

ABSTRACT

Title of Dissertation: **TESTING THE GENERALIZABILITY OF SAMPSON AND LAUB'S LIFE-COURSE THEORY: EXAMINING THE RELATIONSHIP BETWEEN ADULT SOCIAL BONDS AND DRUG USE AMONG AN AFRICAN AMERICAN SAMPLE**

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In 1993, Sampson and Laub found that high quality bonds to employment and marriage redirect offending pathways, net of early criminal propensity among a sample of 500 delinquent and 500 non-delinquent white males living in Boston. The current research explores the generalizability of Sampson and Laub's (1993) findings using Ann Brunswick's *Harlem Longitudinal Study of Urban Black Youth*. Using the first three waves of the dataset, two main research questions are posed: 1) Is there a relationship between adult social bonds and drug use frequency?, and 2) Is there a relationship between the change in adult social bonds and the change in drug use when controlling for unobserved individual heterogeneity?

The effects of the social bonding variables in this study do not provide consistent support for Sampson and Laub's theory. The ordinary-least squares regression results indicate that there is a significant relationship between adult social bonds and drug use in early adulthood in the direction predicted by the underlying theory. In later adulthood, the strongest predictor of drug use frequency is the prior wave's measure of drug use frequency. The first-differences analysis reveals no significant relationships between the changes in social bonds during adulthood and changes in drug use frequency during the same period. There are no consistent interaction effects uncovered in the data across the two analytic techniques and the drug-specific results mimic those uncovered using the composite measure of drug use frequency.

The mixed results from this research may be due to omitted variable bias, low variation in the social bonding variables of interest, how the social bonding variables are measured, or characteristics of the study and the sample population. While no consistent effect for education, employment, or marriage is found to explain changes in drug use frequency over time, supplemental analyses reveal that church is significantly and inversely related to drug use frequency in adulthood. This finding is consistent with Sampson and Laub's life course theory. Beyond education, employment, and marriage, religion may serve as an institution that is able to strengthen ties and bonds to conventional society and modify drug use trajectories in adulthood.

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COURSE THEORY: EXAMINING THE RELATIONSHIP BETWEEN
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AMERICAN SAMPLE**

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS.....	iii
LIST OF TABLES	v
Chapter 1: Introduction	1
Sampson and Laub’s Age-Graded Theory of Informal Social Control	2
Salience of Informal Social Controls for a Contemporary Sample	3
Chapter 2: Literature Review.....	8
Understanding Crime over the Life Course	9
Explaining Desistance from Crime and Drug Use.....	11
Explaining Desistance across Race and Gender	16
Chapter 3: Methods.....	31
Harlem Longitudinal Study of Urban Black Youth.....	33
Demographic Measures	35
Social Bonding Measures	38
Job Stability	38
Commitment	40
Marriage Stability	41
Drug Use Measures.....	42
Validity and Reliability of Measures	44
Drug Use	44
Attrition.....	51
Analytic Strategy	54
OLS Regression Analysis	55
Anderson and Hsiao’s (1981) First-Differences Equation.....	56
Chapter 4: Results.....	59
OLS Regression Results	60
OLS Sample Selection Results	65
OLS Drug-Specific Results.....	67
OLS Interaction Results	77
First-Differences Results	85
First-Differences Drug-Specific Results.....	86
First-Differences Interaction Results	87
Chapter 5: Discussion and Conclusions.....	90
Overview of Research Findings.....	92
Generalizability of Sampson and Laub’s Life-Course Theory.....	98
Future Research Directions.....	108
Appendices.....	114
Appendix A: Operationalization and Coding of Variables.....	115
Appendix B: Bivariate Correlations between Social Bonds and Drug Frequency ...	118
Appendix B1: Bivariate Correlations between Social Bonds and Alcohol Frequency	119

Appendix B2: Bivariate Correlations between Social Bonds and Marijuana Frequency	120
Appendix B3: Bivariate Correlations between Social Bonds and Cocaine Frequency	121
REFERENCES	155

LIST OF TABLES

Table 1: Descriptive Statistics for Independent Variables at Wave One.....	123
Table 2: Descriptive Statistics for Independent Variables at Wave Two	124
Table 3: Descriptive Statistics for Independent Variables at Wave Three	125
Table 4: Descriptive Statistics for Past Year Drug Frequency	126
Table 4: Descriptive Statistics for Past Year Drug Frequency, Continued.....	127
Table 5: Validity of Drug Frequency Measures	128
Table 6: Validity of Alcohol Frequency Measures.....	129
Table 7: Validity of Marijuana Frequency Measures	130
Table 8: Validity of Cocaine Frequency Measures.....	131
Table 9: Wave One Predictors of Survey Completion at Wave Two	132
Table 10: Wave Two Predictors of Survey Completion at Wave Three	133
Table 11: OLS Regression Models Predicting Drug Frequency in Adulthood	135
Table 12: Testing the Impact of Sample Selection Bias on Drug Frequency.....	136
Table 13: OLS Regression Models Predicting Alcohol Frequency in Adulthood....	137
Table 14: Testing the Impact of Sample Selection Bias on Alcohol Frequency	138
Table 15: OLS Regression Models Predicting Marijuana Frequency in Adulthood	139
Table 16: Testing the Impact of Sample Selection Bias on Marijuana Frequency...	140
Table 17: OLS Regression Models Predicting Cocaine Frequency in Adulthood ...	141
Table 18: Testing the Impact of Sample Selection Bias on Cocaine Frequency	142
Table 19: OLS Regression Models Predicting Drug Frequency in Adulthood among Males.....	143
Table 19a: OLS Regression Models Predicting Drug Frequency in Adulthood among Females	144
Table 20: OLS Regression Models Predicting Alcohol Frequency in Adulthood among Males.....	145
Table 20a: OLS Regression Models Predicting Alcohol Frequency in Adulthood among Females	146
Table 21: OLS Regression Models Predicting Marijuana Frequency in Adulthood among Males.....	147
Table 21a: OLS Regression Models Predicting Marijuana Frequency in Adulthood among Females	148
Table 22: OLS Regression Models Predicting Cocaine Frequency in Adulthood among Males.....	149
Table 22a: OLS Regression Models Predicting Cocaine Frequency in Adulthood among Females	150
Table 23: First-Differences OLS Regression Models Predicting Changes in Drug Frequency in Adulthood	151
Table 24: First-Differences OLS Regression Models Predicting Changes in Alcohol Frequency in Adulthood	152
Table 25: First-Differences OLS Regression Models Predicting Changes in Marijuana Frequency in Adulthood	153
Table 26: First-Differences OLS Regression Models Predicting Changes in Cocaine	

