877.

Blumstein, Alfred. (2002). "Youth, Guns, and Violent Crime." *The Future of Children*, 12(2): 39-53.

Borland, Jeff, and Boyd Hunter. (2000). "Does Crime Affect Employment Status? The Case of Indigenous Australians." *Economica*, 67(265): 123-144.

Brock, William A., and Steven N. Durlauf. (2001). "Discrete Choice with Social Interactions." *Review of Economic Studies*, 68(2): 235-260.

Bronfenbrenner, Urie, Peter McClelland, Elaine Wethington, Phylliss Moen, and Stephen J. Ceci. (1996). *The State of Americans: This Generation and the Next*. New York: The Free Press.

Califano, Joseph A. (2006). 2006 Annual Report. The National Center on Addiction and Substance Abuse at Columbia University.

*Committee on the Health and Safety Implications of Child Labor (Committee)*. (1998). *Protecting Youth at Work: Health, Safety, and Development of Working Children and Adolescents in the United States*. Washington, D.C.: National Academy Press.



Cullen, Francis T., Martha Todd Larson, and Richard A. Mathers. (1985). "Having Money and Delinquent Involvement." *Criminal Justice and Behavior*, 12(2): 171-192.

Cullen, Francis T., Nicolas Williams, and John Paul Wright. (1997). "Work Conditions and Juvenile Delinquency: Is Youth Employment Criminogenic?" *Criminal Justice Policy Review*, 8(2-3): 119-143.

Dilulio, John J., Jr. (1996). "Help Wanted: Economists, Crime and Public Policy." *Journal of Economic Perspectives*, 10(1): 3-24.

England, Ralph W., Jr. (1970). A Theory of Middle Class Juvenile Delinquency. In James E. Teele (Eds.), *Juvenile Delinquency: A Reader* (257-262). Itasca, Illinois: F.E. Peacock Publishers.

*Executive Office of the President* (2004). "The Economic Costs of Drug Abuse in the United States 1992-2002." Washington, D.C.

Evans, William N., Wallace E. Oates, and Robert M. Schwab. (1992). "Measuring Peer Group Effects: A Study of Teenage Behavior." *Journal of Political Economy*, 100(5): 966-991.

Falk, Armin, and Andrea Ichino. (2006). "Clean Evidence on Peer Effects." *Journal of Labor Economics*, 24(1): 39-57.

Falk, Armin, and Urs Fischbacher. (2002). "Crime in the Lab-Detecting Social Interaction." *European Economic Review*, 46(4-5): 859-869.

Farrington, David P. (1996). "Understanding and Preventing Youth Crime." *Research No. SP93*, Joseph Rowntree Foundation, England.

Glaeser, Edward L., Bruce Sacerdote, and Jose A. Scheinkman. (1996). "Crime and Social Interactions." *Quarterly Journal of Economics*, 111(2): 507-548.

Glueck, Sheldon, and Eleanor T. Glueck. (1934). *One Thousand Juvenile Delinquents*. Cambridge, Massachusetts: Harvard University Press.

Gottfredson, Denise C. (1985). "Youth Employment, Crime, and Schooling: A Longitudinal Study of a National Sample." *Developmental Psychology*, 21(3): 419-432.

Gottfredson, Michael R., and Travis Hirschi. (1990). *A General Theory of Crime*. Stanford, California: Stanford University Press.

Greenberger, Ellen, and Laurence Steinberg. (1986). *When Teenagers Work: The Psychological and Social Costs of Adolescent Employment*. New York: Basic Books.

Greene, William H. (2008). *Econometric Analysis*. (6th ed.). Upper Saddle River, New Jersey: Prentice-Hall.

Grogger, Jeffrey. (1992). "Arrests, Persistent Youth Joblessness, and Black/White Employment Differentials." *Review of Economics and Statistics*, 74(1): 100-106.

Grogger, Jeffrey. (1995). "The Effect of Arrests on the Employment and Earnings of Young Men." *Quarterly Journal of Economics*, 110(1): 51-71.

Grogger, Jeffrey. (1998). "Market Wages and Youth Crime." *Journal of Labor Economics*, 16(4): 756-791.

Hagan, John. (1991). "Destiny and Drift: Subcultural Preferences, Status Attainments, and the Risks and Rewards of Youth." *American Sociological Review*, 56(5): 567-582.

Healy, William, and Augusta F. Bronner. (1926). *Delinquents and Criminals: Their Making and Unmaking*. New York: J.J. Little and Ives Company.

Jacob, Brian A., and Lars Lefgren. (2003). "Are Idle Hands the Devil's Workshop? Incapacitation, Concentration, and Juvenile Crime." *American Economic Review*, 93(5): 1560-1577.

*Office of Juvenile Justice and Delinquency Prevention Act of 2002*. (2002). Office of Juvenile Justice and Delinquency Prevention. Washington, D.C.

Kosterman, Rick, J. David Hawkins, Jie Guo, Richard F. Catalano, and Robert D. Abbot. (2000). "The Dynamics of Alcohol and Marijuana Initiation: Patterns and Predictors of First Use in Adolescence." *American Journal of Public Health*, 90(3): 360-366.

Krauth, Brian V. (2006). "Simulation-Based Estimation of Peer Effects." *Journal of Econometrics*, 133(1): 243-271.

Kremer, Michael, and Dan Levy. (2008) "Peer Effects and Alcohol Use among College Students." *Journal of Economic Perspectives*, 22(3): 189-206.

Leung, Ambrose. (2004). "Delinquency, Schooling, and Work: Time Allocation Decision of Youth." *Applied Economics*, 36(9): 987-993.

Levitt, Steven D., and Sudhir Alladi Venkatesh. (2000). "An Economic Analysis of a Drug-Selling Gang's Finances." *Quarterly Journal of Economics*, 115(3): 755-789.

Lochner, Lance. (1999). "Education, Work, and Crime: Theory and Evidence." *Working Paper No. 465*, Rochester Center for Economic Research, University of Rochester.

Lochner, Lance. (2004). "Education, Work, and Crime: A Human Capital Approach." *International Economic Review*, 45(3): 811-843.

Ludwig, Jens, Greg J. Duncan, and Paul Hirschfield (2001). "Urban Poverty and Juvenile Crime: Evidence from a Randomized Housing-Mobility Experiment." *The Quarterly Journal of Economics*, 116(2): 655-679.

Manski, Charles F. (2000). "Economic Analysis of Social Interactions." *Journal of Economic Perspectives*, 14(3): 115-136.

Merlo, Antonio, and Kenneth I. Wolpin. (2008). "The Transition from School to Jail: Youth Crime and High School Completion among Black Males." Penn Institute for Economic Research, *PIER Working Paper* 08-033.

*Ministry of Public Health of Belgium* (2002). "Cannabis 2002 Report: A Joint International Effort at the Initiative of the Ministers of Public Health of Belgium, France, Germany, the Netherlands, Switzerland." Brussels: Belgium.

Mortimer, Jeylan T. (2003). *Working and Growing Up in America*. Cambridge, Massachusetts: Harvard University Press.

*NLSY97* Press Release (2005). "Work Activity of High School Students: Data from the National Longitudinal Survey of Youth 1997.", Bureau of Labor Statistics, U.S. Department of Labor.

*NLSY97* User's Guide (2007). *A Guide to the Rounds 1-9 Data, National Longitudinal Survey of Youth 1997*. Center for Human Resource Research. The Ohio State University. Columbus: Ohio.

*National Survey on Drug Use and Health*. (2006). "Substance Use and Employment among Youth Aged 15-17." NSDUH Report, Department of Health and Human Services.

*National Survey on Drug Use and Health*. (2007). Detailed Tables, Table 1.20B and 1.21B. Office of Applied Studies, Department of Health and Human Services.

Narayan, Paresh Kumar, and Russell Smyth. (2004). "Crime Rate, Male Youth Unemployment, and Real Income in Australia: Evidence from Granger Causality Tests." *Applied Economics*, 36(17): 2079-2095.

Newcomb, Michael D., Ebrahim Maddahian, and P. M. Bentler. (1986). "Risk Factors for Drug Use among Adolescents: Concurrent and Longitudinal Analyses." *American Journal of Public Health*, 76(5): 525-531.

Phillips, Sarah, and Kent L. Sandstrom. (1990). "Parental Attitudes toward Youth Work." *Youth and Society*, 22(2): 160-183.

Ploeger, Matthew. (1997). "Youth Employment and Delinquency: Reconsidering a Problematic Relationship." *Criminology*, 35(4): 659-675.

*Report on the Youth Labor Force.* (2000). Bureau of Labor Statistics, U.S. Department of Labor.

Ruggiero, Mary, Ellen Greenberger, and Laurence D. Steinberg. (1982). "Occupational Deviance among Adolescent Workers." *Youth and Society*, 13(4): 423-448.

Ruhm, Christopher J. (1995). "The Extent and Consequences of High School Employment." *Journal of Labor Research*, 16(3): 293-303.

Sacerdote, Bruce. (2001). "Peer Effects with Random Assignment: Results for Dartmouth Roommates." *Quarterly Journal of Economics*, 116(2): 681-704.

Sampson, Robert J. and John H. Laub. (1990). "Crime and Deviance over the Life Course: The Salience of Adult Social Bonds." *American Sociological Review*, 55(5): 609-627.

Snyder, Howard N. (1999). "Violent Juvenile Crime: The Number of Violent Juvenile Offender Declines (Cover Story)." *Corrections Today*. 61(2): 96-101.



Soetevent, Adriaan R. (2006). "Empirics of the Identification of Social Interactions: An Evaluation of the Approaches and Their Results." *Journal of Economic Survey*, 20(2): 193-228.

Soler, Mark. (2001). "Public Opinion on Youth, Crime, and Race: A Guide for Advocates." Building Blocks for Youth, Youth Law Center, Washington, D.C.

Steinberg, Laurence. (1987). "Single Parents, Stepparents, and the Susceptibility of Adolescents." *Child Development*, 58(1): 269-275.

Steinberg, Laurence. (2000). "Youth Violence: Do Parents and Families Make a Difference?" *National Institute of Justice Journal*, April 2000: 30-38.

Steinberg, Laurence, B. Bradford Brown, and Sanford M. Dornbusch. (1996). *Beyond the Classroom: Why School Reform Has Failed and What Parents Need to Do*. New York: Simon & Schuster.

Steinberg, Laurence, and Elizabeth Cauffman. (1995). "The Impact of Employment on Adolescent Development." *Annals of Child Development*, 11: 131-166.

Steinberg, Laurence, Suzanne Fegley, and Sanford M. Dornbusch. (1993).

“Negative Impact of Part-Time Work on Adolescent Adjustment: Evidence from a Longitudinal Study.” *Developmental Psychology*, 29(2): 171-180.

Stinebrickner, Ralph, and Todd Stinebrickner. (2006). “What Can Be Learned about Peer Effects Using College Roommates? Evidence from New Survey Data and Students from Disadvantaged Backgrounds.” *Journal of Public Economics*, 90(8-9): 1435-1454.

Stoli, Michael J. (1998). “Drugs on the Job.” *Behavioral Health Management*, 18(1): 7-8.

*Substance Abuse and Mental Health Services Administration (SAMHSA)* (2007).

“Nationwide Survey Shows Most Illicit Drug Users and Heavy Alcohol Users Are in the Workplace and May Pose Special Problems.” SAMHSA News Release, Office of Applied Studies, Department of Health and Human Services.

*Substance Abuse and Mental Health Services Administration (SAMHSA)* (2008).

Results from the 2007 National Survey on Drug Use and Health: National Findings (NSDUH Series H-34, DHHS Publication No. SMA 08-4343).

Sutherland, Edwin H. (1947). *Principles of Criminology* (4th ed). Chicago: J. B. Lippincott Company.

Sutherland, Edwin H., Donald R. Cressey, and David F. Luckenbill. (1992). *Principles of Criminology* (11th ed.). Dix Hills, New York: General Hall, Inc.

Tanner, J., and Harvey Krahn. (1991). "Part-Time Work and Deviance among High School Seniors." *Canadian Journal of Sociology*, 16(3): 281-302.

Trojannowicz, Robert C. (1978). *Juvenile Delinquency: Concepts and Controls* (2nd ed.). Englewood Cliffs, New Jersey: Prentice-Hall.

*Uniform Crime Report*. (2007). Federal Bureau of Investigation, Department of Justice. Table 41.

U.S. Department of Justice. (2001). "Addressing the Problem of Juvenile Bullying." *OJJDP Fact Sheet*. 27.

Vance, Becky. (2000). "Drug Use and Abuse Remain a Serious Workplace Problem." *Houston Business Journal*, 31(9): 49.

Waldfoegel, Joel. (1994a). "Does Conviction Have a Persistent Effect on Income and Employment?" *International Review of Law and Economic*, 14(1):103-119.

Waldfoegel, Joel. (1994b). "The Effect of Criminal Conviction on Income and Trust  
"Reposed in the Workmen"." *Journal of Human Resources*, 29(1): 62-81.

Warr, Mark. (1993). "Age, Peers, and Delinquency." *Criminology*, 31(1): 17-40.

Weatherburn, Don, and Bronwyn Lind. (1998). "Poverty, Parenting, Peers, and  
Crime-Prone Neighbourhoods." *Trends and Issues in Crime and Criminal  
Justice*, No. 85. Australian Institute of Criminology.

West, Donald James. (1967). *The Young Offender*. New York: International  
Universities Press.

Wright, John Paul, Francis T. Cullen, and Nicholas Williams. (1997). "Working  
While in School and Delinquent Involvement: Implications for Social Policy."  
*Crime and Delinquency*, 43(2): 203-221.

Yablonsky, Lewis. (2000). *Juvenile Delinquency: Into the 21<sup>st</sup> Century*. Belmont,  
CA: Wadsworth/Thompson Learning.

Yamaguchi, Kazuo, and Denise B. Kandel. (1984). "Patterns of Drug Use from Adolescence to Young Adulthood: III. Predictors of Progression." *American Journal of Public Health*, 74(7): 673-680.

Zimmerman, David J. (2003). "Peer Effects in Academic Outcomes: Evidence from a Natural Experiment." *Review of Economics and Statistics*, 85(1): 9-23.

Table 1. Variable Definitions

| Variable                     | Definition   |
|------------------------------|--|
| <b>Dependent Variables</b>   |  |
| anycrime                     | =1 if commit anycrime; =0 otherwise  |
| vandalism                    | =1 if commit vandalism; =0 otherwise   |
| theft                        | =1 if steal less than \$50 or steal more than \$50 including car or commit other property crime; =0 otherwise  |
| assault                      | =1 if assault; =0 otherwise  |
| drug_sales                   | =1 if sell drugs; =0 otherwise   |
| anydrug                      | =1 if use any drug; =0 otherwise   |
| marijuana                    | =1 if use marijuana; =0 otherwise  |
| cocaine                      | =1 if use cocaine or other hard drugs; =0 otherwise  |
| <b>Explanatory Variables</b> |  |
| work                         | =1 if work any hour per week; =0 if not work   |
| low_hours                    | =1 if work 1-9 hours per week; =0 otherwise  |
| moderate_hours               | =1 if work 10-19 hours per week; =0 otherwise  |
| high_hour                    | =1 if work 20-39 hours per week; =0 otherwise  |
| full_time                    | =1 if work 40 hours or more per week; =0 otherwise   |
| <b>Control Variables</b>     |  |
| age13                        | =1 if age equals 13; =0 otherwise  |
| age14                        | =1 if age equals 14; =0 otherwise  |
| age15                        | =1 if age equals 15; =0 otherwise  |
| age16                        | =1 if age equals 16; =0 otherwise  |
| age17                        | =1 if age equals 17; =0 otherwise  |
| age18                        | =1 if age equals 18; =0 otherwise  |
| age19                        | =1 if age equals 19; =0 otherwise  |
| age20                        | =1 if age equals 20; =0 otherwise  |
| age21                        | =1 if age equals 21; =0 otherwise  |
| ageover21                    | =1 if age is greater than 21; =0 otherwise   |
| male                         | =1 if male; =0 if female   |
| black                        | =1 if black; =0 otherwise  |
| hispanic                     | =1 if Hispanic; =0 otherwise   |
| construction                 | =1 if work in construction, manufacturing, wholesale trade, transportation, and warehouse; =0 otherwise  |
| retail                       | =1 if work in retail trade, entertainment, accommodation, and food services; =0 otherwise  |
| professional                 | =1 if work in information and communication; finance, insurance and real estate; professional and related services; educational, health, and social services; =0 otherwise |

Table 1. Variable Definitions (Continued)

| Variable                 | Definition                                       |
|--------------------------|--|
| <b>Control Variables</b> |  |
| wage                     | hourly wage                                      |
| father_education         | years of father education                        |
| mother_education         | years of mother education                        |
| GPA_eighth_grade         | GPA in eighth grade                              |
| asvab                    | Armed Services Vocational Aptitude Battery score |
| bully                    | =1 if bullied before age 12; =0 otherwise        |
| single_parent            | =1 if live in single-parent family; =0 otherwise |
| log_household_income     | household income in base 10 log form             |
| household_size           | number of residents in household                 |
| household_under_18       | number of siblings under age 18                  |
| urban                    | =1 if live in urban areas; =0 otherwise          |

*Notes :* The *asvab* (Armed Services Vocational Aptitude Battery) measures the respondent's knowledge and skills (similar to AFQT score). The *asvab* variable contains a summary percentile score ranging, from one to 99, that is comparable among age groups.

Table 2a. Sample Means for Crime Sample

|                              | Full Sample |          | Criminal Offenders |          | Non-Criminal Offenders |          |
|------------------------------|-------------|----------|--------------------|----------|------------------------|----------|
| <b>Dependent Variables</b>   |             |          |                    |          |                        |          |
| anycrime                     | 0.196       | (0.367)  | 1.000              | (0.000)  | --                     |          |
| vandalism                    | 0.062       | (0.241)  | 0.317              | (0.465)  | --                     |          |
| theft                        | 0.095       | (0.293)  | 0.483              | (0.500)  | --                     |          |
| assault                      | 0.078       | (0.268)  | 0.398              | (0.490)  | --                     |          |
| drug_sales                   | 0.061       | (0.239)  | 0.312              | (0.463)  | --                     |          |
| <b>Explanatory Variables</b> |             |          |                    |          |                        |          |
| work                         | 0.769       | (0.422)  | 0.751              | (0.433)  | 0.773                  | (0.419)  |
| low hours                    | 0.046       | (0.209)  | 0.044              | (0.205)  | 0.046                  | (0.209)  |
| moderate hours               | 0.126       | (0.331)  | 0.126              | (0.332)  | 0.125                  | (0.331)  |
| high hour                    | 0.364       | (0.481)  | 0.370              | (0.483)  | 0.363                  | (0.481)  |
| full time                    | 0.233       | (0.423)  | 0.210              | (0.407)  | 0.238                  | (0.426)  |
| <b>Control Variables</b>     |             |          |                    |          |                        |          |
| age14                        | 0.057       | (0.232)  | 0.086              | (0.280)  | 0.050                  | (0.218)  |
| age15                        | 0.090       | (0.287)  | 0.131              | (0.337)  | 0.080                  | (0.272)  |
| age16                        | 0.125       | (0.331)  | 0.163              | (0.370)  | 0.115                  | (0.320)  |
| age17                        | 0.151       | (0.358)  | 0.174              | (0.379)  | 0.145                  | (0.352)  |
| age18                        | 0.156       | (0.363)  | 0.154              | (0.361)  | 0.157                  | (0.363)  |
| age19                        | 0.137       | (0.344)  | 0.111              | (0.315)  | 0.144                  | (0.351)  |
| age20                        | 0.114       | (0.318)  | 0.082              | (0.374)  | 0.122                  | (0.327)  |
| age21                        | 0.084       | (0.277)  | 0.050              | (0.218)  | 0.092                  | (0.289)  |
| ageover21                    | 0.170       | (0.376)  | 0.099              | (0.298)  | 0.187                  | (0.390)  |
| male                         | 0.499       | (0.500)  | 0.617              | (0.486)  | 0.470                  | (0.499)  |
| black                        | 0.268       | (0.443)  | 0.253              | (0.435)  | 0.271                  | (0.445)  |
| hispanic                     | 0.208       | (0.406)  | 0.200              | (0.400)  | 0.209                  | (0.407)  |
| construction                 | 0.113       | (0.317)  | 0.115              | (0.318)  | 0.113                  | (0.316)  |
| retail                       | 0.400       | (0.490)  | 0.427              | (0.495)  | 0.394                  | (0.489)  |
| professional                 | 0.200       | (0.400)  | 0.156              | (0.363)  | 0.211                  | (0.408)  |
| wage                         | 6.227       | (4.603)  | 5.789              | (4.338)  | 6.334                  | (4.659)  |
| father_education             | 11.580      | (4.323)  | 11.611             | (4.195)  | 11.573                 | (4.354)  |
| mother_education             | 12.287      | (3.230)  | 12.332             | (3.244)  | 12.276                 | (3.227)  |
| GPA_eight_grade              | 2.839       | (0.833)  | 2.640              | (0.864)  | 2.887                  | (0.817)  |
| asvab                        | 46.356      | (26.687) | 46.346             | (26.357) | 46.359                 | (26.767) |
| bully                        | 0.198       | (0.398)  | 0.271              | (0.445)  | 0.180                  | (0.384)  |
| single_parent                | 0.249       | (0.433)  | 0.295              | (0.456)  | 0.238                  | (0.426)  |
| log_household_income         | 6.634       | (5.034)  | 5.710              | (5.190)  | 6.858                  | (4.970)  |
| household_size               | 4.005       | (1.710)  | 4.006              | (1.636)  | 4.005                  | (1.727)  |
| household_under 18           | 1.306       | (1.340)  | 1.425              | (1.326)  | 1.277                  | (1.342)  |
| urban                        | 0.745       | (0.436)  | 0.758              | (0.428)  | 0.741                  | (0.438)  |
| N                            | 39,356      |          | 7,700              |          | 31,656                 |          |

Notes: The crime rates do not sum up to one because 2,708 observations contain more than one crime participation.