Frequency in Adulthood 154

Chapter 1: Introduction

While criminological research has uncovered a strong relationship between problem behavior established early in life and the continuity of that behavior in adulthood, research has also shown that few antisocial children grow up to be antisocial adults (Robins, 1978). A number of theorists have speculated about the factors that lead to desistance from crime however, little systemic research has been conducted to validate their claims because most criminologists have been far more interested in the etiology of offending than crime desistance (Laub and Sampson, 2001). In 1993, Sampson and Laub presented their age-graded theory of informal social control in their book *Crime in the Making: Pathways and Turning Points through Life* and sought to explain how social bonds influence the patterning of offending over time. Sampson and Laub (1993) found that high quality bonds to employment and marriage redirect offending pathways, net of early criminal propensity. Some though have questioned the relevance of their research findings for explaining desistance among more contemporary sample populations (see, for example, Tracy and Kempf-Leonard, 1996: 60 - 63).

The purpose of this chapter is to provide the reader with an overview of Sampson and Laub's (1993) life-course theory and their findings as they relate to transitions made in adulthood and changes in behavior over time. This chapter will also address criticisms that have arisen regarding how well Sampson and Laub's findings generalize to more contemporary and heterogeneous sample populations. In closing, the specific aims of this research will be presented.

Sampson and Laub's Age-Graded Theory of Informal Social Control

The life course is marked by trajectories or established patterns of behavior that span more than one developmental period, and by transitions, events that may redirect (either positively or negatively) behavior trajectories (Elder, 1992). Sampson and Laub find that young adults who obtain stable employment and/or a stable marriage desist from crime controlling for their propensity to engage in offending behavior. Sampson and Laub (1993) tested three hypotheses concerning the salience of adult social bonds in explaining behavior change from childhood through adulthood. These three hypotheses are as follows:

- 1) Early antisocial behavior is linked to adult deviant behavior across a variety of settings including charges in the military, general deviance, alcohol abuse, and official crime, 2) Childhood delinquency is linked to dimensions of adult social bonding, including economic dependence, educational attainment, attachment to the labor force, and quality of marriage, and 3) Adult social bonding can influence subsequent behavior independent of traditional sociological and psychological variables such as social class background, ethnicity, IQ, and even the family/school factors found to predict the onset of delinquency (Sampson and Laub, 1993: 125).

Sampson and Laub (1993) tested their theory using data from the classic study of juvenile delinquency conducted by Sheldon and Eleanor Glueck (1950; 1968), which focused on white males born in Boston, Massachusetts during the period of the Great Depression. The Gluecks' sampled 500 delinquent and 500 non-delinquent males living in disadvantaged neighborhoods in Boston. The delinquent and non-delinquent

youth were matched case by case on IQ, ethnicity, age, and neighborhood socioeconomic status (Sampson and Laub, 1993). The interview schedule included surveying the subjects themselves as well as family members, employers and school personnel. A number of additional measures were taken to ensure the validity of the data (see Sampson and Laub, 1993 for an overview). In tests of their theory, Sampson and Laub (1993; 1997) find that job stability and marital attachment play a vital role in explaining crime desistance in adulthood. They further uncovered that it is the quality of those attachments rather than their mere acquisition that is important in explaining crime desistance (see also Laub, Nagin, and Sampson, 1998).

Salience of Informal Social Controls for a Contemporary Sample

Due to characteristics of the sample population analyzed by Sampson and Laub, questions arise as to whether the occurrence and meaning of certain life transitions (e.g., stable employment or stable marriage) among adults born between the late-1920s and the early-1930s differ for adults born in a more contemporary historical period. The Glueck sample reached their teenage years during the initial stages of World War II, and entered adulthood during a time of post-war prosperity and unprecedented economic opportunity in the United States (Sampson and Laub, 1993). While the historical context in which their subject population was drawn provides a unique opportunity to examine crime and alcohol abuse among a socially disadvantaged group of white males (Sampson and Laub, 1993), it also raises questions about whether relationships that motivate change in crime are similarly uncovered for drug use, and among different race and gender groups.

Some contend that Sampson and Laub's findings present a "distorted perception of the reality of crime" given their use of a sample population made up of only white males (Tracy and Kempf-Leonard, 1996: 63). While Sampson and Laub (1993) maintain that their sample is comparable to more contemporary youth residing in underclass urban centers, Wilson (1987) argues that residents of poverty-stricken urban neighborhoods in the late 1980s differ greatly from poor urban whites and even black residents of earlier years. In fact, Wilson (1987: 8) states that the urban underclass is inhabited by the "most disadvantaged segments of the black urban community." According to Wilson (1987), his conceptualization of the *underclass* includes not only individuals living in the inner-city who have been long-term welfare recipients or street criminals but also individuals who have become isolated from mainstream society and conventional patterns of behavior. Since the 1970s there has been a surge in illegitimacy, female-headed households, and other social problems including crime and drug use (Wilson, 1987; Tracy and Kempf-Leonard, 1996).

Research has shown that while blacks are no more likely to initiate drug use compared to other races, they are more likely to continue their substance use (Ensminger, Anthony, and McCord, 1997); especially, those living in inner-city communities (Epstein, Botvin, Diaz, and Schinke, 1995). Breakdown in the social organization of urban areas has occurred as a result of the out-migration of working- and middle-class blacks and shifts in the economic sector from industrial to more technological markets (Anderson, 1990; Wilson, 1987). As residents whose behavior conforms to conventional society leave inner-city neighborhoods and as employment opportunities decline, those who remain tend to become isolated from mainstream

(conventional) patterns of behavior (Wilson, 1987). Those who are most socially isolated may have a more difficult time finding employment or establishing relationships that afford opportunities for a better life.

Blacks residing in the most underprivileged areas of the inner-city have experienced institutional and individual racism, which has created a “racial division of labor” in which the economic shifts that have taken place have most adversely affected those in the low-wage sector of the economy (Wilson, 1987: 12). Large decreases in labor market participation among black males began in 1965 as compared to white males, whose labor market experience has either remained constant or increased since 1981 (Wilson, 1987). Limited opportunities for legitimate labor market participation have left many black men in the inner-city with no other choice but to turn to illegitimate pursuits for economic security (Pinderhughes, 2002). With fewer black men participating in the legitimate labor market, being viewed as a suitable spouse or father became increasingly more difficult. In 1985, for every 100 black women there were only 43 marriageable (employed) black men (Pinderhughes, 2002). By 1978, 74% of poor black families were headed by a woman compared to 30% of black female-headed families in 1959 (Wilson, 1987). Wilson (1987) contends that female-headed households are representative of the economic hardship faced by poor underclass blacks. In 1960, over three-quarters of black households were headed by a married couple. The percentage of dual-parent households among blacks decreased to 64% in 1970 and less than 50% by the late 1980s (Pinderhughes, 2002). Research has also shown that divorce among blacks has increased over the

past four decades and that it is twice as likely among black men compared to white men (Pinderhughes, 2002).

The economic trends for young black men have become considerably less favorable since the end of World War II (Wilson, 1987). Decreases in employment opportunities for black men living in inner-city neighborhoods and welfare benefits afforded to female-headed households question the relevance of marrying a spouse in the hopes of increasing one's economic security. As a result of the social isolation felt by many in the inner-city, the opportunities to engage in certain mainstream institutions, such as employment and marriage may be limited

Using data from Ann Brunswick's *Harlem Longitudinal Study of Urban Black Youth*, this research explores the extent to which Sampson and Laub's findings generalize to changes in drug use among a contemporary sample of African American males and females. The sample population targeted for the *Harlem Longitudinal Study of Urban Black Youth* was born in the 1950s during a time of postwar prosperity and their teenage years were spent growing up in a time of great social and technological change including the rise of the civil rights and women's liberation movements. During their early adult years, the sample experienced growing disillusionment with the government as a result of the Watergate scandal and the involvement in numerous international conflicts (e.g., the Vietnam War). During their later adult years, in the 1980s, society experienced a surge in the prison population and in the crime rate with violent crime rates having tripled since the 1960s. Increases in the prison population in the mid-1980s are linked to the introduction of crack cocaine in many inner-city communities. The recession

experienced in the early 1980s hit low and middle class families the hardest and many low and semi-skilled jobs were being eliminated.

The historical period in which this sample was surveyed as well as the composition of the sample provides a unique opportunity to examine the relationship between adult social bonds and drug use frequency. The focus of the research is less about the salience of education, employment, and marriage across sample populations and more about whether the opportunities to establish bonds to education, employment, and marriage are in equal supply among an African American sample of males and females living in the inner-city. It remains an empirical question as to whether such opportunities are available to the same extent among a more contemporary sample population living in the inner-city compared to subjects born in the 1920s and 1930s. Unlike the white male sample analyzed by Sampson and Laub, this research examines the relationship between education, employment, and marriage and drug use frequency. This research further explores whether changes in drug use over time is explained by social bonds, is moderated by gender, and varies by the type of drug analyzed.

Chapter 2: Literature Review

While it is beyond question that changes in offending occur over time, ambiguities exist regarding how best to explain those changes (Nagin and Paternoster, 1991; Paternoster and Brame, 1997; Nagin and Farrington, 1992). Gottfredson and Hirschi (1983) contend that crime declines with age irrespective of time, place, demographic subgroup, or type of crime. In contrast to life-course explanations that argue the importance of attachments developed in adulthood, Gottfredson and Hirschi (1990) state that opportunities for social connectedness, in employment and marriage for instance, do not replace age as the predominant explanation of desistance. Despite concerns over the collection of longitudinal data (such as the higher likelihood of attrition, increases in resources to follow subjects over time, etc.), researchers invoking this data collection strategy are able investigate the importance of adult role transitions in explaining behavioral change over time. The life course perspective offers a framework for understanding behavior change; however, questions remain concerning how explanations of behavior change differ across types of crime, and race and gender groups (Piquero, MacDonald, and Parker, 2002). The focus of this chapter is three-fold: 1) discuss various perspectives used to explain crime over the life course, 2) provide an overview of research examining the predictors of desistance from crime and drug use, and 3) address the question of whether predictors of desistance are similar for different race and gender groups.