Table 2b. Sample Means for Drug Sample

|                              | Full Sample |          | Drug Users |          | Non-Drug Users |          |
|------------------------------|-------------|----------|------------|----------|----------------|----------|
| <b>Dependent Variables</b>   |             |          |            |          |                |          |
| anydrug                      | 0.247       | (0.431)  | 1.000      | (0.000)  | --             |          |
| marijuana                    | 0.236       | (0.424)  | 0.956      | (0.206)  | --             |          |
| cocaine                      | 0.063       | (0.243)  | 0.256      | (0.437)  | --             |          |
| <b>Explanatory Variables</b> |             |          |            |          |                |          |
| work                         | 0.787       | (0.409)  | 0.841      | (0.365)  | 0.769          | (0.421)  |
| low hours                    | 0.041       | (0.198)  | 0.036      | (0.187)  | 0.042          | (0.201)  |
| moderate hours               | 0.115       | (0.319)  | 0.116      | (0.320)  | 0.114          | (0.318)  |
| high hour                    | 0.361       | (0.480)  | 0.411      | (0.492)  | 0.345          | (0.475)  |
| full time                    | 0.270       | (0.444)  | 0.277      | (0.448)  | 0.268          | (0.443)  |
| <b>Control Variables</b>     |             |          |            |          |                |          |
| age14                        | 0.047       | (0.211)  | 0.032      | (0.177)  | 0.052          | (0.221)  |
| age15                        | 0.074       | (0.262)  | 0.069      | (0.252)  | 0.076          | (0.264)  |
| age16                        | 0.102       | (0.303)  | 0.106      | (0.307)  | 0.101          | (0.301)  |
| age17                        | 0.123       | (0.328)  | 0.138      | (0.345)  | 0.118          | (0.323)  |
| age18                        | 0.127       | (0.333)  | 0.147      | (0.354)  | 0.121          | (0.326)  |
| age19                        | 0.126       | (0.331)  | 0.138      | (0.345)  | 0.122          | (0.327)  |
| age20                        | 0.121       | (0.332)  | 0.130      | (0.336)  | 0.125          | (0.331)  |
| age21                        | 0.108       | (0.310)  | 0.101      | (0.302)  | 0.111          | (0.313)  |
| ageover21                    | 0.275       | (0.447)  | 0.241      | (0.428)  | 0.286          | (0.452)  |
| male                         | 0.486       | (0.500)  | 0.545      | (0.498)  | 0.467          | (0.499)  |
| black                        | 0.266       | (0.442)  | 0.207      | (0.405)  | 0.285          | (0.451)  |
| hispanic                     | 0.209       | (0.406)  | 0.182      | (0.386)  | 0.218          | (0.412)  |
| construction                 | 0.119       | (0.324)  | 0.131      | (0.337)  | 0.115          | (0.319)  |
| retail                       | 0.387       | (0.487)  | 0.435      | (0.496)  | 0.371          | (0.483)  |
| professional                 | 0.224       | (0.417)  | 0.217      | (0.412)  | 0.227          | (0.419)  |
| wage                         | 6.780       | (4.882)  | 7.304      | (4.742)  | 6.608          | (4.915)  |
| father_education             | 11.600      | (4.336)  | 11.906     | (4.274)  | 11.500         | (4.352)  |
| mother_education             | 12.307      | (3.235)  | 12.703     | (3.142)  | 12.178         | (3.255)  |
| GPA_eight_grade              | 2.855       | (0.828)  | 2.757      | (0.856)  | 2.886          | (0.817)  |
| asvab                        | 46.748      | (26.715) | 49.991     | (25.993) | 45.686         | (26.863) |
| bully                        | 0.195       | (0.396)  | 0.231      | (0.421)  | 0.183          | (0.387)  |
| single_parent                | 0.236       | (0.424)  | 0.250      | (0.433)  | 0.231          | (0.421)  |
| log_household_income         | 7.311       | (4.827)  | 7.598      | (4.723)  | 7.217          | (4.856)  |
| household_size               | 3.890       | (1.730)  | 3.707      | (1.620)  | 3.950          | (1.760)  |
| household_under 18           | 1.200       | (1.316)  | 1.027      | (1.209)  | 1.257          | (1.344)  |
| urban                        | 0.753       | (0.431)  | 0.778      | (0.415)  | 0.745          | (0.436)  |
| N                            | 47,725      |          | 11,771     |          | 35,954         |          |

Notes : The rates of drug use do not sum up to one because 2,494 observations contain more than one drug use.

Table 3a. Estimation Results and Marginal Effects for Crime Participation (Overall)

|                            | Model<br>(1)       | Model<br>(2)       | Model<br>(3)       | Model<br>(4)       | Model<br>(5)       |
|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>A. Coefficients</b>     |                    |                    |                    |                    |                    |
| work                       | -0.158 (0.055) *** | 0.259 (0.066) ***  | 0.251 (0.063) ***  | 0.225 (0.074) ***  | 0.251 (0.074) ***  |
| age15                      |                    | 0.662 (0.049) ***  | 0.682 (0.049) ***  | 0.666 (0.049) ***  | 0.756 (0.057) ***  |
| age16                      |                    | 0.545 (0.042) ***  | 0.568 (0.042) ***  | 0.548 (0.043) ***  | 0.630 (0.051) ***  |
| age17                      |                    | 0.432 (0.038) ***  | 0.455 (0.039) ***  | 0.440 (0.039) ***  | 0.506 (0.044) ***  |
| age18                      |                    | 0.343 (0.036) ***  | 0.365 (0.036) ***  | 0.354 (0.037) ***  | 0.386 (0.038) ***  |
| age19                      |                    | 0.217 (0.036) ***  | 0.241 (0.036) ***  | 0.234 (0.036) ***  | 0.254 (0.037) ***  |
| age20                      |                    | 0.138 (0.036) ***  | 0.156 (0.036) ***  | 0.151 (0.036) ***  | 0.163 (0.037) ***  |
| age21                      |                    | 0.029 (0.037)      | 0.039 (0.038)      | 0.036 (0.038)      | 0.049 (0.038)      |
| male                       |                    |                    | 0.358 (0.025) ***  | 0.354 (0.025) ***  | 0.297 (0.026) ***  |
| black                      |                    |                    | -0.007 (0.029)     | -0.006 (0.029)     | -0.027 (0.033)     |
| hispanic                   |                    |                    | -0.033 (0.033)     | -0.030 (0.033)     | -0.033 (0.037)     |
| construction               |                    |                    |                    | 0.027 (0.048)      | 0.018 (0.049)      |
| retail                     |                    |                    |                    | 0.056 (0.043)      | 0.049 (0.044)      |
| professional               |                    |                    |                    | -0.043 (0.045)     | -0.041 (0.046)     |
| wage                       |                    |                    |                    |                    | -0.003 (0.003)     |
| father_education           |                    |                    |                    |                    | 0.002 (0.003)      |
| mother_education           |                    |                    |                    |                    | -0.001 (0.005)     |
| GPA_eighth_grade           |                    |                    |                    |                    | -0.200 (0.017) *** |
| asvab                      |                    |                    |                    |                    | 0.003 (0.001) ***  |
| bully                      |                    |                    |                    |                    | 0.249 (0.030) ***  |
| single_parent              |                    |                    |                    |                    | 0.083 (0.027) ***  |
| log_household_income       |                    |                    |                    |                    | 0.006 (0.003) **   |
| household_size             |                    |                    |                    |                    | -0.029 (0.010) *** |
| household_under_18         |                    |                    |                    |                    | 0.005 (0.014)      |
| urban                      |                    |                    |                    |                    | 0.082 (0.026) ***  |
| constant                   | -0.809 (0.047) *** | -1.445 (0.066) *** | -1.643 (0.070) *** | -1.628 (0.070) *** | -1.282 (0.101) *** |
| p                          | 0.112 (0.031) ***  | -0.122 (0.037) *** | -0.115 (0.034) *** | -0.115 (0.034) *** | -0.116 (0.031) *** |
| Wald Test                  | 12.824             | 10.835             | 11.189             | 11.128             | 13.535             |
| <b>B. Marginal Effects</b> |                    |                    |                    |                    |                    |
| work                       | -0.044 (0.016) *** | 0.059 (0.013) ***  | 0.056 (0.013) ***  | 0.051 (0.015) ***  | 0.055 (0.015) ***  |

Notes: The sample contains 39,356 person-year observations. The excluded categories for age, gender, race, and industry are age over 21, female, white, and other industries, respectively. Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 3b. Estimation Results and Marginal Effects for Drug Use (Overall)

|                            | Model<br>(1)       | Model<br>(2)       | Model<br>(3)       | Model<br>(4)       | Model<br>(5)       |
|----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>A. Coefficients</b>     |                    |                    |                    |                    |                    |
| work                       | 0.541 (0.048) ***  | 0.667 (0.054) ***  | 0.480 (0.054) ***  | 0.454 (0.064) ***  | 0.316 (0.067) ***  |
| age15                      |                    | 0.256 (0.041) ***  | 0.190 (0.041) ***  | 0.174 (0.042) ***  | 0.364 (0.051) ***  |
| age16                      |                    | 0.284 (0.032) ***  | 0.240 (0.032) ***  | 0.222 (0.033) ***  | 0.410 (0.043) ***  |
| age17                      |                    | 0.260 (0.027) ***  | 0.239 (0.027) ***  | 0.224 (0.028) ***  | 0.347 (0.034) ***  |
| age18                      |                    | 0.266 (0.024) ***  | 0.259 (0.024) ***  | 0.249 (0.024) ***  | 0.306 (0.026) ***  |
| age19                      |                    | 0.208 (0.022) ***  | 0.208 (0.022) ***  | 0.200 (0.022) ***  | 0.233 (0.024) ***  |
| age20                      |                    | 0.155 (0.021) ***  | 0.156 (0.022) ***  | 0.151 (0.022) ***  | 0.173 (0.023) ***  |
| age21                      |                    | 0.082 (0.021) ***  | 0.080 (0.021) ***  | 0.076 (0.021) ***  | 0.090 (0.022) ***  |
| male                       |                    |                    | 0.197 (0.025) ***  | 0.199 (0.025) ***  | 0.133 (0.026) ***  |
| black                      |                    |                    | -0.244 (0.030) *** | -0.244 (0.030) *** | -0.209 (0.033) *** |
| hispanic                   |                    |                    | -0.215 (0.032) *** | -0.213 (0.032) *** | -0.150 (0.035) *** |
| construction               |                    |                    |                    | -0.003 (0.044)     | 0.006 (0.045)      |
| retail                     |                    |                    |                    | 0.053 (0.039)      | 0.050 (0.039)      |
| professional               |                    |                    |                    | -0.012 (0.040)     | -0.027 (0.041)     |
| wage                       |                    |                    |                    |                    | 0.007 (0.003) ***  |
| father_education           |                    |                    |                    |                    | 0.000 (0.003)      |
| mother_education           |                    |                    |                    |                    | 0.021 (0.005) ***  |
| GPA_eighth_grade           |                    |                    |                    |                    | -0.183 (0.017) *** |
| asvab                      |                    |                    |                    |                    | 0.004 (0.001) ***  |
| bully                      |                    |                    |                    |                    | 0.129 (0.031) ***  |
| single_parent              |                    |                    |                    |                    | 0.081 (0.026) ***  |
| log_household_income       |                    |                    |                    |                    | 0.010 (0.003) ***  |
| household_size             |                    |                    |                    |                    | -0.011 (0.008)     |
| household_under_18         |                    |                    |                    |                    | -0.057 (0.013) *** |
| urban                      |                    |                    |                    |                    | 0.149 (0.026) ***  |
| constant                   | -0.113 (0.040) *** | -1.399 (0.050) *** | -1.234 (0.055) *** | -1.224 (0.055) *** | -1.257 (0.091) *** |
| $\rho$                     | -0.202 (0.026) *** | -0.279 (0.029) *** | -0.168 (0.027) *** | -0.167 (0.027) *** | -0.126 (0.025) *** |
| Wald Test                  | 57.006             | 83.503             | 36.863             | 36.513             | 24.174             |
| <b>B. Marginal Effects</b> |                    |                    |                    |                    |                    |
| work                       | 0.143 (0.010) ***  | 0.167 (0.010) ***  | 0.129 (0.012) ***  | 0.123 (0.015) ***  | 0.088 (0.017) ***  |

Notes: The sample contains 47,725 person-year observations. The excluded categories for age, gender, race, and industry are age over 21, female, white, and other industries, respectively. Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 4. Estimation Results and Marginal Effects for Crime Participation and Drug Use by Subgroup

|                            | Coefficients      |                   | Marginal Effects  |                   |
|----------------------------|-------------------|-------------------|-------------------|-------------------|
|                            | Crimes<br>(1)     | Drugs<br>(2)      | Crimes<br>(3)     | Drugs<br>(4)      |
| <b>Full Sample</b>         | 0.251 (0.074) *** | 0.316 (0.067) *** | 0.055 (0.015) *** | 0.088 (0.017) *** |
| <b>Gender</b>              |                   |                   |                   |                   |
| Male                       | 0.288 (0.096) *** | 0.238 (0.092) *** | 0.074 (0.022) *** | 0.074 (0.027) *** |
| Female                     | 0.197 (0.116) *   | 0.447 (0.096) *** | 0.036 (0.019) *   | 0.107 (0.019) *** |
| <b>Race</b>                |                   |                   |                   |                   |
| Black                      | -0.071 (0.143)    | 0.413 (0.125) *** | -0.017 (0.035)    | 0.095 (0.025) *** |
| Hispanic                   | 0.552 (0.164) *** | 0.494 (0.151) *** | 0.102 (0.024) *** | 0.117 (0.029) *** |
| White                      | 0.427 (0.104) *** | 0.382 (0.094) *** | 0.087 (0.017) *** | 0.116 (0.025) *** |
| <b>Age</b>                 |                   |                   |                   |                   |
| 14-16                      | 0.385 (0.154) **  | 0.275 (0.153) *   | 0.106 (0.039) *** | 0.075 (0.039) *   |
| 17-19                      | 0.264 (0.107) **  | 0.274 (0.105) *** | 0.060 (0.022) *** | 0.083 (0.029) *** |
| 20 and over                | -0.082 (0.138)    | 0.343 (0.093) *** | -0.017 (0.029)    | 0.089 (0.021) *** |
| <b>Household Income</b>    |                   |                   |                   |                   |
| < 25 percentile            | 0.264 (0.102) *** | 0.219 (0.090) **  | 0.064 (0.022) *** | 0.062 (0.024) **  |
| 25-75 percentile           | 0.035 (0.124)     | 0.390 (0.103) *** | 0.008 (0.027)     | 0.104 (0.024) *** |
| > 75 percentile            | 0.747 (0.181) *** | 0.489 (0.156) *** | 0.113 (0.017) *** | 0.136 (0.035) *** |
| <b>ASVAB Score</b>         |                   |                   |                   |                   |
| < 25 percentile            | -0.019 (0.140)    | 0.221 (0.135)     | -0.004 (0.034)    | 0.054 (0.031) *   |
| 25-75 percentile           | 0.404 (0.098) *** | 0.428 (0.088) *** | 0.084 (0.017) *** | 0.118 (0.021) *** |
| > 75 percentile            | 0.733 (0.183) *** | 0.412 (0.175) **  | 0.123 (0.021) *** | 0.122 (0.045) *** |
| <b>GPA in Eighth Grade</b> |                   |                   |                   |                   |
| < 2.5                      | -0.193 (0.143)    | 0.254 (0.133) *   | -0.060 (0.046)    | 0.080 (0.039) **  |
| 2.5-3.0                    | 0.372 (0.117) *** | 0.144 (0.105) *** | 0.079 (0.021) *** | 0.119 (0.024) *** |
| > 3.0                      | 0.569 (0.123) *** | 0.396 (0.116) *** | 0.087 (0.014) *** | 0.100 (0.025) *** |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level;

\*\* at 5 percent level; \*\*\* at 1 percent level.