Understanding Crime over the Life Course

While attention to the etiology and discontinuity of offending surfaced in the 1930s with research conducted by Sheldon and Eleanor Glueck, it has been argued that the life course perspective gained research interest following debates in the 1980s surrounding criminal careers and career criminals (Hagan and Palloni, 1988). These debates moved the field to question whether or not there are sub-types of offenders whose pattern of offending diverge from the age-crime curve and whether different factors explain different stages of the offending career. While some criminologists argue strongly against the criminal career paradigm (see Gottfredson and Hirschi, 1986; 1988; 1990), the debates generated interest in the patterning of behavior over time and the extent to which age (or maturation) adequately explains crime desistance. Gottfredson and Hirschi (1990) claim that all offenders reduce their offending as they age and therefore, it is uninformative to examine the influence of social factors on crime desistance. These researchers further contend that criminality is the result of a stable individual trait, low self-control. While individuals with a lower level of self-control are more likely to commit crime, their rate of offending follows the aggregate age-crime curve, and will lessen as they age.

Despite Gottfredson and Hirschi's (1990) claim that age sufficiently accounts for desistance, researchers have encouraged the field to examine behavior within the context of the life course (Hagan and Palloni, 1988). Research examining the characteristics of criminal behavior over time finds that antisocial and criminal behavior in adulthood virtually requires antisocial behavior in adolescence (Robins, 1978). Two divergent perspectives have been put forth to explain continuity in

antisocial behavior over time. The first perspective, the population heterogeneity process, states that stability in criminal behavior is the result of time-stable individual differences or propensities that are revealed early in childhood and remain constant throughout adulthood. The second perspective, the state dependence process, suggests that antisocial behavior exhibited early in life has a cumulative effect on the probability of that behavior occurring later in life. For instance, Nagin and Paternoster (1991) find that the strong correlation between past and future participation in property delinquency is due to a state dependence process rather than the result of unobserved heterogeneity. The state dependence perspective also suggests that life events have a causal effect on subsequent behavior despite individual propensities toward that behavior. Persistence in antisocial behavior may be redirected as a result of transitions experienced at different points in the lifespan. Therefore, research suggests that despite stability, there is change in behavior over time.

In an attempt to explain this paradox, theorists have constructed models that acknowledge the importance of both the population heterogeneity and state dependence processes. These mixed perspectives contend that stability in anti-social behavior is explained, in part, by individual propensities established early in life. However, it is also understood that initial antisocial acts, when formally recognized, narrow opportunities for future behavioral change. The official recognition of deviant behavior may increase the likelihood of subsequent deviance (Nagin and Paternoster, 2000). Research has also shown that while an event such as an arrest may perpetuate a criminal lifestyle, other events such as employment or marriage may curb or cease

criminal activity. Job stability and marital attachment may redirect criminal patterns of behavior as well as maintain conventionality among previously criminal offenders. This mixed perspective guides much of the research on crime in the life course as attempts are made to understand both continuity and change in behavior.

Explaining Desistance from Crime and Drug Use

After the 1960s, longitudinal assessments were undertaken to examine how societal change influences human development and how transitions into and out of roles influence behavioral patterns (Elder, 1992). Examining the impact that particular events have on behavior trajectories has unearthed insights about stability and change in behavior over time. Obtaining employment, losing employment, or being underemployed all may signal turning points in adulthood. Additionally, marriage has been shown to provide protection from a host of physical and psychological problems (Miller-Tutzauer, Leonard, and Windle, 1991). Entrance into a variety of adult role transitions may present opportunities for change (Elder, 1998). When discussing the influence of particular life events (such as employment or marriage) on patterns of behavior, it is important to recognize the complexities in identifying their causal impact, especially when researchers have not adequately controlled for individual heterogeneity or time-stable characteristics that pre-dispose individuals to engage in certain behavior.

A number of theories and research studies discuss the importance of balancing individual propensities and social factors in explaining stability and change in criminal behavior over time. One such theory, which underlies the current research,

is Sampson and Laub's age-graded theory of informal social control. Their theory of crime states that changes in offending result from the presence of non-criminal social events in the lives of offenders. In tests of their theory, they find that life events significantly reduce criminal offending net of individual differences in the propensity to commit crime. While relatively little is known about the desistance process and limited research has linked studies of desistance with a theoretical model (Uggen and Piliavin, 1998; Laub and Sampson, 2001), it is important to provide insight on the factors that have been identified by the research community. The discussion will begin with an overview of life events found to predict crime cessation, generally and drug use, more specifically.

Sampson and Laub's life course theory states that the patterning of crime is linked to age-graded life experiences. There are certain points during the life cycle when opportunities for redirecting stable behavior patterns are more appropriate or more available than at other points. During early adulthood, for instance, individuals decide whether or not to continue with post-secondary education, enter the work force full-time, or marry (Bachman, O'Malley, and Johnston, 1984). In making these decisions, the potential for relationships and attachments to be formed not only with co-workers or one's spouse but also with the institutions they represent may permanently change criminal trajectories. In a longitudinal study of youth followed into adulthood, Labouvie (1996) finds that the effect of adult transitions on drug use depends on the life stage in which they are experienced. Marriage and parenthood reduce drug use among subjects who enter into those transitions at ages 28 to 31 rather than at ages 21 to 24, controlling for an individual's early drug use and friends'

drug use. Labouvie (1996) contends that both self-selection and the self correcting effects of the transition account for declines in drug use.

While researchers continue to debate over whether partaking in certain life experiences reflects self-selection or the direct effect of the particular life event, Sampson and Laub (1995) argue the importance of acknowledging the unique impact of new social environments and roles despite a degree of self-selection into such states. Laub and colleagues (1998) find that desistance from crime is directly linked to the cumulative effects of a cohesive marital relationship among a sample of 500 delinquents. Horney, Osgood, and Marshall (1995) sought to extend Sampson and Laub's (1993) findings by examining the relationship between local life events and short-term variations in offending. Using a sample of newly convicted male offenders, the researchers find that, controlling for individual differences in the propensity to offend, living with a wife decreases recidivism (Horney et al., 1995). The authors further contend that despite variability in offenders' propensity to engage in crime, individual propensity does not necessarily exclude individuals from opportunities to develop attachments in conventional relationships. Research conducted by Shover and Thompson (1992) reveals that age has a direct positive effect on desistance from crime among a sample of inmates who were studied longitudinally in the late 1970s and early 1980s as part of the Rand Inmate Survey (RIS). However, the researchers find that the odds of desistance increase with lowered expectations that success in acquiring friends, money, autonomy, and happiness will be achieved through criminal participation. Additionally, Shover (1996) in an analysis of persistent thieves finds that the development of conventional

bonds and a strengthened resolve to turn away from a life of crime are important factors in explaining desistance. While age may be a motivating factor to leave a criminal lifestyle, establishing a social niche in conventional society is likely to result in “a pattern of routine activities that conflicts with and leaves little time for the daily activities associated with crime” (Shover, 1996: 127).

Compared to the age-crime curve in which crime peaks in late adolescence and declines thereafter (Gottfredson and Hirschi, 1990), literature on the maturational trend of drug use is less clear. For instance, cigarette use remains constant throughout adulthood among regular and persistent users (Chen and Kandel, 1995). Labouvie (1996) finds developmental continuity in substance use from early to later adulthood and found that peer associations and selection processes play a role in the continuity of substance use later in the life course (Labouvie, 1996). However, across all substances, their use declines with age and that decline appears to be a function of both selection and socialization processes. Chen and Kandel (1998) analyzed the patterning of drug use among adults ages 34 – 35 who were part of a longitudinal survey that began when these adults were middle-school students. The authors find that adult role transitions significantly reduce marijuana use. Specifically, getting married, becoming pregnant, and being a parent for the first time are associated with significant declines in marijuana use despite the inclusion of control variables in the multivariate models (Chen and Kandel, 1998). However, the inverse effect between adult role transitions and drug use may reflect an anticipatory effect rather than the direct socializing effects of the attained role. This research suggests that the anticipation of the role transition influences behavior and therefore, it may not be

necessarily the relationships developed during a marriage that are most salient when explaining changes in drug use in adulthood.

In analyzing marriage patterns over three time periods, Miller-Tutzauer and colleagues (1991) report that subjects who marry and remain married in the second and third waves of their study reduce their alcohol use compared to subjects who remain single across all three waves. The researchers find that individual characteristics differ only in the year prior to marriage, which suggest that changes in alcohol use are associated with the anticipation of marriage (Miller-Tutzauer et al., 1991). Esbensen and Elliott (1994), using data from the National Youth Survey, analyzed predictors of drug desistance among a sample of youth followed-up over a 13 year period. The researchers find that family role transitions made at 24 to 30 years of age increase the odds of drug use cessation. The researchers suggest that this effect may be contingent on its interaction with a decrease in the number of drug using friends after the first child is born. A similar finding is uncovered by Warr (1998) who reports that the significant effect of marriage on marijuana cessation is reduced to non-significance when any change in the presence of delinquent peers is accounted for in the equation.

The cessation of drug use may be easier for users of marijuana than users of cocaine, for instance. However, the influence of employment or marriage relationships may have a greater impact among subjects who have reached some threshold of serious crime (Laub and Sampson, 2003). Kandel and Davies (1990) find that when controls for work experience and education are included in the regression models, illicit drug use appears to influence job mobility, employment

gaps, and duration of unemployment, with cocaine having a more pervasive influence as compared to marijuana and alcohol use. In their prospective longitudinal study of adolescent development, White and Bates (1995) find that cocaine cessation occurs with the adoption of positive adult associations and roles, similar to research on the factors associated with marijuana and heroin cessation. However, the researchers are unable to assess whether declines in drug use are associated with selection or socialization processes. Newcomb and Bentler (1990) in their eight year longitudinal assessment of the consequences of cocaine use and drug use (more generally) find no significant differences in drug use desistance by type of drug. The researchers find that illicit drug use decreases social conformity and increases later drug use (Newcomb and Bentler, 1990).

Explaining Desistance across Race and Gender

Research suggests that the timing and influence of adult transitions on behavior may differ depending on the location, race, and gender group analyzed (Shanahan, 2000). Brunswick notes that it is important to understand the multiple contexts in which behavior develops and how contextual factors impact the “strength of ties to the existing social opportunity structure” for different race groups (Brunswick, 2002: 220). Opportunities for positive behavior change are substantially less likely among “underclass” individuals living in inner-city communities plagued by poverty, disease, unemployment and crime (Wilson, 1987; Pinderhughes, 2002). For instance, Wilson (1987: 3) finds that while unemployment and female-headed households were characteristic of urban life in the 1970s, urban life during the two

previous decades were characterized by “positive neighborhood identification and explicit norms and sanctions against aberrant behavior.”