Table 5a. Estimation Results for Crime Participation by Crime Type

|                            | Vandalism          | Theft              | Assault            | Drug Sales         |
|----------------------------|--------------------|--------------------|--------------------|--------------------|
| <b>A. Coefficients</b>     |                    |                    |                    |                    |
| work                       | 0.107 (0.103)      | 0.248 (0.089) ***  | 0.086 (0.092)      | 0.303 (0.101) ***  |
| age15                      | 0.829 (0.082) ***  | 0.833 (0.071) ***  | 0.612 (0.072) ***  | 0.327 (0.083) ***  |
| age16                      | 0.709 (0.076) ***  | 0.710 (0.065) ***  | 0.524 (0.065) ***  | 0.390 (0.071) ***  |
| age17                      | 0.485 (0.069) ***  | 0.613 (0.057) ***  | 0.451 (0.056) ***  | 0.325 (0.059) ***  |
| age18                      | 0.394 (0.060) ***  | 0.452 (0.053) ***  | 0.315 (0.050) ***  | 0.211 (0.052) ***  |
| age19                      | 0.286 (0.062) ***  | 0.357 (0.051) ***  | 0.184 (0.050) ***  | 0.154 (0.049) ***  |
| age20                      | 0.199 (0.065) ***  | 0.192 (0.051) ***  | 0.138 (0.050) ***  | 0.094 (0.049) *    |
| age21                      | 0.131 (0.067) *    | 0.145 (0.055) ***  | -0.002 (0.053)     | 0.012 (0.051)      |
| male                       | 0.345 (0.034) ***  | 0.216 (0.030) ***  | 0.274 (0.031) ***  | 0.283 (0.036) ***  |
| black                      | -0.096 (0.044) **  | -0.032 (0.039)     | 0.108 (0.040) ***  | -0.205 (0.046) *** |
| hispanic                   | -0.053 (0.046)     | 0.014 (0.042)      | 0.048 (0.045)      | -0.044 (0.049)     |
| construction               | 0.005 (0.067)      | -0.009 (0.060)     | 0.040 (0.060)      | 0.016 (0.065)      |
| retail                     | 0.007 (0.060)      | 0.088 (0.054)      | 0.047 (0.053)      | 0.021 (0.058)      |
| professional               | 0.002 (0.065)      | 0.003 (0.057)      | 0.008 (0.057)      | -0.062 (0.062)     |
| wage                       | -0.015 (0.005) *** | -0.004 (0.004)     | -0.001 (0.004)     | 0.003 (0.004)      |
| father_education           | 0.003 (0.005)      | 0.003 (0.004)      | -0.005 (0.004)     | 0.002 (0.004)      |
| mother_education           | -0.006 (0.006)     | -0.001 (0.006)     | -0.005 (0.006)     | -0.001 (0.007)     |
| GPA_eighth_grade           | -0.150 (0.022) *** | -0.143 (0.022) *** | -0.183 (0.020) *** | -0.215 (0.023) *** |
| asvab                      | 0.002 (0.001) ***  | 0.004 (0.020) ***  | -0.002 (0.001) *** | 0.003 (0.001)      |
| bully                      | 0.201 (0.038) ***  | 0.221 (0.001) ***  | 0.269 (0.035) ***  | 0.176 (0.040) ***  |
| single_parent              | 0.007 (0.037)      | 0.092 (0.034)      | 0.053 (0.032) *    | 0.132 (0.037) ***  |
| log_household_income       | 0.005 (0.004)      | 0.004 (0.003)      | 0.013 (0.004) ***  | 0.007 (0.004) *    |
| household_size             | -0.025 (0.014) *   | -0.007 (0.012)     | -0.049 (0.013) *** | -0.006 (0.013)     |
| household_under_18         | 0.009 (0.019)      | -0.002 (0.016)     | 0.037 (0.017) **   | -0.046 (0.019) **  |
| urban                      | -0.002 (0.034)     | 0.048 (0.031)      | 0.031 (0.033)      | 0.113 (0.037) ***  |
| constant                   | -1.860 (0.139) *** | -2.085 (0.119) *** | -1.405 (0.121) *** | -1.845 (0.141) *** |
| <b>B. Marginal Effects</b> |                    |                    |                    |                    |
| work                       | 0.009 (0.008)      | 0.028 (0.009) ***  | 0.009 (0.009)      | 0.026 (0.007) ***  |

Notes : The excluded categories for age, gender, race, and industry are age over 21, female, white, and other industries, respectively. Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 5b. Estimation Results for Drug Use by Drug Type

|                            | Marijuana          | Cocaine and Other Drugs |
|----------------------------|--------------------|-------------------------|
| <b>A. Coefficients</b>     |                    |                         |
| work                       | 0.347 (0.068) ***  | 0.094 (0.091)           |
| age15                      | 0.380 (0.051) ***  | 0.276 (0.074) ***       |
| age16                      | 0.436 (0.043) ***  | 0.319 (0.063) ***       |
| age17                      | 0.360 (0.034) ***  | 0.298 (0.049) ***       |
| age18                      | 0.320 (0.027) ***  | 0.199 (0.039) ***       |
| age19                      | 0.240 (0.024) ***  | 0.155 (0.037) ***       |
| age20                      | 0.183 (0.023) ***  | 0.087 (0.035) **        |
| age21                      | 0.099 (0.022) ***  | 0.040 (0.034)           |
| male                       | 0.138 (0.026) ***  | 0.010 (0.033)           |
| black                      | -0.185 (0.033) *** | -0.567 (0.042) ***      |
| hispanic                   | -0.166 (0.036) *** | -0.114 (0.043) ***      |
| construction               | 0.003 (0.045)      | 0.024 (0.059)           |
| retail                     | 0.050 (0.039)      | 0.011 (0.053)           |
| professional               | -0.023 (0.041)     | -0.094 (0.055) *        |
| wage                       | 0.007 (0.003) ***  | 0.005 (0.003)           |
| father_education           | 0.000 (0.003)      | -0.001 (0.004)          |
| mother_education           | 0.021 (0.005) ***  | 0.009 (0.006)           |
| GPA_eighth_grade           | -0.180 (0.017) *** | -0.170 (0.021) ***      |
| asvab                      | 0.004 (0.001) ***  | 0.003 (0.001)           |
| bully                      | 0.121 (0.031) ***  | 0.137 (0.037) ***       |
| single_parent              | 0.082 (0.026) ***  | 0.054 (0.034)           |
| log_household_income       | 0.010 (0.003) ***  | 0.011 (0.004) ***       |
| household_size             | -0.010 (0.008)     | -0.029 (0.012) **       |
| household_under_18         | -0.057 (0.013) *** | -0.052 (0.018) ***      |
| urban                      | 0.151 (0.026) ***  | 0.119 (0.032) ***       |
| constant                   | -1.371 (0.092) *** | -1.486 (0.119) ***      |
| <b>B. Marginal Effects</b> |                    |                         |
| work                       | 0.093 (0.016) ***  | 0.010 (0.008)           |

Notes: The excluded categories for age, gender, race, and industry are age over 21, female, white, and other industries, respectively. Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 6. Estimation Results and Marginal Effects for Crime Participation and Drug Use by Work Intensity

|                                 | Coefficients     |                    | Marginal Effects |                    |
|---------------------------------|------------------|--------------------|------------------|--------------------|
|                                 | Crimes<br>(1)    | Drugs<br>(2)       | Crimes<br>(3)    | Drugs<br>(4)       |
| Low Hours<br>(1-9 Hours)        | -0.188 (0.184)   | -0.507 (0.160) *** | -0.047 (0.051)   | -0.179 (0.065) *** |
| Moderate Hours<br>(10-19 Hours) | 0.138 (0.151)    | -0.184 (0.111) *   | 0.030 (0.030)    | -0.057 (0.037)     |
| High Hours<br>(20-39 Hours)     | 0.177 (0.076) ** | 0.415 (0.060) ***  | 0.040 (0.016) ** | 0.114 (0.014) ***  |
| Full Time<br>(40 Hours or more) | 0.023 (0.063)    | -0.062 (0.050)     | 0.006 (0.015)    | -0.020 (0.016)     |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level;  
 \*\* at 5 percent level; \*\*\* at 1 percent level.