For minority residents living in the inner-city (during the 1970s), structural constraints in combination with cultural isolation limit conventional opportunities. In his ethnographic analysis of an inner-city community in Pennsylvania, Anderson (1990) finds that the hopelessness and alienation many young inner-city black men and women feel is largely a result of persistent joblessness and racism that results in fewer legitimate opportunities for the majority of residents who do not participate in the cycle of violence. The experiences of black residents differ from similarly situated white residents. Sampson and Wilson (1995: 43) contend that “given the same objective socioeconomic status, blacks and whites face vastly different environments in which to live, work, and raise children.” Research reveals that African Americans living in inner-city communities are living in an environment that may exacerbate an already deviant lifestyle (Epstein et al., 1995). As more working- and middle-class blacks leave the urban environment to more suburban residences, the pool of conventional role models for less fortunate members of the inner-city is markedly reduced (Wilson, 1987). Therefore, while opportunities for change exist, they are limited.

According to the desistance literature, opportunities for change are not the sole result of maturation. These opportunities exist in relationships established over time in school, employment, or marriage, for instance. Rand (1987) finds that age does not completely account for desistance in criminal behavior among a sample of 106 offenders. Marriage appears to influence the seriousness of offenses committed

among non-whites compared to whites. Non-whites who are not married report more serious offenses than married non-whites (Rand, 1987). Marriage is significantly related to the seriousness of subsequent offenses among non-white male offenders. However, larger reductions in recidivism are uncovered for white offenders compared to non-white offenders (84% and 42%, respectively). It is also important to note that a third factor not accounted for in the analysis may explain the relationship found between marriage and crime (such as employment). Rand (1987) also finds that white subjects who receive vocational training in the armed forces reduce their criminal activity by almost two and a half years earlier as compared to white offenders who do not receive such training. There is a non-significant difference among non-white offenders who attend and those who do not attend vocational training in the armed forces.

With regard to drug use, a cross-sectional analysis by Nielsen (1999) provides an initial step in examining the relationship between social bonding variables and drunkenness among an ethnically diverse sample. Using data from the National Household Survey on Drug Abuse, Nielsen (1999) finds that race and social bonding variables (such as educational attainment and marriage) interact significantly to explain declines in drunkenness across ethnic groups. Increased education has an inverse effect on the number of times drunk for blacks and whites compared to no association among Hispanics. In contrast, marriage is inversely related to drunkenness among whites but has no effect among African Americans. While Nielsen (1999) finds that social bonds are significantly correlated with drunkenness, such bonds have differential effects depending on the race group analyzed. Since the

research is cross-sectional in nature the findings do not provide clarification on the proper ordering of social bonding variables in explaining desistance in drunkenness. Additionally, subjects were surveyed via a sampling of households which may exclude certain under-representative groups (e.g., the homeless, prisoners) in the population and may make generalizations about the sample difficult. Crum, Ensminger, Marguerite, and McCord (1998) in a longitudinal assessment of education and alcoholism among subjects living in a relatively poor black inner-city community find that subjects identified as underachievers by their first grade teachers are more likely to have an alcohol problem during adulthood (ages 32 to 33) compared to subjects defined as adapting well. It is unclear whether the link between being labeled an underachiever and problematic alcohol use is the result of selection or the poor formation of positive attachments over time.

In a more robust examination of desistance, Uggen (2000) uses data from the National Supported Work Demonstration Project to study whether those randomly assigned to a work program are more likely to desist from crime than those who are not randomly assigned to the work program. The experiment provides an opportunity to separate the effect of selection and socialization in understanding the desistance process among a predominantly black sample of young adults. The findings reveal that the work group has a reduced rate of re-arrests and illegal earnings than the control (or non-work group). However, the lower rate of recidivism among the work group is contingent on the age of the subjects with the older offenders showing most of the positive effects. While the results support the notion that criminal offenders desist as they age, the results also state that older criminal offenders who are not

afforded employment do not desist to the same extent as offenders receiving employment.

In a comparative study of white and non-white parolees, Piquero, MacDonald, and Parker (2002) find that the relationship between marriage and non-violent arrests is similar for both whites and non-whites controlling for individual heterogeneity. However, marriage is found to have an inhibiting effect on total arrests for non-whites only. Piquero and colleagues (2002) still leave questions unanswered about the circumstances under which the factors associated with desistance differentially influence non-white and white criminal populations. While there are similarities in the relationship between local life events and recidivism among white and non-white subjects, the effects are not mirror images of each other.

Increased isolation from conventional society has had a particularly damaging effect on the economic opportunities and social relationships of blacks residing in the most underprivileged areas of the inner-city (Wilson, 1987). As the literature suggests, this isolation experienced by black inner-city residents differs from that of white residents. Questions arise as to whether the different experiences of black and white residents also vary by gender. With regard to crime cessation, it is important to explore whether life events differentially bind women compared to men to conventional society.