Figure 1. Crime Participation and Drug Use by Age

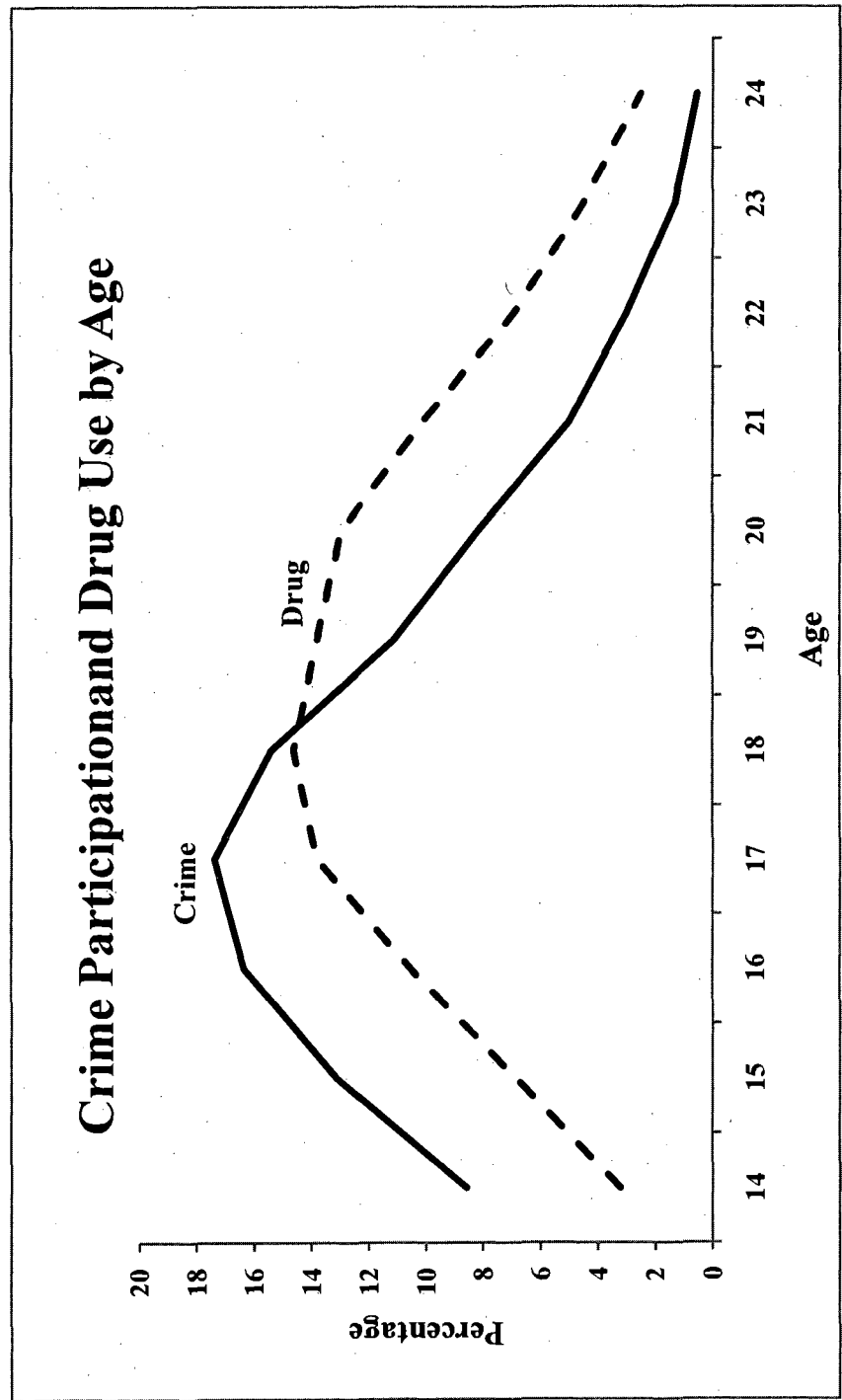




Figure 2. Crime Participation and Drug Use by Race

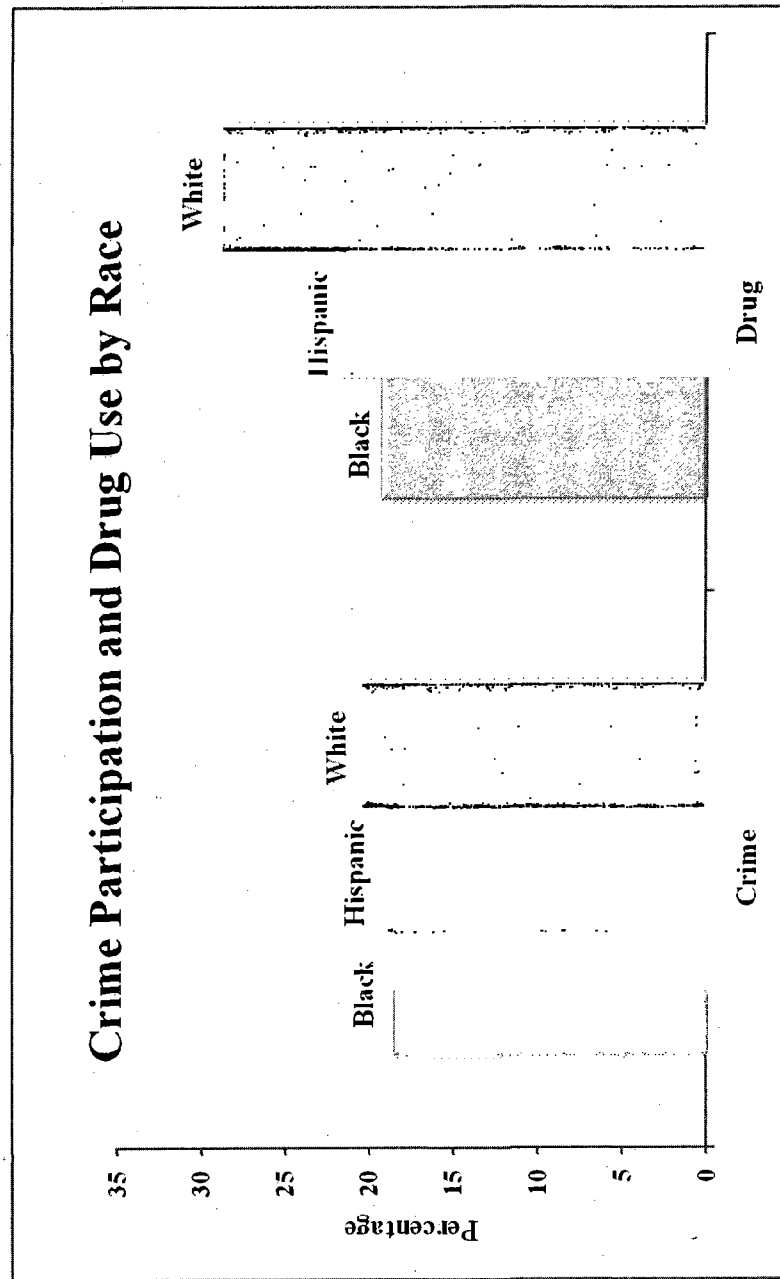


Figure 2.1. Vandalism and Theft by Race

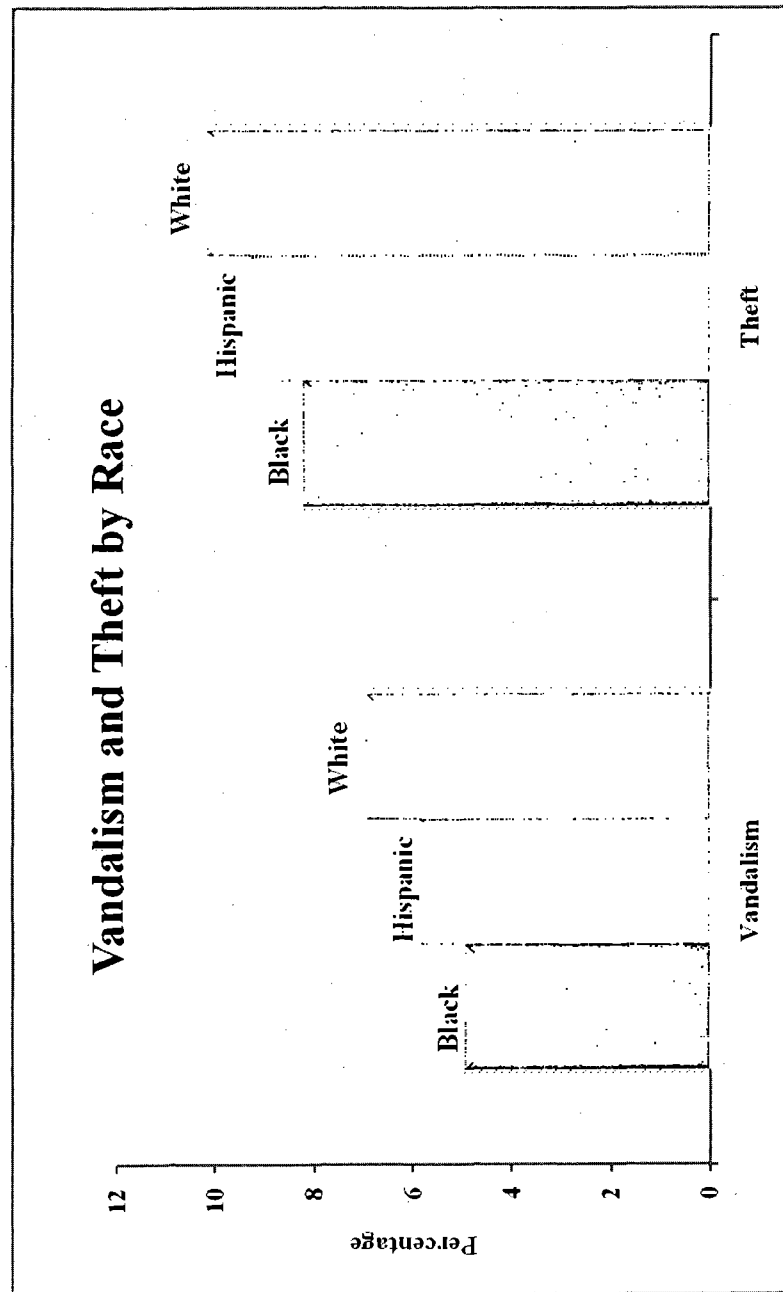


Figure 2.2. Assault and Drug Sales by Race

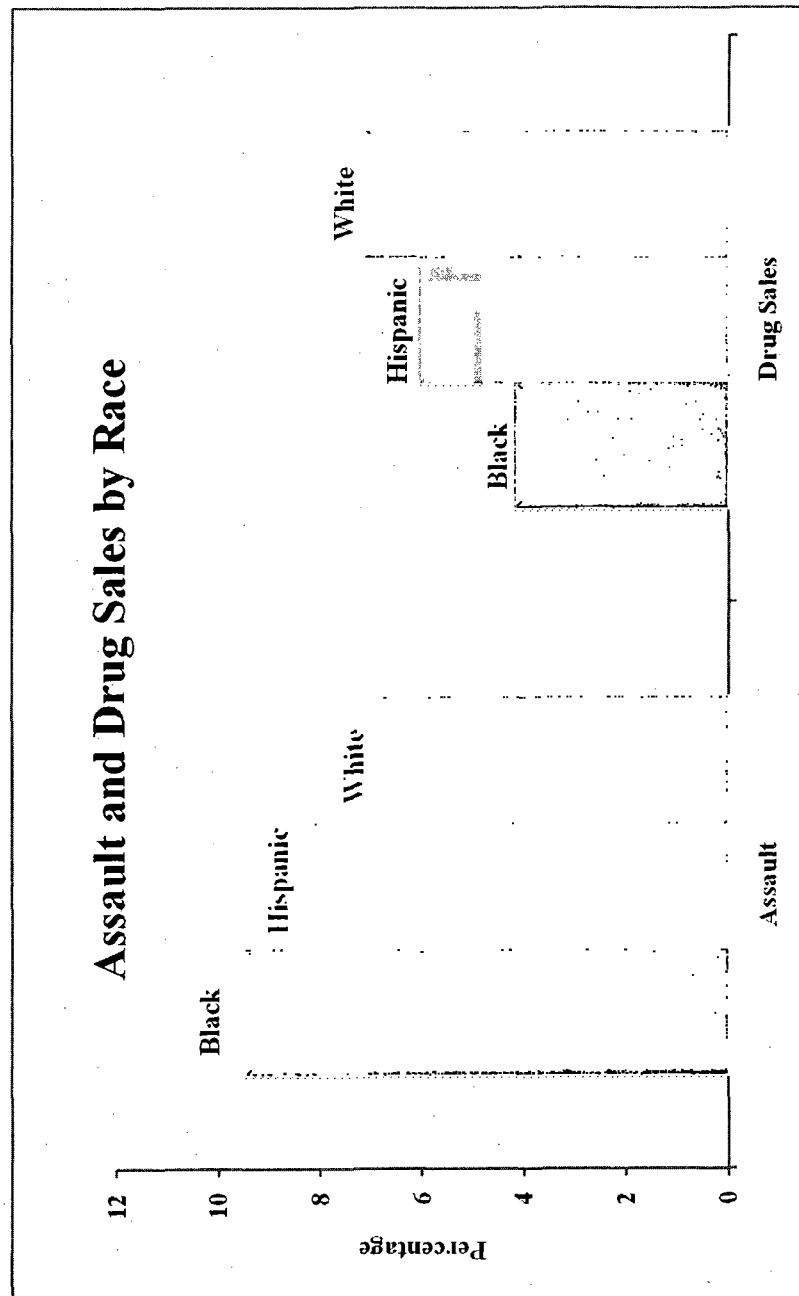


Figure 2.3. Marijuana and Cocaine and Other Drugs by Race

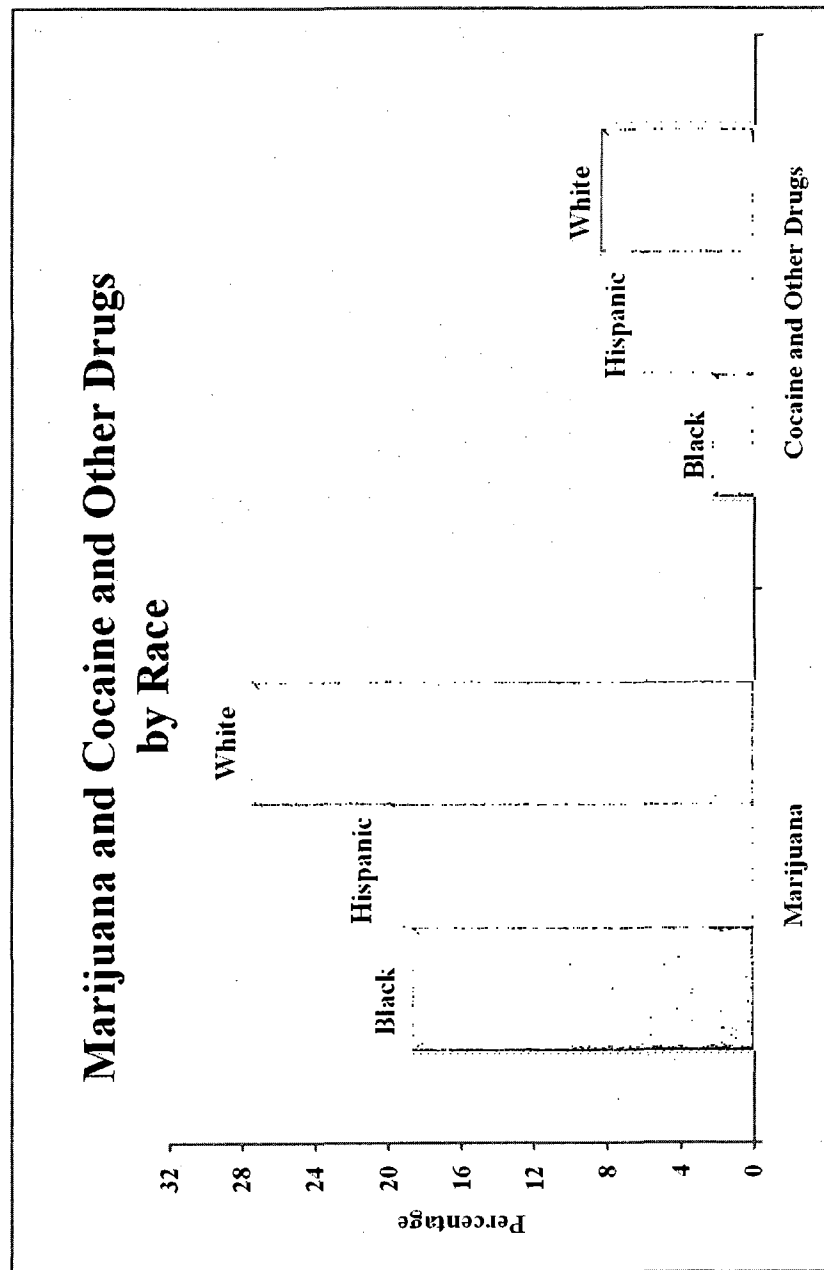


Figure 3. Crime Participation and Drug Use by Work Industry

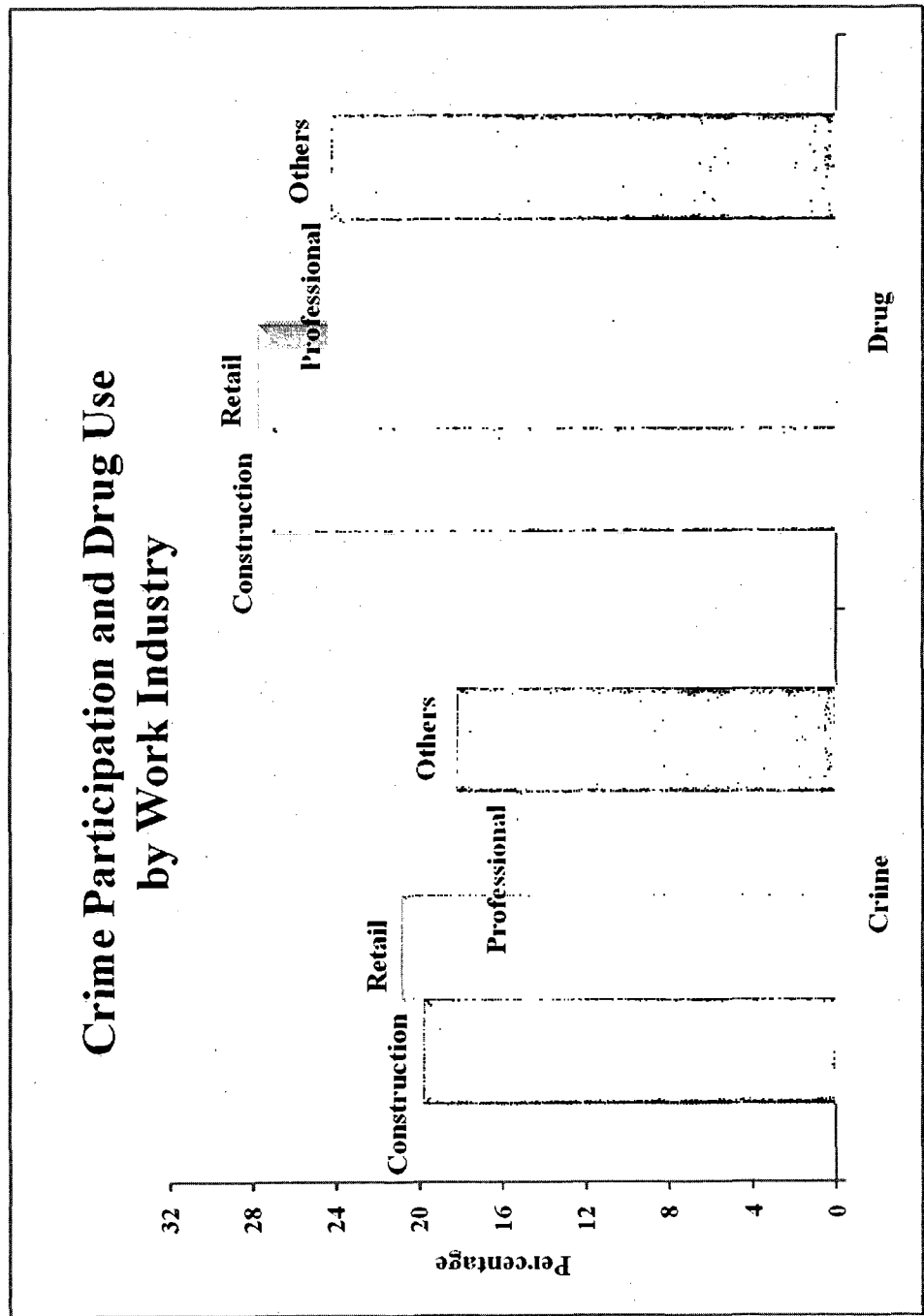
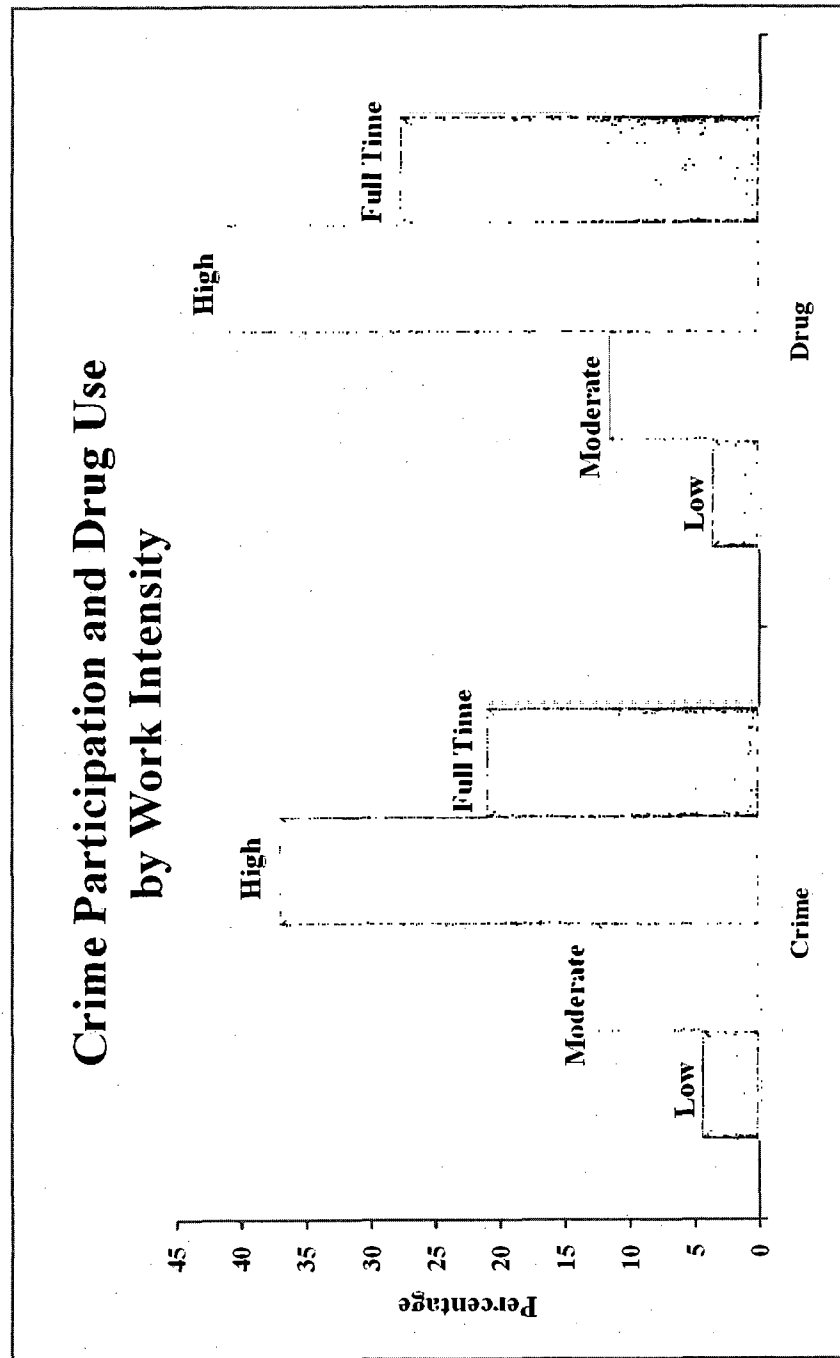


Figure 4. Crime Participation and Drug Use by Work Intensity



## **Chapter 2**

### **The Impact of Participation in School-To-Work (STW) Programs on Youth Criminal Behavior and Drug Use**

#### **1. Introduction**

In May 1994, President Clinton signed the School-To-Work Opportunity Act (STWOA) into law, providing \$1.5 billion over a five-year period to address national concern about students who pursue little or no formal education beyond high school. In 1992, approximately 3.4 million (11 percent) youths in the U.S. ages 16-24 had not completed high school and were not currently enrolled in school. A substantial number of those youths were from a disadvantaged or minority background or had a disability. Furthermore, three-quarters of high school students in the U.S. enter the workforce without a college degree, and many of them lack the skills necessary to compete for high-skill jobs. The earnings of high school graduates fall behind those with more education. Although originally designed to deal with students not earning a college degree, the final version of the STWOA serves all students, even those bound for college (School-To-Work Opportunity Act, 1994). The STOWA expired in 2001 when President Clinton left the office.

The STWOA was jointly administered by the U.S. Departments of Education and Labor. The goal was to encourage partnerships among schools, local employers,

and postsecondary education and training institutions at the state and local levels to support and strengthen the transition from school to career (Burtless, 1997). The School-To-Work (STW) programs teach youths career-related skills and provide career exploration through activities (Hughes et al., 2002). Each STW program is classified as work-based or school-based. The work-based programs take place at business sites and focus on real-world, hands-on concepts relevant to subject matter and workplace skills. The programs familiarize youths with a career, and adult mentors integrate youths into the workplace. The work-based programs include internships, job shadowing, mentoring, and school-sponsored enterprises.

The school-based programs, on the other hand, emphasize formal classroom instruction and counseling related to future work experience to develop the students' career determination. The school-based programs include career major, cooperative education, and technical preparation. According to the *Report on the Youth Labor Force* (2000), nearly four in 10 youths participated in some type of STW program. A career major was the most frequent, and the programs with the lowest participation were mentoring and internships.

While most existing research has evaluated the impact of STW programs on educational and labor market outcomes and found a positive relationship, little research has studied whether those benefits will translate into constructive social behavior by discouraging youths from getting involved with criminal activities and drug use. This relationship could be of interest for policymakers. If a training



program like this is reconsidered, the program can be constructed optimally to gain the most benefit and avoid undesirable effects.

A study by Riggio and Riggio (1999) explores the relationship between STW program participation and criminal activities using the first year of data from the National Longitudinal Survey of Youth 97 (NLSY97) survey; they find no significant relationship. The primary goal of this study is to examine the relationship between participation in STW programs and the incidence of youth criminal behavior and drug use, using five years of data from the NLSY97. Essentially, the analysis focuses on the impact of each individual program on criminal behavior and drug use by full sample, subsample, and crime and drug type. The study uses the Heckman probit sample selection approach to control for estimation bias arising from self-selection into STW programs. It is argued that STW programs attract less successful and non-college-bound students (Hughes et al., 2002). Joyce and Neumark (2001) report that youths who work or attend public high schools are more likely to participate in STW programs.

The self-selection bias is of concern if the decision to participate in STW programs is not random. Since youths are not randomly assigned to STW programs, it is plausible that unobserved factors determining STW participation, such as motivation or self-esteem, also influence the decision to get involved with illegal behavior. This will bias the estimated relationship between the outcome variables and participation in STW programs. The unobserved factors will be included as part of the effect of participation in STW programs. Heckman (1979) develops a two-step

estimator, which includes a first-stage selection equation and second-stage outcome equation, to deal with self-selection bias.

Youths who are not college-bound may be more likely to participate in STW programs since they view them as a path to careers after high school graduation. If those youths less interested in academics are more likely to have behavioral problems, the study might find a spurious positive relationship between participation in STW programs and illegal behavior. The Heckman probit sample selection model adjusts the parameter estimates by taking the nonrandom selection of youths into STW programs into consideration.

The results indicate four types of program impacts: negative, positive, mixed, and none, where negative indicates a decrease and positive an increase in the probability of engaging in illegal behavior. The mentoring and technical preparation programs have a negative impact on youth social behavior, lowering the probability of committing crimes and using drugs. The programs deemed unfavorable because participation in those programs is positively associated with crimes and drug use are school-sponsored enterprises and cooperative education programs. Job shadowing and internship programs demonstrate mixed results, having a negative impact on crimes but a positive impact on drug use. The only program not related to youth criminal behavior and drug use is career major.

The remainder of the paper is organized as follows. Section 2 presents the literature review. Section 3 develops the theoretical model. Section 4 describes the

data from NLSY97. Section 5 demonstrates the estimation methodology. Section 6 discusses the details of empirical results. Section 7 presents the concluding remarks.

## **2. Literature Review**

Current studies indicate that education and training are inversely related to crimes and delinquency. Leung (2004) finds young students who are motivated to pursue college education are less likely to be delinquent. Usher (1997) asserts that education benefits society by promoting positive values and acting as a deterrent to crimes. If social value is not incorporated into the benefits of education, the optimal expenditure on education is miscalculated.

Using a human capital approach, Lochner (1999 and 2004) demonstrates that an increase in future skill levels and wage rates from education and training raises the opportunity cost of crimes, hence lowering the probability that an individual will participate in crimes. He finds that high school graduation reduces the probability of becoming incarcerated within the next five years by 85-95 percent for individuals ages 19-22. Lochner and Moretti (2004) further state that education discourages crimes because the punishment is more costly for individuals with more education and education affects taste for crime by increasing the psychological cost of breaking laws. They suggest that the social savings from crime reduction associated with high school completion is \$1.4 billion for a one percent increase in the high school graduation rate for male students. Lochner (1999 and 2004) and Lochner and Moretti

(2004) advocate policies that raise skill level and encourage high school completion. They recommend subsidies for schooling or job training.

The STW programs were relatively recent and existed for only a short period of time. Most research so far has been directed toward identifying the impact of the STW programs on educational and labor market outcomes. Neumark and Joyce (2001) study whether participation in any STW program impacts youths' future school and work behavior. The findings report that STW participation is not associated with future college attendance, described as college test-taking and the subjective probability of obtaining a four-year college degree, but increases the probability of obtaining a high school diploma and working more than 20 hours per week at age 30. Neumark and Rothstein (2006) examine the effects of the STW programs, detailed by type, on college enrollment and employment immediately after high school. The evidence shows that school-sponsored enterprises increase college attendance but technical preparation reduces it. Internships and cooperative education boost post-high school employment. They further conclude that the benefits of increased college enrollment and employment arise without offsetting decreases in other activity, suggesting that STW programs heighten skill formation.

Relatively little work has been conducted on the impact of STW participation on youth criminal behavior and drug use. A study by Riggio and Riggio (1999) investigates this issue but does not find a relationship between participation in STW programs and youth criminality and drug use. They use the first round of the NLSY97 data to conduct analysis on the impact of participation in STW programs on

work-related variables, future educational expectations, and self-reported delinquent behavior. A series of one-way analyses of covariance (ANCOVA) are conducted to examine the mean differences of outcome variables between STW participants and non-STW participants. The results indicate that participation in STW programs has a positive effect on work-related variables such as job-seeking behavior, income from part-time work, and future educational expectations such as the probability of completing high school and obtaining a college degree. On the other hand, participation in STW programs does not significantly affect youth criminal activity and drug use.

However, the existing research suffers from some shortcomings. First, the analysis of means comparison between STW participants and non-STW participants confounds the true effects of participating in STW programs because other characteristics are not held constant. Second, there are concerns that participation in STW programs is not random when the unobserved characteristics that influence youths to self-select into the programs also affect their criminal behavior. If the sample is nonrandom and that is not taken into account, the estimated coefficients will be biased. This study attempts to correct for sample selection bias by using the Heckman probit sample selection model to account for the nonrandomness of the sample using system equations (selection and outcome equations).

### 3. Theoretical Model

A two-period model is formulated using a human capital framework. The model incorporates human capital investment ( $I_1$ ) into the production of human capital. An individual can acquire human capital through education and training as well as work experience (Becker, 1964). In each period, an individual optimally allocates time to legal market work ( $j_1, j_2$ ), criminal activities ( $c_1, c_2$ ), or both.

An individual is endowed with initial skill level ( $H_0$ ), learning ability ( $A$ ) and criminal ability ( $\theta$ ). Following Lochner (2004), the production of human capital can be written as

$$H_2 = h(H_1, I_1, A)$$

$$\frac{\partial H_2}{\partial I_1} > 0, \quad \frac{\partial H_2}{\partial A} > 0, \quad \frac{\partial^2 H_2}{\partial I_1 \partial A} > 0$$

where the function  $h(\cdot)$  is increasing and concave in its arguments. An individual with higher learning ability earns a higher rate of return on human capital investment.

If a person commits a crime, the return-to-crime function is expressed as

$$r = r(\theta, H, c)$$

$$\frac{\partial r}{\partial \theta} > 0, \quad \frac{\partial r}{\partial c} > 0, \quad \frac{\partial r}{\partial H} < 0$$

$$\frac{\partial^2 r}{\partial \theta^2} < 0, \quad \frac{\partial^2 r}{\partial c^2} < 0,$$

$$\frac{\partial^2 r}{\partial \theta \partial c} > 0, \quad \frac{\partial^2 r}{\partial c \partial H} < 0$$

where  $r$  is the net return from crime and  $r(\cdot)$  is increasing and concave in  $c$  and  $\theta$ . An increase in a stock of human capital presents a lower return to crime due to a reduction in taste for crime (Lochner and Moretti, 2004). A person with higher criminal ability receives a higher rate of return on crime. He faces the probability of being arrested equal to  $p$ . The wage rate for labor market work is  $w$ . For simplicity, the probability of getting caught ( $p$ ) and the wage rate ( $w$ ) are assumed to be the same for both periods. An individual maximizes the expected discounted lifetime earnings with a discount rate  $\beta$ . The objective function is formulated as

$$\text{Max } U = Y_1 + \beta Y_2$$

Subject to

$$c_t + j_t = 1 \quad \text{where } t = 1, 2$$

$$Y_1 = p \cdot [wH_1j_1] + (1-p) \cdot [wH_1j_1 + r(\theta, H_1, c_1)]$$

$$Y_2 = p \cdot [wH_2j_2] + (1-p) \cdot [wH_2j_2 + r(\theta, H_2, c_2)]$$

$$H_2 = h(H_1, I_1, A)$$

$Y_1$  and  $Y_2$  denote the earnings in periods 1 and 2, respectively. The total time endowment is normalized to be equal to one. For a given level of human capital, criminal ability, and time allocated to criminal activities in that period,  $r$  is the net

return from crime. The individual does not obtain illegal income if he is arrested. The human capital in period 2 is accumulated through an increasing function of the stock of human capital in the last period, human capital investment, and learning ability. After substituting all the constraints into the objective function, the model is described as

$$\begin{aligned} \text{Max } U = & p \cdot [wH_1(1-c_1)] + (1-p) \cdot [wH_1(1-c_1) + r(\theta, H_1, c_1)] \\ & + \beta \{ p \cdot [wh(H_1, I_1, A) \cdot (1-c_2)] + (1-p) \cdot [wh(H_1, I_1, A) \cdot (1-c_2) \\ & + r(\theta, h(H_1, I_1, A), c_2)] \} \end{aligned}$$

The first-order conditions for  $c_1$  and  $c_2$  are given as follows:

- (1)  $\mathcal{L}_{c_1} : (1-p) r'_{c_1}(\theta, H_1, c_1) = wH_1$
- (2)  $\mathcal{L}_{c_2} : (1-p) r'_{c_2}(\theta, h(H_1, I_1, A), c_2) = wH_2$

The left side of equations (1) and (2) denotes the marginal revenue of criminal activity if a person is successful in committing a crime in periods 1 and 2, respectively. The marginal revenue from participating in legal activity represented on the right side of equations (1) and (2) embodies the market wage rate. The first-order conditions state that at the optimum, the marginal revenue of criminal activity must equal the marginal revenue of working in the labor market.



Substituting  $H_2$  for  $h(H_1, I_1, A)$ , the first-order condition for  $c_2$  is rewritten as

$$(2') \quad \epsilon_{c_2} : (1-p) r'_{c_2}(\theta, H_2, c_2) = wH_2$$

The term  $wH_2$  on the right side is constant since it is determined by choices in period 1. Thus, if  $H_2$  in the term  $r'_{c_2}(\theta, H_2, c_2)$  on the left side increases,  $c_2$  must decrease for the equality to be maintained given that an increase in the stock of human capital has a negative effect on the marginal return to crimes with respect to time spent in criminal activity,  $r''_{c_2 H_2} < 0$ . The model implies that an individual with more human capital will spend less time committing crimes and more time in the labor market.

#### 4. Data

This study uses data from the second to fifth rounds (1998 to 2002) of the NLSY97 to analyze the relationship between STW program participation and criminal behavior and drug use.<sup>12</sup> The NLSY97 is the most current survey in the National Longitudinal Surveys (NLS) program sponsored by the Bureau of Labor Statistics (BLS). The survey is designed to be representative of the 1997 U.S. population born between 1980 and 1984. The NLSY97 cohort includes 8,984 youths who were 12 to 16 years old as of December 31, 1996. The primary purpose of the NLSY97 is to collect data on youths' labor market behavior and educational experience. The survey also asks

---

<sup>12</sup> Although the first round of the NLSY97 survey started in 1997, the data information about cocaine and other drug use were not collected before 1998. For that reason, the study omits data from 1997 in order to include more extensive types of drug use. The sample does not include data later than 2002 because it reduces a significant number of observations due to a high number of valid skips since a majority of the respondents were not enrolled in school and hence were not asked the STW questions.

about career training programs like STW while the respondents were in school. The NLSY97 covers a variety of topics of interest to other governmental agencies. To improve the accuracy of reporting answers, many sensitive questions such as criminal behavior and drug use are self-administered using a computer-assisted interview, which allows the respondents to answer privately (*NLSY97 User's Guide*, 2007). The NLSY97 also collects information on other characteristics including socioeconomic background, family characteristics, attitudes, and other risky behavior, which allows researchers to include relevant control variables for studies that do not come from random assignment.

The criminal behavior data contain information about individuals who (1) commit vandalism, (2) steal less than \$50, (3) steal more than \$50 including a car, (4) commit other property crimes including fencing stolen property, possessing or receiving stolen property, or selling something for more than it is worth, (5) attack or assault a person, or (6) sell illegal drugs. The data on drugs include the use of (1) marijuana and (2) cocaine and other drugs including crack, heroin, and other substances not prescribed by a doctor. If the individual answers "yes" to the corresponding question, the value of the dependent variable is set to equal to one, and zero otherwise. The *theft* variable is created to represent crime categories (2), (3), and (4). Nonresponses for any reason are dropped.

The explanatory variables of interest are the types of participation in STW programs. In round 1, respondents who reported a highest grade attended of 9<sup>th</sup> to 12<sup>th</sup> were asked about their participation in STW programs. In subsequent rounds, all

respondents enrolled in high school at any level were asked the STW questions. Each program is categorized as either a work-based or school-based learning program.

1.) Work-based learning programs place students in actual work settings where students learn real, functional, and sustainable skills. The work-based learning component includes work experience, workplace mentoring, and instruction in general workplace competencies.

1.1) Job Shadowing: A student follows an employee for one or more days to learn about an occupation or industry.

1.2) Mentoring: A student is paired with an employee who assesses his or her performance over a period of time, during which the employee helps the student master certain skills and knowledge.

1.3) School-Sponsored Enterprises: Students produce goods or services for sale or use by others. Enterprises typically involve students in the management of a project.

1.4) Internship: Students work with an employee for a specified period of time to learn about a particular industry or occupation.

2.) School-based learning programs center on the student's career major to meet academic standards. The programs encompass classroom instruction and curriculum to prepare the participating students for postsecondary education and to earn a skill certificate.

2.1) Career Major: A coherent sequence of courses based upon an occupational goal.

2.2) Cooperative Education: Students alternate or coordinate their academic and vocational studies with a job in a related field.

2.3) Technical Preparation: A planned program of study with a defined career focus that links secondary and postsecondary education.

Only the respondents enrolled in school are asked the STW questions. Skips are valid if the respondents are not enrolled in school and not asked about participation in STW programs. These valid skips are treated as “no” responses for nonparticipation in STW programs. Seven qualitative variables are created for each type of STW program participation. Each program variable receives a value equal to one if the respondent answers “yes” to participation in a particular program question and zero if the response is “no.” Nonresponses for invalid reasons are dropped.

Table 1 describes the variable definitions. The control variables include age, gender, race, parental education, grade point average (GPA) in eighth grade, Armed Services Vocational Aptitude Battery (ASVAB) score, whether bullied before age 12, household arrangement, household income, whether living in an urban area, and whether the school has a career day. The data for control variables, except for household income, were replaced with sample means for nonresponses. The household income nonresponses with valid reasons, i.e., valid skip, are replaced with zeroes for no income and with sample means for all other nonresponses with invalid reasons. Household income data are subsequently transformed to base 10 log figures. The variable *asvab* is the percentile, ranging from 1 to 99, of ASVAB score, which measures knowledge and skills like Armed Forces Qualifying Test (AFQT) score and

is comparable among age groups. The variable *GPA\_eighth\_grade* measures the grade point average in eighth grade on 4.0 scales.

Figure 1 shows the relationship of crime participation and drug use by age. The rate of crime participation increases until early pre-adulthood and diminishes rapidly afterward (Grogger, 1998). The rate of drug use characterizes the same pattern and peaks one year later than crime participation. Figure 2 compares crime participation and drug use by race. The rates of crime participation are primarily similar among blacks, Hispanics, and whites, but white youths use drugs more than black and Hispanic youths. Drug use is 26 percent for white youths, 17 percent for blacks, and 22 percents for Hispanics.

Figure 3 reveals that family structure is correlated with children's social behavior. For example, youths who live with both biological parents are less likely to commit crimes and use drugs than those who live in a single-parent family. Youths with higher academic performance are less likely to commit crimes and use drugs (Figure 4). Except for GPAs between 0.5 and 1.0, the rates of crime participation and drug use decrease with GPA. Figure 5.1 shows that youths in the school-sponsored enterprise program have the highest rate of crime participation and those in the internship program have the lowest. The highest rates of drug use are from the school-sponsored enterprise and the cooperative education programs, and the lowest are from the mentoring program (Figure 5.2).

Table 2 illustrates that STW participants commit more crimes and use more drugs than non-STW participants, except for cocaine and other drugs. Examining

STW programs separately, Figures 5.1 and 5.2 reveal that crime participation and drug use are lowest for the mentoring program (22 percent and 20 percent, respectively) and highest for the school-sponsored enterprise program (30 percent and 26 percent, respectively).

More students participate in school-based than in work-based programs (70 percent vs. 54 percent). Males have lower participation rates than females. Black students are more likely, and Hispanic students less likely, to participate in STW programs compared to white students. The non-STW participants have higher ASVAB scores and household income than those who participate in the programs. The students who choose to participate in STW programs are more likely to come from schools that hold a career day than from schools that do not. The final sample contains 26,125 person-year observations (8,213 STW participants vs. 17,912 non-STW participants). The standard errors are adjusted for heterogeneity and clustered at the individual level.

## **5. Empirical Model**

The goal of this study is to identify the extent to which STW programs impact youth criminal behavior and drug use. It is well established that sample selection bias, where the sample is nonrandom due to self-selection of individuals, is pervasive in social sciences data (Berk, 1983). In particular, unobserved factors that determine selection into the sample simultaneously determine the outcome of interest (Demaris,

2004). For example, STW programs typically attract less successful and non-college-bound students (Hughes et al., 2002), so the decision to participate in STW programs is not random.

If the STW participants are less academically inclined and more crime-prone than the non-STW participants, STW participants would have higher crime rates than non-STW participants, *ceteris paribus*, even if they did not participate in STW programs. The unobserved factors influencing both STW participation and probability of committing crimes will be interpreted as part of the effect of STW program participation, causing the parameter estimates to be biased.

This study attempts to correct for the self-selection bias by taking the nonrandomness of the sample into account using the Heckman probit sample selection model, estimated by the maximum likelihood method (Heckman, 1979). The key variables in these models are dichotomous variables representing the incidence of illegal activity (I) and participation in seven individual STW programs where the **PROGRAM** variable represents job shadowing, mentoring, school-sponsored enterprise, internship, career major, cooperative education, and technical preparation.

The empirical specification of the probit sample selection model is

$$(1) \quad \text{outcome equation:} \quad I_i = \alpha_1 + \beta_1 X_{1i} + \delta_i \text{PROGRAM}_i + \varepsilon_{1i}$$

$$(2) \quad \text{selection equation:} \quad \text{STW}_i = \alpha_2 + \beta_2 X_{2i} + \xi Z_i + \varepsilon_{2i}$$

$$\begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix} \sim N \left\{ \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix} \right\}$$

where  $\mathbf{X}_1$  and  $\mathbf{X}_2$  are matrices of control variables.  $Z$  is a unique predictor for the selection model that is a significant determinant of the selection equation (STW) but not related to the outcome equation (1). An indicator of whether the school has a career day is chosen as a variable affecting the decision to participate in STW programs but not the incidence of illegal behavior. The reason is that the career day introduces youths to the labor market by providing information and guidance about jobs, which could increase youths' interest in participating in STW programs to improve prospects for their future career. On the other hand, there is no reason why a career day would be related to the incidence of illegal activity. The error terms  $\varepsilon_1$  and  $\varepsilon_2$  are jointly distributed as bivariate normal with means zero, unit variances, and correlation  $\rho$ .  $STW_i$  is a latent variable, i.e., the desire to participate in STW programs, one only observes its sign (Melino, 1982).  $I_i$  is observed only if  $STW_i$  is positive. If  $\rho \neq 0$ , then the probit estimate from the sample will not consistently estimate the parameter  $\delta_i$  if a single-equation model is estimated (Baum, 2006).

## 6. Results

Table 3 estimates the coefficients of the probit sample selection model for crimes and drug use. The results indicate that two STW programs, mentoring and school-sponsored enterprise, significantly affect the behavior of the participants. Mentoring



is negatively related to drug use, while school-sponsored enterprises are positively related to both crimes and drug use. Youths who are younger than 18, were bullied before age 12, or come from a single-parent family are more likely to commit crimes and use drugs. Male youths are more likely to commit crimes, while black youths are less likely to use drugs. Living in a large household and attaining a good GPA in eighth grade have a negative impact on crime participation and drug use; in contrast, ASVAB score has a positive impact. Living in an urban area is associated with more drug use but not crimes. Parental education has no impact on crimes or drug use. Test statistics suggest that sample selection bias might not be a problem. The correlation coefficients ( $\rho$ ) are found to be statistically insignificant, indicating that unobserved factors affecting youths' participation in STW programs are not highly correlated with youths' criminal behavior and drug use.

Table 4 estimates the marginal effects of participation in STW programs. Youths who participate in the mentoring program are four percent less likely to use drugs, while those who participate in a school-sponsored enterprise are five percent more likely to use drugs and four percent more likely to commit crimes. Tables 5a and 6a and Tables 5b and 6b report results and marginal effects for crime participation by subgroup for work-based programs and school-based programs, respectively. All work-based programs but no school-based programs have significant impacts on youth criminal behavior. Mentoring is negatively related to crimes for youths who come from a middle-income family, decreasing the probability of committing crimes by five percentage points. The school-sponsored enterprise

program is positively associated with crimes for all groups except those who are Hispanic or white, at least 18 years old, or from a high-income family. The positive association between the school-sponsored enterprise program and crimes is also not significant for youths who have low or high ASVAB scores or GPAs in eighth grade. Youths who participate in a school-sponsored enterprise are three to 10 percent more likely to commit crimes. Job shadowing and internships have a negative impact on crimes for youths with high ASVAB scores. Youths who participate in job shadowing are seven percent less likely to commit crimes. Those in internships are nine percent less likely to commit crimes.

Tables 7a and 8a and Tables 7b and 8b estimate the results and marginal effects for drug use by subgroup for work-based and school-based programs, respectively. All work-based programs and one school-based program have significant impacts on drug use. Mentoring is negatively related to drug use for youths who are male, black, 13 to 17 years old, or from a low- to middle-income family, or who have middle ASVAB scores or attain low to middle GPAs in eighth grade. Youths who participate in the mentoring program are three to 11 percent less likely to use drugs. The school-sponsored enterprise program is positively associated with drug use for youths who are male, Hispanic, 13 to 17 years old, or from a low-income family, or who have middle ASVAB scores and attain high GPAs in eighth grade. Youths who participate in the school-sponsored enterprise program are five to eight percent more likely to use drugs. The two other work-based programs, job shadowing and internship, are positively associated with drug use. Job shadowing

increases the probability of using drugs by four to five percentage points for youths who are black or have low ASVAB scores. Internships increase the probability of using drugs by four percentage points for youths who are female or have high GPAs in eighth grade. One school-based program, technical preparation, has a negative impact on drug use, decreasing the probability of drug use by six percentage points for youths with low GPAs in eighth grade.

To further investigate the impact of STW program participation by crime and drug type, Tables 9 and 10 report the estimated coefficients and marginal effects, respectively. Table 10 shows that mentoring and internship programs are negatively related to crimes and drug use but school-sponsored enterprise and cooperative education programs are positively related. Youths who participate in the mentoring program are two and four percent less likely to commit theft and use marijuana, respectively, while those who participate in an internship are two percent less likely to commit vandalism. Youths who participate in a school-sponsored enterprise are two, three, and five percent more likely to commit vandalism, assault someone, and use marijuana, respectively. Those who participate in cooperative education are two percent more likely to sell drugs and one percent more likely to use cocaine and other drugs.

## **7. Conclusion**

Participation in STW programs has both favorable and harmful effects on criminal behavior and drug use, depending on the type of program. The study of the impact of STW programs on youth criminal behavior and drug use concludes four results (as shown in Table 11): negative, positive, mixed, and none. Under work-based programs, mentoring has the effect of reducing crimes and drug use, while school-sponsored enterprises are associated with increased problem behavior. The other two, job shadowing and internships, indicate a mixed impact, producing a reduction in crimes but an increase in drug use. Under school-based programs, technical preparation demonstrates a reduction in drug use, while cooperative education appears to increase crimes and drug use. Career major is the only program related to neither crimes nor drug use.

Of all STW programs, mentoring and technical preparation are desirable in terms of reducing crimes and drug use. Negative mentoring impact results are generated in five of the six estimations. Although mentoring does not produce a significant negative impact on crimes in the full-sample estimation, the negative results are statistically significant when estimated by subsample and crime and drug type. The negative impact of technical preparation is represented on a subgroup of youth population. Technical preparation is negatively related to drug use for youths with low eighth grade GPAs.

School-sponsored enterprises and cooperative education, on the other hand, are seen as detrimental to youth social behavior. Both are positively associated with

youth criminal behavior and drug use. While school-sponsored enterprises increase crimes and drug use in all estimations, cooperative education also increases problem behavior by crime and drug type. Cooperative education is positively associated with drug sales and cocaine use.

Job shadowing and internships provide mixed results, showing a reduction in crimes but an increase in drug use. Both programs have a negative impact on crimes for youths with high ASVAB scores. Job shadowing increases drug use for youths who are black or have low ASVAB scores, while internships increase drug use for females and those with high eighth grade GPAs.

The evidence suggests that the most favorable of STW programs is mentoring. The impact of participation in mentoring is negatively related to crimes and drug use for a large demographic of youth population. The second best is technical preparation. Participation in technical preparation benefits youths who are less academically successful by decreasing the likelihood of drug use.

School-sponsored enterprise is the least beneficial program. The positive impact on problem behavior is significant all across six estimations. Participation in a school-sponsored enterprise increases the likelihood of committing crimes and using drugs. The positive impact is evidenced for various groups of youth population. Cooperative education is the second most undesirable program. It is associated with increased crimes and drug use when the estimation is analyzed by crime and drug type.

Determining the implication of job shadowing and internships is complicated. Job shadowing and internships reduce the tendency to commit crimes for one group of intelligent youths but raise the tendency to use drugs for others. An increased likelihood of using drugs is evidenced for youths who are minorities and less intelligent in job shadowing and for youths who are female and academically accomplished in internships. When a school decides to implement job shadowing and internship programs, the demographic characteristics of the student population should be taken into consideration in order to reap the benefits and prevent potential costs. Otherwise, some youths could benefit at the expense of the others.

## References:

- Baum, Christopher F. (2006). *An Introduction to Modern Econometrics Using STATA*. College Station, Texas: STATA Press.
- Becker, Gary S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. New York: Columbia University Press.
- Berk, Richard A. (1983). "An Introduction to Sample Selection Bias in Sociological Data." *American Sociological Review*, 48(3): 386-398.
- Burtless, Gary (1997). "Evaluating Early Program Experiences in the School-To-Work Opportunities Act: Policy and Design Issues." Evaluating the Net Impact of School-To-Work: Proceeding of a Roundtable, Office of Policy and Research, U.S. Department of Labor.
- Demaris, Alfred. (2004). *Regression with Social Data: Modeling Continuous and Limited Response Variables*. Hoboken, New Jersey: John Wiley & Sons, Inc.
- Grogger, Jeffrey. (1998). "Market Wages and Youth Crime." *Journal of Labor Economics*, 16(4): 756-791.

Heckman, James J. (1979). "Sample Selection Bias as a Specification Error."

*Econometrica*, 47(1): 153-162.

Hughes, Katherine L., Thomas R. Bailey, and Melinda Mechur Karp. (2002).

"School-To-Work: Making a Difference in Education." *Phi Delta Kappan*, 4(4): 272-294.

Joyce, Mary, and David Neumark. (2001). "School-To-Work Programs: Information

from Two Surveys." *Monthly Labor Review*, 124(8): 38-50.

Leung, Ambrose. (2004). "Delinquency, Schooling, and Work: Time Allocation

Decision of Youth." *Applied Economics*, 36(9): 987-993.

Lochner, Lance. (1999). "Education, Work, and Crime: Theory and Evidence."

*Working Paper No. 465*, Rochester Center for Economic Research, University of Rochester.

Lochner, Lance. (2004). "Education, Work, and Crime: A Human Capital Approach."

*International Economic Review*, 45(3): 811-843.



Lochner, Lance, and Enrico, Moretti. (2004). "The Effective of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports." *American Economic Review*, 94(1): 155-189.

Melino, Angelo. (1982). "Testing for Sample Selection Bias." *Review of Economic Studies*, 49(1): 151-153.

NLSY97 User's Guide (2007). *A Guide to the Rounds 1-9 Data, National Longitudinal Survey of Youth 1997*. Center for Human Resource Research. The Ohio State University. Columbus: Ohio.