The higher incidence of offending among males and the more serious nature of their offenses has led to the virtual exclusion of females as the subjects of crime research (Sommers, Baskin, and Fagan, 1994). However, since World War II there has been a narrowing in the crime gap (for most types of crimes). Several

explanations at both the macro- and micro-level exist to explain male and female offending (Steffensmeier and Allan, 1996; Steffensmeier and Haynie, 2000). For instance, the women's movement is offered as a potential reason for the narrowing of the gender gap. It is hypothesized that as women become more liberated in areas of social life (e.g., increased participation in the labor market) their crime rates will mirror the offending rates of males (Adler, 1975). An alternative explanation states that the type of control structure females experience within the home influences their likelihood of offending with egalitarian households producing more deviant behavior among female children (Hagan, Gillis, and Simpson, 1987). Some researchers suggest that criminological theories can only partially explain the gender gap in offending (Steffensmeier and Allan, 1996) while others contend that differences in the predictors of female and male offending differ in degree rather than in kind (Smith and Paternoster, 1987). Hill and Crawford (1990) find that there are relatively few differences across race in explaining female crime. However, the significant differences that are uncovered reveal that black female offending is most strongly related to structural factors (such as, unemployment and proximity to an urban environment) whereas white female offending is most strongly associated with social-psychological factors (such as bonding, attitudes, and maturation).

Using data from the National Supported Work Demonstration Project, Uggen and Kruttschnitt (1998) examine whether covariates gleaned from social control, rational choice, and opportunity theories as well as Black's theory of law explain desistance differently for women compared to men and for self-reported illegal earnings compared to official arrest. The researchers find that education is the only significant

predictor of crime desistance. Specifically, yearly increases in education reduce women's risk of illegal earnings by 18% while it increases men's risk by 2% (Uggen and Kruttschnitt, 1998). With regard to official desistance, race, the effects of drug use, and arrest history differentially affect desistance among women compared to men. The researchers find that it is significantly more difficult for women who use drugs or who have a longer criminal history to avoid arrest than men. Furthermore, controlling for self-reported illegal behavior, black women have a significantly lower risk of rearrest than white women (Uggen and Kruttschnitt, 1998). The researchers contend that the higher likelihood of subsequent arrest among women as compared to men may be the result of how women's unconventional behavior is viewed more negatively than that of men's behavior. Crime committed by women is contradictory to traditional gender roles which may leave women more vulnerable to future official sanctions. Uggen and Kruttschnitt (1998) find that it is important to identify the outcome being analyzed prior to drawing broad conclusions about the gender neutrality of predictors of desistance.

Similar to race comparisons in life course research, gender comparisons are limited. Explanations of female offending have traditionally been provided from within a white middle class framework (Hill and Crawford, 1990). This is problematic to the extent that the roles and status concerns of black women differ from those of white women (Laub and McDermott, 1985). King (1988) contends that often times conditions viewed as oppressive by white middle-class feminists are seen as privileges by black women (e.g., the opportunity to be a "stay at home" mom would be a luxury for many low-income black women). In order to identify events

that may elicit changes in behavior among female criminals, it is helpful to understand the situational context in which women, particularly black women (as compared to white women), find themselves. In understanding this context we will be more informed about the salience of particular life events such as employment and marriage for explaining desistance among women as compared to similarly situated men.

Unlike their white counterparts, black females experience discrimination on two fronts: one as a result of their race and the other due to their gender. Confronting discrimination on both of these fronts in addition to increased isolation and disorganization among those living in the inner-city, may erect obstacles that inhibit behavior change. Labor market participation among females has increased from 1940 to 1980 (Wilson, 1987). Historically, a higher proportion of black females (except for those ages 16 to 24) have been employed as compared to white females (Wilson, 1987). The types of jobs available to inner-city female residents are less likely to provide sufficient income to cover their cost of living. King (1998), using a nationally representative census dataset, analyzed the occupation categories of men and women in the 1960s, 1970s, and 1980s and finds that for the majority of employment positions available for African Americans, their pay is low given the education required. Furthermore, King (1998) finds that black women are under-employed in industrial jobs more so than are similarly situated black men. Similar to King (1998), Treiman and Hartmann (1981) find that the jobs where women are most represented offer wages lower than expected given the skills required. Young black

women, particularly those living in the inner-city, are at a further disadvantage because most entry level jobs are located in the suburbs.

The proportion of poor black female headed-families has increased steadily since the 1960s, holding slightly above 70 percent (Wilson, 1987). Several factors associated with this high proportion of black female-headed families include increases in the population of females within child-bearing age and decreases in the number of economically secure, “marriageable” men (Wilson, 1987). Females experiencing parenthood during adolescence disrupt education and employment opportunities that help establish a secure economic future. Research suggests that education plays a crucial role in the wage earnings of black females compared to their white counterparts and therefore, may impact the salience of employment on subsequent behavior. King (1988) finds that black females with a college degree or higher earn more than similarly situated white females. Additionally, Manning and Smock (1995) find a positive relationship between black women’s education and marriage.

Interviews conducted with female offenders provide further insight about factors relevant to the desistance process. Sommers and colleagues (1994) find that women with a history of at least one serious violent street arrest prior to their interview, who established and maintained conventional relationships, are more likely to discontinue criminal involvement. The researchers suggest that there is a cognitive component to discontinuing their criminal behavior. When deciding whether or not to leave a criminal lifestyle, the women report that they turned to established relationships with conventional others or they developed new relationships. Sommers

and colleagues (1994) indicate that the patterns of cessation among women appear similar to those of men.