Neumark, David, and Donna Rothstein. (2006). "School-To-Career Programs and Transitions to Employment and Higher Education." *Economics of Education Review*, 25(4): 374-393.

Neumark, David, and Mary Joyce. (2001). "Evaluating School-To-Work Programs Using the New NLSY." *Journal of Human Resources*, 36(4): 666-702.

*Report on the Youth Labor Force*. (2000). Bureau of Labor Statistics, U.S. Department of Labor.

Riggio, Ronald E., and Heidi R. Riggio. (1999). "Evaluation of School-To-Work Programs Using the NLSY97 Database." *Kravis Leadership Institution Report*. Claremont McKenna College

*School-To-Work Opportunities Act of 1994*. (1994). Senate and House of Representatives of the United States of America.

Usher, Dan. (1997). "Education as a Deterrent to Crime." *Canadian Journal of Economics*, 30(2): 367-384.

Table 1. Variable Definitions

| Variable                     | Definition  |
|------------------------------|---|
| <b>Dependent Variables</b>   |   |
| anycrime                     | =1 if commit anycrime; =0 otherwise   |
| vandalism                    | =1 if commit vandalism; =0 otherwise  |
| theft                        | =1 if steal less than \$50 or steal more than \$50 including car or commit other property crime; =0 otherwise |
| assault                      | =1 if assault; =0 otherwise   |
| drug_sales                   | =1 if sell drugs; =0 otherwise  |
| anydrug                      | =1 if use any drug; =0 otherwise  |
| marijuana                    | =1 if use marijuana; =0 otherwise   |
| cocaine                      | =1 if use cocaine or other hard drugs; =0 otherwise   |
| <b>Explanatory Variables</b> |   |
| stw                          | =1 if participate in any School-To-Work program; =0 otherwise   |
| workbase                     | =1 if participate in any School-To-Work work-based program; =0 otherwise                                      |
| job_shadowing                | =1 if participate in job shadowing; =0 otherwise  |
| mentoring                    | =1 if participate in mentoring; =0 otherwise  |
| school_sponsored_enterprise  | =1 if participate in school-sponsored enterprise; =0 otherwise  |
| internship                   | =1 if participate in internship; =0 otherwise   |
| schoolbase                   | =1 if participate in any School-To-Work school-based program; =0 otherwise                                    |
| career_major                 | =1 if participate in career major program; =0 otherwise   |
| cooperative_education        | =1 if participate in cooperative education; =0 otherwise  |
| technical_preparation        | =1 if participate in technical preparation program; =0 otherwise  |
| <b>Control Variables</b>     |   |
| age14                        | =1 if age equals 14; =0 otherwise   |
| age15                        | =1 if age equals 15; =0 otherwise   |
| age16                        | =1 if age equals 16; =0 otherwise   |
| age17                        | =1 if age equals 17; =0 otherwise   |
| age18                        | =1 if age equals 18; =0 otherwise   |
| ageover18                    | =1 if age is greater than 18; =0 otherwise  |
| male                         | =1 if male; =0 if female  |
| black                        | =1 if black; =0 otherwise   |
| hispanic                     | =1 if Hispanic; =0 otherwise  |

Table 1. Variable Definitions (Continued)

| Variable                 | Definition                                       |
|--------------------------|--|
| <b>Control Variables</b> |  |
| father_education         | years of father education                        |
| mother_education         | years of mother education                        |
| GPA_eighth_grade         | GPA in eighth grade                              |
| asvab                    | Armed Services Vocational Aptitude Battery score |
| bully                    | =1 if bullied before age 12; =0 otherwise        |
| single_parent            | =1 if live in single-parent family; =0 otherwise |
| log_household_income     | household income in base 10 log form             |
| household_size           | number of residents in household                 |
| household_under_18       | number of siblings under age 18                  |
| urban                    | =1 if live in urban areas; =0 otherwise          |
| career_day               | =1 if school has a career day; =0 otherwise      |

*Notes :* The *asvab* (Armed Services Vocational Aptitude Battery) measures the respondent's knowledge and skills (similar to AFQT score). The *asvab* variable contains a summary percentile score ranging, from one to 99, that is comparable among age groups.

Table 2. Descriptive Statistics (Standard Deviation)

| Variable                     | Full Sample |          | School-To-Work<br>Program Participants |          | Non-School-To-Work<br>Program Participants |          |
|------------------------------|-------------|----------|--|----------|--|----------|
| <b>Dependent Variables</b>   |             |          |  |          |  |          |
| anycrime                     | 0.214       | (0.410)  | 0.230                                  | (0.421)  | 0.206                                      | (0.405)  |
| vandalism                    | 0.077       | (0.266)  | 0.081                                  | (0.273)  | 0.075                                      | (0.263)  |
| theft                        | 0.112       | (0.316)  | 0.119                                  | (0.324)  | 0.109                                      | (0.312)  |
| assault                      | 0.080       | (0.271)  | 0.093                                  | (0.290)  | 0.074                                      | (0.261)  |
| drug_sales                   | 0.055       | (0.228)  | 0.059                                  | (0.235)  | 0.053                                      | (0.225)  |
| anydrug                      | 0.231       | (0.421)  | 0.234                                  | (0.424)  | 0.229                                      | (0.420)  |
| marijuana                    | 0.222       | (0.415)  | 0.225                                  | (0.418)  | 0.220                                      | (0.414)  |
| cocaine                      | 0.056       | (0.231)  | 0.055                                  | (0.227)  | 0.057                                      | (0.232)  |
| <b>Explanatory Variables</b> |             |          |  |          |  |          |
| stw                          | 0.314       | (0.464)  | 1.000                                  | (0.000)  | -  | -        |
| workbase                     | 0.169       | (0.375)  | 0.538                                  | (0.499)  | -  | -        |
| job_shadowing                | 0.090       | (0.287)  | 0.288                                  | (0.453)  | -  | -        |
| mentoring                    | 0.040       | (0.195)  | 0.126                                  | (0.332)  | -  | -        |
| school_sponsored_enterprise  | 0.031       | (0.174)  | 0.099                                  | (0.299)  | -  | -        |
| internship                   | 0.049       | (0.215)  | 0.155                                  | (0.362)  | -  | -        |
| schoolbase                   | 0.220       | (0.414)  | 0.698                                  | (0.459)  | -  | -        |
| career_major                 | 0.172       | (0.377)  | 0.547                                  | (0.498)  | -  | -        |
| cooperative_education        | 0.059       | (0.236)  | 0.189                                  | (0.392)  | -  | -        |
| technical_preparation        | 0.052       | (0.222)  | 0.165                                  | (0.372)  | -  | -        |
| <b>Control Variables</b>     |             |          |  |          |  |          |
| age13                        | 0.039       | (0.193)  | 0.030                                  | (0.171)  | 0.043                                      | (0.202)  |
| age14                        | 0.093       | (0.291)  | 0.084                                  | (0.277)  | 0.098                                      | (0.297)  |
| age15                        | 0.151       | (0.358)  | 0.146                                  | (0.353)  | 0.154                                      | (0.361)  |
| age16                        | 0.199       | (0.399)  | 0.216                                  | (0.412)  | 0.191                                      | (0.393)  |
| age17                        | 0.211       | (0.408)  | 0.247                                  | (0.431)  | 0.195                                      | (0.396)  |
| age18                        | 0.142       | (0.349)  | 0.134                                  | (0.340)  | 0.146                                      | (0.354)  |
| ageover18                    | 0.164       | (0.370)  | 0.143                                  | (0.351)  | 0.174                                      | (0.379)  |
| male                         | 0.494       | (0.500)  | 0.475                                  | (0.499)  | 0.502                                      | (0.500)  |
| black                        | 0.248       | (0.432)  | 0.286                                  | (0.453)  | 0.229                                      | (0.420)  |
| hispanic                     | 0.193       | (0.395)  | 0.175                                  | (0.380)  | 0.202                                      | (0.401)  |
| father_education             | 12.019      | (4.311)  | 11.923                                 | (4.229)  | 12.063                                     | (4.347)  |
| mother_education             | 12.567      | (3.302)  | 12.580                                 | (3.115)  | 12.563                                     | (3.384)  |
| GPA_eighth_grade             | 2.968       | (0.809)  | 2.955                                  | (0.803)  | 2.973                                      | (0.812)  |
| asvab                        | 50.638      | (26.659) | 48.867                                 | (25.830) | 51.450                                     | (26.993) |
| bully                        | 0.186       | (0.389)  | 0.193                                  | (0.395)  | 0.182                                      | (0.386)  |
| single_parent                | 0.267       | (0.442)  | 0.273                                  | (0.445)  | 0.264                                      | (0.441)  |
| log_household_income         | 3.687       | (5.040)  | 3.438                                  | (4.957)  | 3.801                                      | (5.073)  |
| household_size               | 4.233       | (1.543)  | 4.216                                  | (1.513)  | 4.241                                      | (1.556)  |
| household_under_18           | 1.599       | (1.339)  | 1.603                                  | (1.336)  | 1.597                                      | (1.340)  |
| urban                        | 0.729       | (0.445)  | 0.710                                  | (0.454)  | 0.737                                      | (0.440)  |
| career_day                   | 0.300       | (0.458)  | 0.382                                  | (0.486)  | 0.263                                      | (0.440)  |
| N                            | 26,125      |          | 8,213                                  |          | 17,912                                     |          |

Table 3. Estimated Coefficients for School-To-Work Participation and Crime Participation and Drug Use

|                             | Selection Equation | Outcome Equation   |                    |
|-----------------------------|--------------------|--------------------|--------------------|
|                             | STW<br>(1)         | Crimes<br>(2)      | Drugs<br>(3)       |
| job_shadowing               |                    | -0.006 (0.039)     | 0.021 (0.038)      |
| mentoring                   |                    | -0.023 (0.050)     | -0.124 (0.049) **  |
| school_sponsored_enterprise |                    | 0.133 (0.051) ***  | 0.153 (0.054) ***  |
| internship                  |                    | 0.013 (0.048)      | 0.040 (0.045)      |
| career_major                |                    | 0.002 (0.034)      | 0.003 (0.034)      |
| cooperative_education       |                    | 0.011 (0.042)      | 0.066 (0.041)      |
| technical_preparation       |                    | -0.011 (0.045)     | -0.038 (0.045)     |
| age13                       | -0.202 (0.057) *** | 0.904 (0.114) ***  | -0.153 (0.122)     |
| age14                       | -0.104 (0.046) **  | 0.890 (0.092) ***  | -0.003 (0.089)     |
| age15                       | -0.058 (0.042)     | 0.793 (0.084) ***  | 0.163 (0.080) **   |
| age16                       | 0.055 (0.040)      | 0.725 (0.080) ***  | 0.286 (0.076) ***  |
| age17                       | 0.162 (0.035) ***  | 0.599 (0.072) ***  | 0.281 (0.067) ***  |
| age18                       | 0.024 (0.030)      | 0.428 (0.068) ***  | 0.244 (0.058) ***  |
| male                        | -0.079 (0.020) *** | 0.312 (0.039) ***  | 0.044 (0.039)      |
| black                       | 0.136 (0.027) ***  | -0.047 (0.050)     | -0.349 (0.055) *** |
| hispanic                    | -0.062 (0.029) **  | 0.008 (0.054)      | -0.084 (0.054)     |
| father_education            | -0.003 (0.003)     | 0.007 (0.005)      | 0.004 (0.005)      |
| mother_education            | 0.006 (0.004)      | -0.001 (0.007)     | 0.010 (0.007)      |
| GPA_eighth_grade            | 0.010 (0.014)      | -0.215 (0.026) *** | -0.214 (0.027) *** |
| asvab                       | -0.002 (0.001) *** | 0.002 (0.001) ***  | 0.002 (0.001) **   |
| bully                       | 0.054 (0.026) **   | 0.260 (0.045) ***  | 0.118 (0.046) **   |
| single_parent               | -0.034 (0.023)     | 0.085 (0.044) *    | 0.110 (0.044) **   |
| log_household_income        | 0.002 (0.003)      | 0.010 (0.005) **   | 0.007 (0.005)      |
| household_size              | -0.015 (0.010)     | -0.045 (0.020) **  | -0.034 (0.019) *   |
| household_under_18          | 0.001 (0.012)      | 0.025 (0.024)      | -0.030 (0.023)     |
| urban                       | -0.081 (0.023) *** | 0.053 (0.043)      | 0.093 (0.043) **   |
| career_day                  | 0.345 (0.020) ***  |                    |                    |
| constant                    | -0.481 (0.077) *** | -1.184 (0.209) *** | -0.678 (0.213) *** |
| $\rho$                      |                    | 0.108 (0.141)      | 0.199 (0.146)      |
| Wald Test                   |                    | 0.580              | 1.750              |
| N                           |                    | 26,125             | 26,125             |

Notes : The excluded categories for age, gender, and race are age over 18, female, and white, respectively. Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 4. Marginal Effects for Crime Participation and Drug Use

|                             | Outcome Equation |                    |
|-----------------------------|------------------|--------------------|
|                             | Crimes<br>(1)    | Drugs<br>(2)       |
| job_shadowing               | -0.002 (0.011)   | 0.006 (0.012)      |
| mentoring                   | -0.007 (0.014)   | -0.036 (0.014) *** |
| school_sponsored_enterprise | 0.041 (0.016) ** | 0.049 (0.018) ***  |
| internship                  | 0.004 (0.014)    | 0.012 (0.014)      |
| career_major                | 0.001 (0.010)    | 0.001 (0.010)      |
| cooperative_education       | 0.003 (0.012)    | 0.020 (0.013)      |
| technical_preparation       | -0.003 (0.013)   | -0.011 (0.013)     |
| N                           | 26,125           | 26,125             |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 5a. Estimation Results for Crime Participation by Subgroup for Work-Based Programs

|                            | Job<br>Shadowing<br>(1) | Mentoring<br>(2) | School-Sponsored<br>Enterprise<br>(3) | Internship<br>(4) |
|----------------------------|-------------------------|------------------|---------------------------------------|-------------------|
| <b>Full Sample</b>         | -0.006 (0.039)          | -0.023 (0.050)   | 0.133 (0.051) ***                     | 0.013 (0.048)     |
| <b>Gender</b>              |                         |                  |                                       |                   |
| Male                       | 0.024 (0.054)           | -0.041 (0.074)   | 0.136 (0.073) *                       | -0.068 (0.067)    |
| Female                     | -0.041 (0.055)          | -0.003 (0.067)   | 0.136 (0.073) *                       | 0.101 (0.067)     |
| <b>Race</b>                |                         |                  |                                       |                   |
| Black                      | 0.091 (0.071)           | -0.001 (0.085)   | 0.170 (0.090) *                       | 0.046 (0.093)     |
| Hispanic                   | 0.047 (0.083)           | -0.050 (0.102)   | 0.110 (0.111)                         | 0.092 (0.098)     |
| White                      | -0.080 (0.051)          | -0.023 (0.070)   | 0.085 (0.070)                         | -0.041 (0.062)    |
| <b>Age</b>                 |                         |                  |                                       |                   |
| 13-17                      | 0.017 (0.043)           | 0.007 (0.056)    | 0.147 (0.054) ***                     | 0.053 (0.056)     |
| 18 and over                | -0.111 (0.084)          | -0.136 (0.112)   | 0.047 (0.154)                         | -0.123 (0.092)    |
| <b>Household Income</b>    |                         |                  |                                       |                   |
| < 30 percentile            | -0.008 (0.043)          | 0.022 (0.057)    | 0.101 (0.055) *                       | 0.029 (0.056)     |
| 30-70 percentile           | 0.032 (0.095)           | -0.257 (0.132) * | 0.376 (0.150) *                       | 0.091 (0.104)     |
| > 70 percentile            | -0.090 (0.616)          | -0.055 (0.461)   | 0.188 (0.495)                         | -0.228 (1.177)    |
| <b>ASVAB Score</b>         |                         |                  |                                       |                   |
| < 25 percentile            | 0.019 (0.078)           | -0.029 (0.112)   | 0.154 (0.110)                         | 0.055 (0.104)     |
| 25-75 percentile           | 0.034 (0.050)           | 0.007 (0.063)    | 0.146 (0.067) **                      | 0.072 (0.061)     |
| > 75 percentile            | -0.229 (0.098) **       | -0.120 (0.126)   | 0.021 (0.113)                         | -0.293 (0.113) ** |
| <b>GPA in Eighth Grade</b> |                         |                  |                                       |                   |
| < 2.5                      | -0.055 (0.077)          | -0.010 (0.103)   | -0.065 (0.111)                        | -0.048 (0.102)    |
| 2.5-3.0                    | 0.009 (0.059)           | -0.036 (0.085)   | 0.270 (0.081) ***                     | -0.012 (0.074)    |
| > 3.0                      | 0.012 (0.059)           | -0.025 (0.070)   | 0.079 (0.073)                         | 0.041 (0.071)     |

Notes: Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level;

\*\* at 5 percent level; \*\*\* at 1 percent level.



Table 5b. Estimation Results for Crime Participation by Subgroup for School-Based Programs

|                            | Career<br>Major<br>(5) | Cooperative<br>Education<br>(6) | Technical<br>Preparation<br>(7) |
|----------------------------|------------------------|---------------------------------|---------------------------------|
| <b>Full Sample</b>         | 0.002 (0.034)          | 0.011 (0.042)                   | -0.011 (0.045)                  |
| <b>Gender</b>              |                        |                                 |                                 |
| Male                       | -0.032 (0.047)         | 0.028 (0.058)                   | -0.055 (0.059)                  |
| Female                     | 0.044 (0.050)          | -0.015 (0.063)                  | 0.053 (0.070)                   |
| <b>Race</b>                |                        |                                 |                                 |
| Black                      | 0.051 (0.064)          | -0.001 (0.077)                  | -0.014 (0.077)                  |
| Hispanic                   | -0.091 (0.071)         | -0.072 (0.088)                  | 0.135 (0.095)                   |
| White                      | -0.005 (0.046)         | 0.051 (0.057)                   | -0.063 (0.064)                  |
| <b>Age</b>                 |                        |                                 |                                 |
| 13-17                      | 0.013 (0.038)          | 0.003 (0.048)                   | 0.014 (0.049)                   |
| 18 and over                | -0.073 (0.074)         | 0.026 (0.088)                   | -0.121 (0.116)                  |
| <b>Household Income</b>    |                        |                                 |                                 |
| < 30 percentile            | -0.001 (0.038)         | -0.025 (0.048)                  | 0.007 (0.049)                   |
| 30-70 percentile           | -0.012 (0.086)         | 0.124 (0.104)                   | -0.096 (0.129)                  |
| > 70 percentile            | -0.021 (0.353)         | 0.172 (0.272)                   | -0.128 (0.494)                  |
| <b>ASVAB Score</b>         |                        |                                 |                                 |
| < 25 percentile            | 0.008 (0.071)          | 0.062 (0.090)                   | 0.098 (0.091)                   |
| 25-75 percentile           | 0.010 (0.044)          | -0.003 (0.054)                  | -0.042 (0.058)                  |
| > 75 percentile            | -0.131 (0.085)         | -0.017 (0.105)                  | 0.013 (0.124)                   |
| <b>GPA in Eighth Grade</b> |                        |                                 |                                 |
| < 2.5                      | -0.019 (0.066)         | 0.020 (0.086)                   | -0.095 (0.084)                  |
| 2.5-3.0                    | -0.010 (0.054)         | 0.086 (0.065)                   | -0.034 (0.070)                  |
| >3.0                       | 0.015 (0.052)          | -0.080 (0.068)                  | 0.081 (0.074)                   |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 6a. Marginal Effects for Crime Participation by Subgroup for Work-Based Programs

|                            | Job<br>Shadowing<br>(1) | Mentoring<br>(2)  | School-Sponsored<br>Enterprise<br>(3) | Internship<br>(4)  |
|----------------------------|-------------------------|-------------------|---------------------------------------|--------------------|
| <b>Full Sample</b>         | -0.002 (0.011)          | -0.007 (0.014)    | 0.041 (0.016) **                      | 0.004 (0.014)      |
| <b>Gender</b>              |                         |                   |                                       |                    |
| Male                       | 0.008 (0.018)           | -0.014 (0.025)    | 0.048 (0.026) *                       | -0.023 (0.022)     |
| Female                     | -0.009 (0.013)          | -0.001 (0.016)    | 0.034 (0.019) *                       | 0.025 (0.017)      |
| <b>Race</b>                |                         |                   |                                       |                    |
| Black                      | 0.026 (0.021)           | -0.001 (0.024)    | 0.050 (0.028) *                       | 0.013 (0.027)      |
| Hispanic                   | 0.016 (0.029)           | -0.017 (0.033)    | 0.039 (0.040)                         | 0.032 (0.035)      |
| White                      | -0.024 (0.015)          | -0.007 (0.021)    | 0.027 (0.023)                         | -0.012 (0.019)     |
| <b>Age</b>                 |                         |                   |                                       |                    |
| 13-17                      | 0.006 (0.014)           | 0.002 (0.018)     | 0.050 (0.019) ***                     | 0.017 (0.018)      |
| 18 and over                | -0.024 (0.018)          | -0.029 (0.023)    | 0.011 (0.037)                         | -0.027 (0.020)     |
| <b>Household Income</b>    |                         |                   |                                       |                    |
| < 30 percentile            | -0.003 (0.014)          | 0.007 (0.018)     | 0.033 (0.018) *                       | 0.009 (0.018)      |
| 30-70 percentile           | 0.007 (0.021)           | -0.047 (0.021) ** | 0.098 (0.045) **                      | 0.020 (0.024)      |
| > 70 percentile            | -0.021 (0.061)          | -0.013 (0.060)    | 0.050 (0.129)                         | -0.050 (0.058)     |
| <b>ASVAB Score</b>         |                         |                   |                                       |                    |
| < 25 percentile            | 0.005 (0.023)           | -0.008 (0.032)    | 0.047 (0.035)                         | 0.016 (0.031)      |
| 25-75 percentile           | 0.010 (0.015)           | 0.002 (0.018)     | 0.044 (0.021) **                      | 0.021 (0.018)      |
| > 75 percentile            | -0.071 (0.028) **       | -0.039 (0.039)    | 0.007 (0.038)                         | -0.088 (0.031) *** |
| <b>GPA in Eighth Grade</b> |                         |                   |                                       |                    |
| < 2.5                      | -0.022 (0.030)          | -0.004 (0.041)    | -0.025 (0.043)                        | -0.019 (0.040)     |
| 2.5-3.0                    | 0.003 (0.017)           | -0.010 (0.024)    | 0.086 (0.028) ***                     | -0.003 (0.021)     |
| > 3.0                      | 0.003 (0.016)           | -0.007 (0.018)    | 0.022 (0.021)                         | 0.011 (0.020)      |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 6b. Marginal Effects for Crime Participation by Subgroup for School-Based Programs

|                            | Career<br>Major<br>(5) | Cooperative<br>Education<br>(6) | Technical<br>Preparation<br>(7) |
|----------------------------|------------------------|---------------------------------|---------------------------------|
| <b>Full Sample</b>         | 0.001 (0.010)          | 0.003 (0.012)                   | -0.003 (0.013)                  |
| <b>Gender</b>              |                        |                                 |                                 |
| Male                       | -0.011 (0.016)         | 0.010 (0.020)                   | -0.019 (0.019)                  |
| Female                     | 0.011 (0.012)          | -0.004 (0.015)                  | 0.013 (0.017)                   |
| <b>Race</b>                |                        |                                 |                                 |
| Black                      | 0.014 (0.018)          | -0.001 (0.021)                  | -0.004 (0.021)                  |
| Hispanic                   | -0.030 (0.023)         | -0.024 (0.028)                  | 0.048 (0.034)                   |
| White                      | -0.002 (0.014)         | 0.016 (0.018)                   | -0.019 (0.019)                  |
| <b>Age</b>                 |                        |                                 |                                 |
| 13-17                      | 0.004 (0.012)          | 0.001 (0.015)                   | 0.005 (0.016)                   |
| 18 and over                | -0.017 (0.017)         | 0.006 (0.021)                   | -0.026 (0.024)                  |
| <b>Household Income</b>    |                        |                                 |                                 |
| < 30 percentile            | -0.001 (0.012)         | -0.008 (0.015)                  | 0.002 (0.016)                   |
| 30-70 percentile           | -0.003 (0.018)         | 0.028 (0.024)                   | -0.019 (0.025)                  |
| > 70 percentile            | -0.005 (0.066)         | 0.045 (0.144)                   | -0.029 (0.043)                  |
| <b>ASVAB Score</b>         |                        |                                 |                                 |
| < 25 percentile            | 0.002 (0.021)          | 0.018 (0.027)                   | 0.029 (0.027)                   |
| 25-75 percentile           | 0.003 (0.012)          | -0.001 (0.016)                  | -0.012 (0.016)                  |
| > 75 percentile            | -0.042 (0.027)         | -0.006 (0.035)                  | 0.004 (0.042)                   |
| <b>GPA in Eighth Grade</b> |                        |                                 |                                 |
| < 2.5                      | -0.008 (0.026)         | 0.008 (0.034)                   | -0.037 (0.032)                  |
| 2.5-3.0                    | -0.003 (0.016)         | 0.026 (0.020)                   | -0.010 (0.020)                  |
| > 3.0                      | 0.004 (0.014)          | -0.021 (0.017)                  | 0.023 (0.021)                   |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 7a. Estimation Results for Drug Use by Subgroup for Work-Based Programs

|                            | Job<br>Shadowing<br>(1) | Mentoring<br>(2)   | School-Sponsored<br>Enterprise<br>(3) | Internship<br>(4) |
|----------------------------|-------------------------|--------------------|---------------------------------------|-------------------|
| <b>Full Sample</b>         | 0.021 (0.038)           | -0.124 (0.049) **  | 0.153 (0.054) ***                     | 0.040 (0.045)     |
| <b>Gender</b>              |                         |                    |                                       |                   |
| Male                       | 0.002 (0.056)           | -0.172 (0.078) **  | 0.192 (0.080) **                      | -0.074 (0.069)    |
| Female                     | 0.038 (0.051)           | -0.092 (0.062)     | 0.107 (0.073)                         | 0.135 (0.060) **  |
| <b>Race</b>                |                         |                    |                                       |                   |
| Black                      | 0.154 (0.075) **        | -0.191 (0.096) **  | 0.110 (0.100)                         | -0.015 (0.093)    |
| Hispanic                   | 0.035 (0.081)           | -0.112 (0.105)     | 0.233 (0.116) **                      | 0.119 (0.093)     |
| White                      | -0.043 (0.047)          | -0.089 (0.061)     | 0.113 (0.070)                         | 0.034 (0.056)     |
| <b>Age</b>                 |                         |                    |                                       |                   |
| 13-17                      | 0.028 (0.043)           | -0.113 (0.057) **  | 0.159 (0.057) ***                     | -0.002 (0.054)    |
| 18 and over                | -0.010 (0.074)          | -0.120 (0.095)     | 0.127 (0.142)                         | 0.097 (0.078)     |
| <b>Household Income</b>    |                         |                    |                                       |                   |
| < 30 percentile            | 0.029 (0.043)           | -0.106 (0.057) *   | 0.143 (0.058) **                      | -0.011 (0.055)    |
| 30-70 percentile           | 0.066 (0.096)           | -0.223 (0.121) *   | 0.124 (0.163)                         | 0.087 (0.101)     |
| > 70 percentile            | -0.087 (0.126)          | -0.010 (0.139)     | 0.333 (0.242)                         | 0.173 (0.124)     |
| <b>ASVAB Score</b>         |                         |                    |                                       |                   |
| < 25 percentile            | 0.176 (0.080) **        | 0.004 (0.113)      | 0.138 (0.125)                         | 0.067 (0.108)     |
| 25-75 percentile           | 0.018 (0.048)           | -0.192 (0.061) *** | 0.126 (0.067) *                       | 0.015 (0.158)     |
| > 75 percentile            | -0.126 (0.105)          | -0.025 (0.109)     | 0.207 (0.131)                         | 0.111 (0.106)     |
| <b>GPA in Eighth Grade</b> |                         |                    |                                       |                   |
| < 2.5                      | 0.007 (0.080)           | -0.341 (0.109) *** | -0.044 (0.119)                        | -0.020 (0.106)    |
| 2.5-3.0                    | 0.048 (0.059)           | -0.179 (0.082) **  | 0.127 (0.085)                         | -0.055 (0.071)    |
| >3.0                       | -0.007 (0.059)          | 0.026 (0.069)      | 0.248 (0.082) ***                     | 0.125 (0.067) *   |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 7b. Estimation Results for Drug Use by Subgroup for School-Based Programs

|                            | Career<br>Major<br>(5) | Cooperative<br>Education<br>(6) | Technical<br>Preparation<br>(7) |
|----------------------------|------------------------|---------------------------------|---------------------------------|
| <b>Full Sample</b>         | 0.003 (0.034)          | 0.066 (0.041)                   | -0.038 (0.045)                  |
| <b>Gender</b>              |                        |                                 |                                 |
| Male                       | -0.013 (0.049)         | 0.056 (0.057)                   | -0.048 (0.060)                  |
| Female                     | 0.028 (0.045)          | 0.072 (0.058)                   | -0.015 (0.066)                  |
| <b>Race</b>                |                        |                                 |                                 |
| Black                      | -0.059 (0.067)         | -0.008 (0.080)                  | -0.018 (0.085)                  |
| Hispanic                   | -0.060 (0.071)         | 0.039 (0.082)                   | 0.021 (0.091)                   |
| White                      | 0.038 (0.041)          | 0.085 (0.052)                   | -0.074 (0.057)                  |
| <b>Age</b>                 |                        |                                 |                                 |
| 13-17                      | 0.007 (0.038)          | 0.065 (0.047)                   | -0.037 (0.049)                  |
| 18 and over                | 0.007 (0.066)          | 0.060 (0.078)                   | -0.044 (0.098)                  |
| <b>Household Income</b>    |                        |                                 |                                 |
| < 30 percentile            | 0.020 (0.039)          | 0.047 (0.047)                   | -0.021 (0.049)                  |
| 30-70 percentile           | 0.059 (0.085)          | 0.109 (0.096)                   | -0.144 (0.125)                  |
| > 70 percentile            | -0.092 (0.109)         | 0.151 (0.132)                   | -0.152 (0.168)                  |
| <b>ASVAB Score</b>         |                        |                                 |                                 |
| < 25 percentile            | -0.007 (0.074)         | 0.142 (0.093)                   | 0.003 (0.097)                   |
| 25-75 percentile           | -0.002 (0.042)         | 0.034 (0.051)                   | -0.052 (0.055)                  |
| > 75 percentile            | 0.002 (0.081)          | 0.078 (0.102)                   | -0.039 (0.119)                  |
| <b>GPA in Eighth Grade</b> |                        |                                 |                                 |
| < 2.5                      | 0.081 (0.072)          | 0.054 (0.087)                   | -0.175 (0.087) **               |
| 2.5-3.0                    | -0.086 (0.053)         | 0.060 (0.081)                   | -0.035 (0.067)                  |
| > 3.0                      | 0.029 (0.051)          | 0.050 (0.066)                   | 0.051 (0.074)                   |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 8a. Marginal Effects for Drug Use by Subgroup for Work-Based Programs

|                            | Job<br>Shadowing<br>(1) | Mentoring<br>(2)   | School-Sponsored<br>Enterprise<br>(3) | Internship<br>(4) |
|----------------------------|-------------------------|--------------------|---------------------------------------|-------------------|
| <b>Full Sample</b>         | 0.006 (0.012)           | -0.036 (0.014) *** | 0.049 (0.018) ***                     | 0.012 (0.014)     |
| <b>Gender</b>              |                         |                    |                                       |                   |
| Male                       | 0.001 (0.018)           | -0.052 (0.022) **  | 0.065 (0.028) **                      | -0.023 (0.021)    |
| Female                     | 0.011 (0.015)           | -0.026 (0.017)     | 0.033 (0.023)                         | 0.042 (0.019) **  |
| <b>Race</b>                |                         |                    |                                       |                   |
| Black                      | 0.040 (0.020) ***       | -0.042 (0.020) **  | 0.028 (0.027)                         | -0.004 (0.022)    |
| Hispanic                   | 0.012 (0.027)           | -0.035 (0.031)     | 0.084 (0.043) *                       | 0.041 (0.033)     |
| White                      | -0.015 (0.017)          | -0.031 (0.020)     | 0.042 (0.027)                         | 0.012 (0.020)     |
| <b>Age</b>                 |                         |                    |                                       |                   |
| 13-17                      | 0.009 (0.013)           | -0.033 (0.016) **  | 0.051 (0.019) ***                     | -0.001 (0.017)    |
| 18 and over                | -0.003 (0.023)          | -0.035 (0.027)     | 0.041 (0.047)                         | 0.131 (0.025)     |
| <b>Household Income</b>    |                         |                    |                                       |                   |
| < 30 percentile            | 0.009 (0.013)           | -0.031 (0.016) *   | 0.046 (0.019) **                      | -0.003 (0.017)    |
| 30-70 percentile           | 0.019 (0.028)           | -0.057 (0.029) **  | 0.049 (0.052)                         | 0.025 (0.030)     |
| > 70 percentile            | -0.029 (0.040)          | -0.003 (0.048)     | 0.125 (0.095)                         | 0.062 (0.042)     |
| <b>ASVAB Score</b>         |                         |                    |                                       |                   |
| < 25 percentile            | 0.046 (0.121) **        | 0.001 (0.028)      | 0.036 (0.034)                         | 0.017 (0.028)     |
| 25-75 percentile           | 0.006 (0.015)           | -0.057 (0.017) *** | 0.042 (0.023) *                       | 0.005 (0.019)     |
| > 75 percentile            | -0.039 (0.031)          | -0.008 (0.034)     | 0.071 (0.046)                         | 0.037 (0.035)     |
| <b>GPA in Eighth Grade</b> |                         |                    |                                       |                   |
| < 2.5                      | 0.003 (0.029)           | -0.112 (0.032) *** | -0.016 (0.042)                        | -0.007 (0.038)    |
| 2.5-3.0                    | 0.016 (0.019)           | -0.054 (0.023) **  | 0.043 (0.030)                         | -0.018 (0.022)    |
| > 3.0                      | -0.002 (0.016)          | 0.007 (0.020)      | 0.076 (0.027) ***                     | 0.037 (0.020) *   |

Notes: Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 8b. Marginal Effects for Drug Use by Subgroup for School-Based Programs

|                            | Career<br>Major<br>(5) | Cooperative<br>Education<br>(6) | Technical<br>Preparation<br>(7) |
|----------------------------|------------------------|---------------------------------|---------------------------------|
| <b>Full Sample</b>         | 0.001 (0.010)          | 0.020 (0.013)                   | -0.011 (0.013)                  |
| <b>Gender</b>              |                        |                                 |                                 |
| Male                       | -0.004 (0.016)         | 0.018 (0.019)                   | -0.015 (0.019)                  |
| Female                     | 0.008 (0.013)          | 0.022 (0.018)                   | 0.004 (0.019)                   |
| <b>Race</b>                |                        |                                 |                                 |
| Black                      | -0.014 (0.016)         | -0.002 (0.019)                  | -0.004 (0.020)                  |
| Hispanic                   | -0.019 (0.023)         | 0.013 (0.027)                   | 0.007 (0.031)                   |
| White                      | 0.014 (0.015)          | 0.031 (0.019)                   | -0.026 (0.019)                  |
| <b>Age</b>                 |                        |                                 |                                 |
| 13-17                      | 0.002 (0.012)          | 0.020 (0.015)                   | -0.011 (0.015)                  |
| 18 and over                | 0.002 (0.020)          | 0.019 (0.265)                   | -0.013 (0.029)                  |
| <b>Household Income</b>    |                        |                                 |                                 |
| < 30 percentile            | 0.006 (0.012)          | 0.014 (0.015)                   | -0.006 (0.015)                  |
| 30-70 percentile           | 0.017 (0.023)          | 0.032 (0.029)                   | -0.038 (0.032)                  |
| > 70 percentile            | -0.031 (0.036)         | 0.054 (0.049)                   | -0.500 (0.051)                  |
| <b>ASVAB Score</b>         |                        |                                 |                                 |
| < 25 percentile            | -0.002 (0.018)         | 0.037 (0.025)                   | 0.001 (0.024)                   |
| 25-75 percentile           | -0.001 (0.014)         | 0.011 (0.017)                   | -0.016 (0.017)                  |
| > 75 percentile            | 0.001 (0.026)          | 0.026 (0.034)                   | -0.012 (0.037)                  |
| <b>GPA in Eighth Grade</b> |                        |                                 |                                 |
| < 2.5                      | 0.030 (0.026)          | 0.020 (0.032)                   | -0.061 (0.029) **               |
| 2.5-3.0                    | -0.027 (0.017)         | 0.020 (0.020)                   | -0.011 (0.021)                  |
| >3.0                       | 0.008 (0.014)          | 0.014 (0.019)                   | 0.014 (0.021)                   |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 9. Estimated Coefficients for School-to-Work Participation by Crime and Drug Type

|                         | Work-Based Programs |                       |                             |                      | School-Based Programs |                       |                       |
|-------------------------|---------------------|-----------------------|-----------------------------|----------------------|-----------------------|-----------------------|-----------------------|
|                         | Job Shadowing       | Mentoring             | School-Sponsored Enterprise | Internship           | Career Major          | Cooperative Education | Technical Preparation |
| Crime                   |                     |                       |                             |                      |                       |                       |                       |
| Vandalism               | 0.003<br>(0.050)    | 0.045<br>(0.068)      | 0.138 **<br>(0.068)         | -0.136 **<br>(0.069) | -0.008<br>(0.044)     | -0.036<br>(0.055)     | 0.045<br>(0.057)      |
| Theft                   | 0.020<br>(0.044)    | -0.097<br>(0.059)     | 0.068<br>(0.060)            | -0.030<br>(0.056)    | 0.010<br>(0.040)      | -0.026<br>(0.049)     | -0.075<br>(0.053)     |
| Assault                 | -0.053<br>(0.049)   | 0.031<br>(0.062)      | 0.193 ***<br>(0.063)        | 0.093<br>(0.059)     | 0.043<br>(0.043)      | 0.082<br>(0.051)      | 0.048<br>(0.055)      |
| Drug Sales              | -0.043<br>(0.054)   | 0.016<br>(0.075)      | 0.110<br>(0.076)            | -0.071<br>(0.071)    | 0.026<br>(0.050)      | 0.159 ***<br>(0.057)  | -0.071<br>(0.064)     |
| Drug Use                |                     |                       |                             |                      |                       |                       |                       |
| Marijuana               | 0.019<br>(0.038)    | -0.139 ***<br>(0.050) | 0.159 ***<br>(0.055)        | 0.029<br>(0.046)     | 0.009<br>(0.034)      | 0.067<br>(0.041)      | -0.052<br>(0.045)     |
| Cocaine and Other Drugs | -0.068<br>(0.054)   | -0.012<br>(0.071)     | 0.082<br>(0.076)            | -0.011<br>(0.064)    | -0.013<br>(0.048)     | 0.116 **<br>(0.055)   | 0.090<br>(0.060)      |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.



Table 10. Marginal Effects for School-To-work Participation by Crime and Drug Type

|                         | Work-Based Programs |                       |                             |                      | School-Based Programs |                       |                       |
|-------------------------|---------------------|-----------------------|-----------------------------|----------------------|-----------------------|-----------------------|-----------------------|
|                         | Job Shadowing       | Mentoring             | School-Sponsored Enterprise | Internship           | Career Major          | Cooperative Education | Technical Preparation |
| Crime                   |                     |                       |                             |                      |                       |                       |                       |
| Vandalism               | 0.000<br>(0.006)    | 0.006<br>(0.009)      | 0.019 *<br>(0.010)          | -0.016 **<br>(0.007) | -0.001<br>(0.006)     | -0.004<br>(0.007)     | 0.006<br>(0.007)      |
| Theft                   | 0.004<br>(0.008)    | -0.018 *<br>(0.010)   | 0.013<br>(0.012)            | -0.006<br>(0.010)    | 0.002<br>(0.007)      | -0.005<br>(0.009)     | -0.014<br>(0.009)     |
| Assault                 | -0.007<br>(0.006)   | 0.004<br>(0.008)      | 0.029 ***<br>(0.010)        | 0.013<br>(0.009)     | 0.006<br>(0.006)      | 0.011<br>(0.007)      | 0.006<br>(0.008)      |
| Drug Sales              | -0.004<br>(0.005)   | 0.002<br>(0.007)      | 0.011<br>(0.008)            | -0.006<br>(0.006)    | 0.003<br>(0.005)      | 0.017 **<br>(0.007)   | -0.006<br>(0.006)     |
| Drug Use                |                     |                       |                             |                      |                       |                       |                       |
| Marijuana               | 0.006<br>(0.011)    | -0.039 ***<br>(0.013) | 0.050 ***<br>(0.018)        | 0.009<br>(0.014)     | 0.003<br>(0.010)      | 0.020<br>(0.013)      | -0.015<br>(0.013)     |
| Cocaine and Other Drugs | -0.007<br>(0.005)   | -0.001<br>(0.007)     | 0.009<br>(0.009)            | -0.001<br>(0.006)    | -0.001<br>(0.005)     | 0.013 **<br>(0.006)   | 0.010<br>(0.007)      |

Notes : Standard errors (in parentheses) are clustered robust by individual. \* significant at 10 percent level; \*\* at 5 percent level; \*\*\* at 1 percent level.

Table 11. Summary of the Results for Crime Participation and Drug Use by School-To-Work Program

|                 | Work-Based Programs |            |                  |            | School-Based Programs |              |                       |                       |
|-----------------|---------------------|------------|------------------|------------|-----------------------|--------------|-----------------------|-----------------------|
|                 | Job Shadowing       | Mentoring  | School-Sponsored |            | Internship            | Career Major | Cooperative Education | Technical Preparation |
|                 |                     |            | Enterprise       | Enterprse  |                       |              |                       |                       |
| <b>Crime</b>    |                     |            |                  |            |                       |              |                       |                       |
| Full Sample     | No Effects          | No Effects | +                | No Effects | No Effects            | No Effects   | No Effects            | No Effects            |
| Subsample       | -                   | -          | +                | -          | No Effects            | No Effects   | No Effects            | No Effects            |
| By Crime Type   | No Effects          | -          | +                | -          | No Effects            | +            | No Effects            | No Effects            |
| <b>Drug Use</b> |                     |            |                  |            |                       |              |                       |                       |
| Full Sample     | No Effects          | -          | +                | No Effects | No Effects            | No Effects   | No Effects            | No Effects            |
| Subsample       | +                   | -          | +                | +          | No Effects            | No Effects   | -                     | -                     |
| By Drug Type    | No Effects          | -          | +                | No Effects | No Effects            | +            | No Effects            | No Effects            |

Notes : + sign indicates a positive and significant coefficient at conventional level. - sign indicates a negative and significant coefficient at conventional level.

Figure 1. Crime Participation and Drug Use by Age

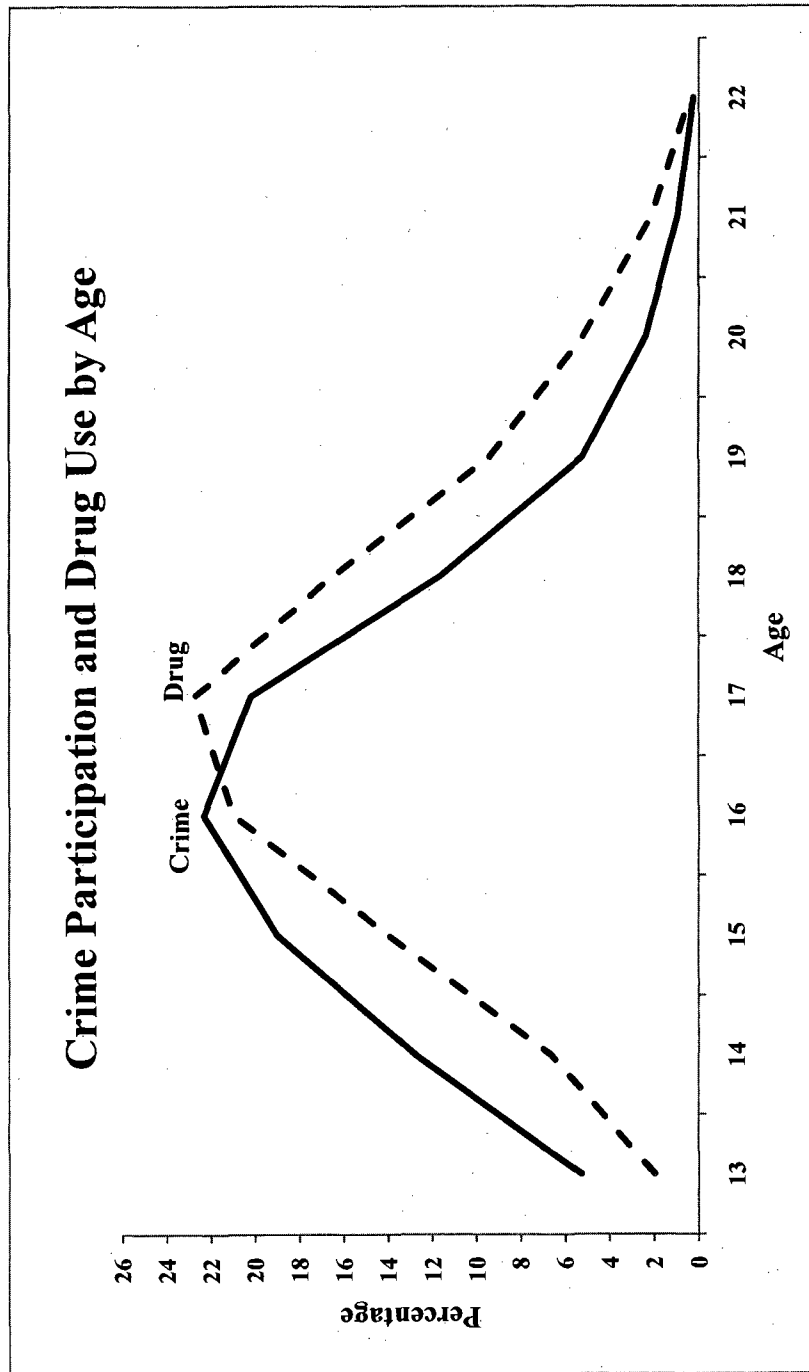


Figure 2. Crime Participation and Drug Use by Race

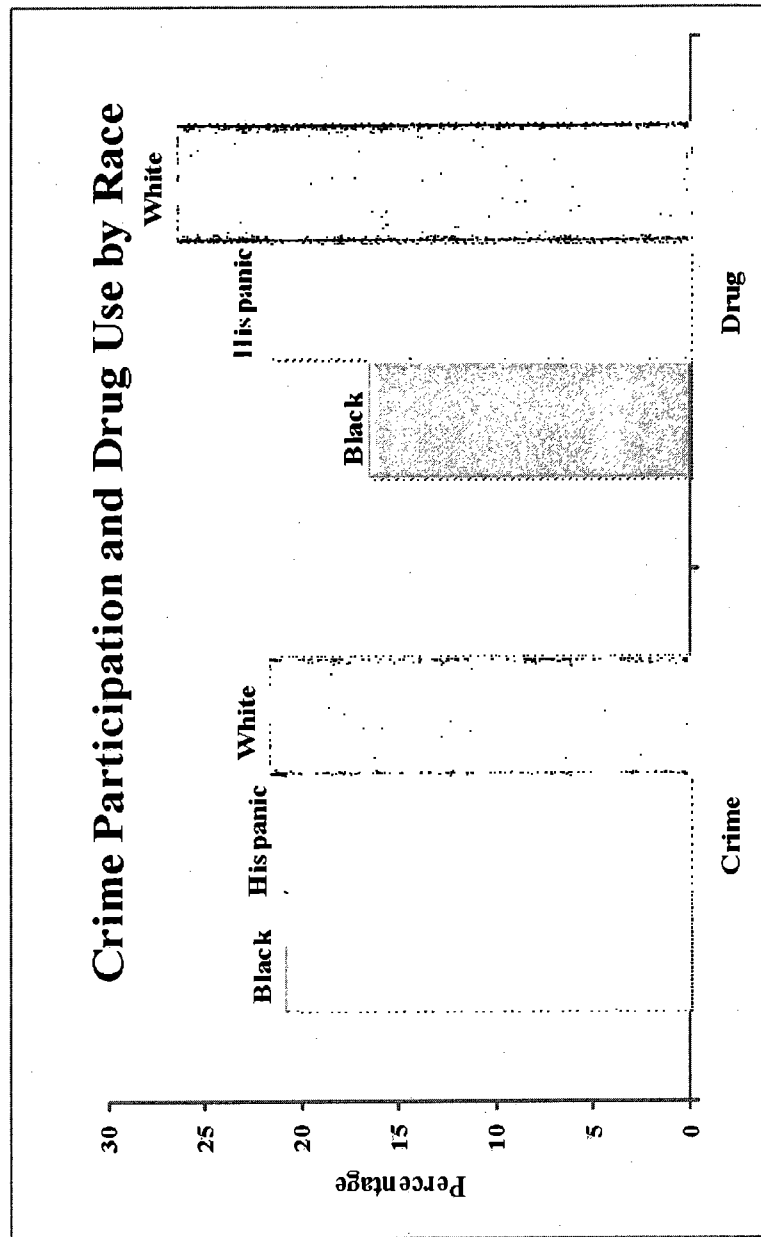


Figure 3. Crime Participation and Drug Use by Family Arrangement

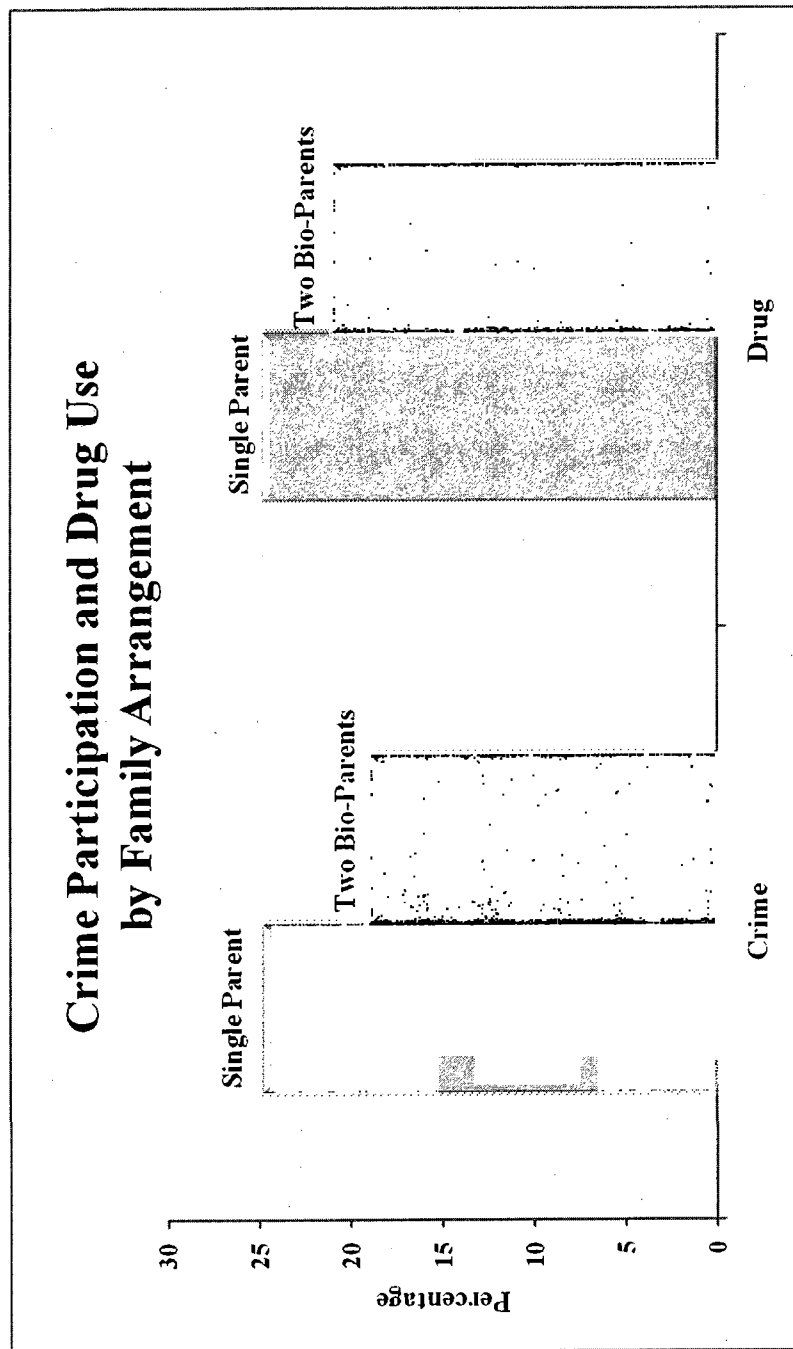


Figure 4. Crime Participation and Drug Use by GPA in Eighth Grade

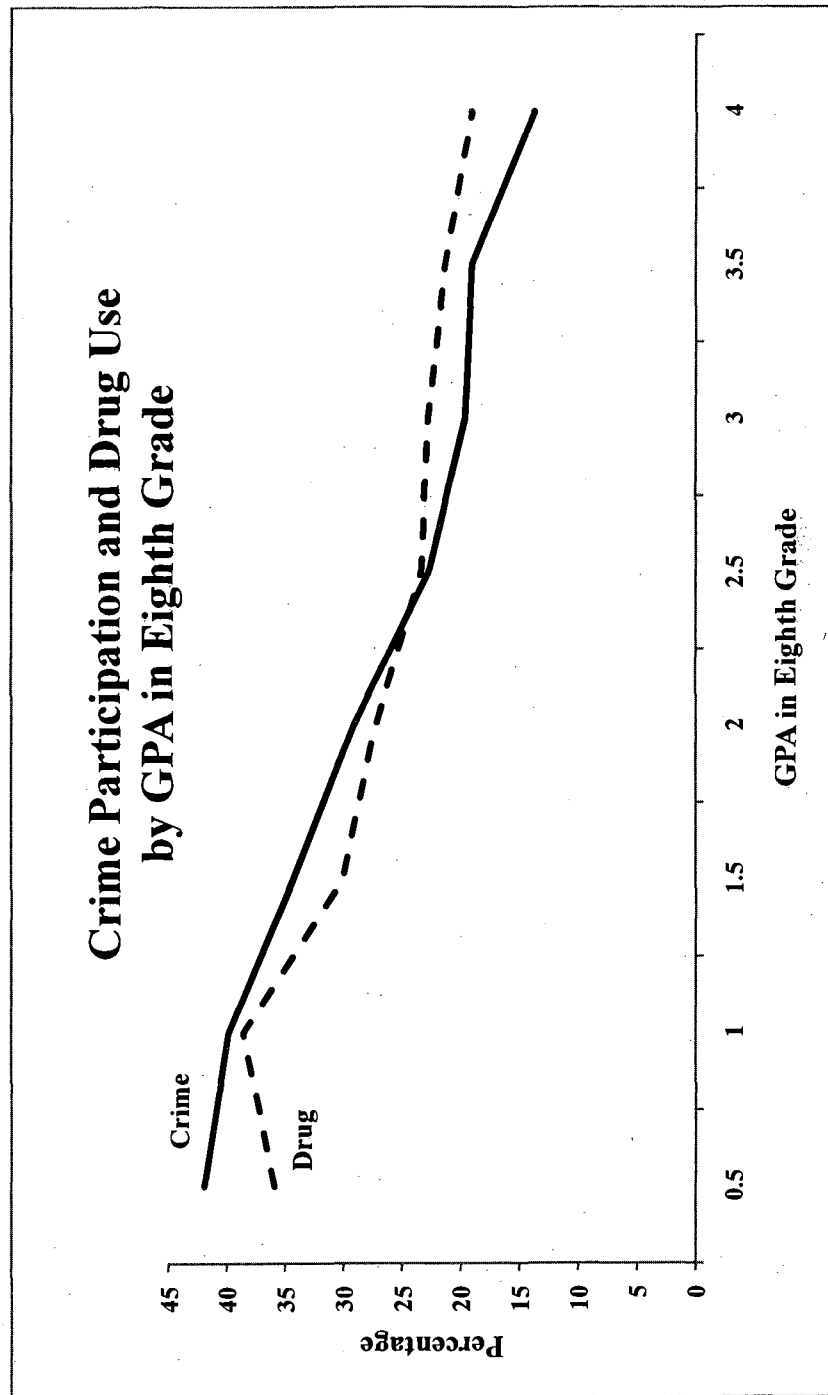


Figure 5.1. Crime Participation by Program Type

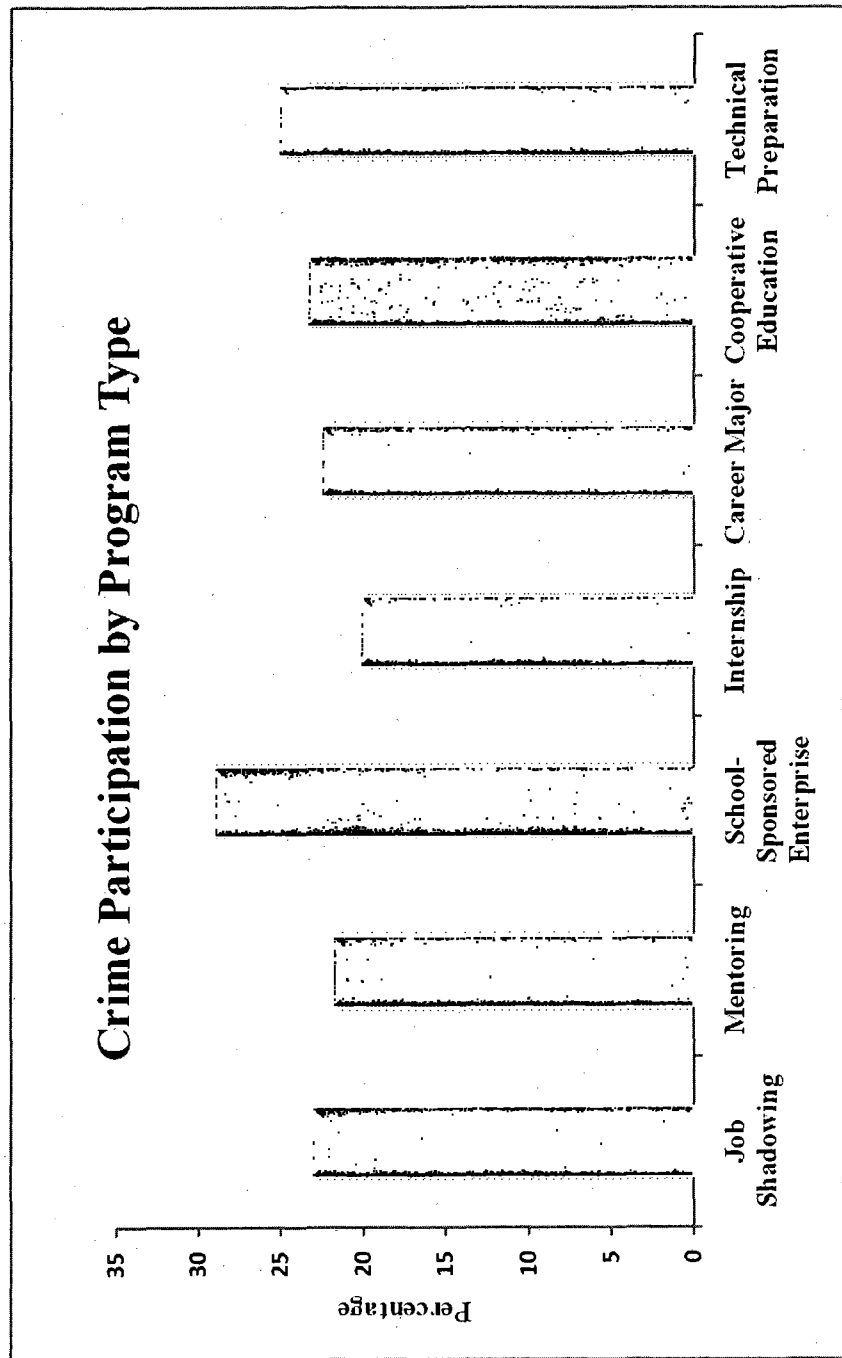


Figure 5.2. Drug Use by Program Type