In contrast to Sommers and colleagues (1994) who find few differences in the factors leading to desistance among men and women, other researchers find that conclusions are much less definitive. Using cross-sectional data, Yamaguchi and Kandel (1985) find an inverse relationship between marriage and marijuana use among men and women. The researchers attribute this finding to both role selection (i.e., marijuana use leads to a delay in marriage) and role socialization (i.e., family roles influence marijuana use). The effects of role socialization among male subjects occur prior to marriage whereas among female subjects role socialization occurs prior to and after marriage.

In a more rigorous study, which surveyed a sample of serious offenders initially identified and surveyed in detention facilities, Giordano, Cernkovich, and Rudolph (2002) explore the salience of certain social bonding factors among a contemporary sample of men and women. The researchers analyzed differences in desistance among girls and boys identified as serious offenders. The first survey was administered in 1982 and was followed until 1995, with 85 percent of the initial sample (Giordano et al., 2002). The results do not support the conclusion of an inverse relationship between marriage or employment and crime. While the direction of the effect is similar to that predicted by Sampson and Laub (1993) in tests of their age-graded theory of informal social control, the results do not reach significance. However, in additional analyses which assessed the joint effect of marriage and stable employment on crime desistance compared to individuals who possessed partial or no

aspects of this relationship, some support is found for Sampson and Laub's (1993) research findings. Individuals who are married and employed are more likely to desist from crime; however, this effect is incremental and left a large portion of adult offending unexplained (Giordano et al., 2002). Giordano and colleagues (2002) supplement their quantitative findings with narratives conducted with a portion of their subjects. The qualitative analysis of the life history narratives provides additional insight on the "hooks for change" not uncovered in the quantitative outcomes (Giordano et al., 2002: 1033). For instance, experiences with formal organization settings (prison or treatment and religion) and relationships with intimate networks (children and marital/romantic partner) are found to be mechanisms of change among subjects. These "hooks for change" differ in importance across gender. Specifically, women are more likely to emphasize the importance of religion and children as catalysts of change compared to men. While men, more so than women, indicate that prison, treatment, or family (more generally) greatly motivate behavioral change. Giordano and colleagues (2002) recognize the importance of social controls in explaining behavior change but also contend that cognitive shifts and the transformation of one's self-concept is key to understanding sustained behavioral change.

In an attempt to synthesize findings from 12 longitudinal studies examining the association between life transitions and alcohol consumption, Temple, Fillmore, Hartka, Johnstone, Leino, and Motoyoshi (1991) find that while marriage appears to decrease consumption across gender and age categories, employment appears to positively increase consumption. While not significant, the researchers uncover a

positive association between employment and alcohol consumption. This positive relationship is not consistent across gender and age categories; negative results are uncovered for young females only. Lack of information on the timing of events and the use of only two time periods confound the researchers' ability to model change (Temple et al., 1991). However, variability in the nature of the relationship between social bonding factors suggests that further research is warranted to clarify the generalizability of social bonding factors in explaining desistance among women and men.

Research suggests that the patterning of offending among men and women share both similarities and differences, with substance use offenses being prevalent among both sexes (Steffensmeier and Allan, 1996). While research has found declines in offending with age, attachments to conventional others appear to play a role in crime desistance. Opportunities to establish these relationships may vary depending on the characteristics of the sample population (e.g., their race, gender, and social location). Research suggests that certain life events, such as marriage, may be less viable as an agent of change than they were in the past (Goldscheider and Waite, 1986). Among residents of inner-cities, the pool of eligible marriage partners is decreasing along with the resources to establish and secure stable relationships (Pinderhughes, 2002; Bennett, Bloom, and Craig, 1989; Goldscheider and Waite, 1986). African American men who are not stably employed are less likely to be married compared to those with stable employment (Pinderhughes, 2002; Cooney and Hogan, 1991). Changes in women's roles in society, especially their increased labor

participation and their singular role as the head of the household, have placed multiple contingencies on their ability to sufficiently provide for their families.

The opportunities to acquire a stable job or marriage may be particularly limited among urban residents who are confronted with structural barriers and cultural adaptations that further isolate them from conventional networks (Sampson and Wilson, 1995). With limited research examining sub-group differences in patterns of desistance, conclusions remain tentative as to the extent to which criminological theories can generalize propositions of their theories to minority men and women (Laub and Sampson, 2001). Questions regarding the role of history, gender, and race in understanding the acquisition, importance, and influence of adult roles remain, partially as a result of limitations in research. Researchers have been unable to agree on how to appropriately measure desistance or how to explain the desistance process (Bushway, Thornberry, and Krohn, 2003). Most of the research has not adequately controlled for individual heterogeneity or prior criminal behavior in examining the link between adult role transitions and substance use. In their follow-up analysis of high school students in young adulthood, Kandel and Yamaguchi (1987) find that when individual and job characteristics are controlled, young adult marijuana, alcohol, and illicit drug users have higher rates of job turnover (see also, Kandel, Kessler, and Yamaguchi, 1986). The authors contend that most of the effects may be the result of pre-existing differences in individuals, which make them more susceptible to employment instability (Kandel and Yamaguchi, 1987). Similarly, research finds that unstable marriages may be the result of individual characteristics (e.g., low self-control). Yamaguchi and Kandel (1993) find that there

is assortative mating among drug users once controls for individual heterogeneity are incorporated into the analytic models. Drug users are likely to select spouses who similarly use drugs. This may create a contaminating marriage environment that may lead to increases in marital instability and separation or divorce. It is important to note however, that despite an initial selection effect, socialization may be a viable explanation of marital homophily (Yamaguchi and Kandel, 1993).

Other methodological constraints which have led to inconsistencies in the conclusions about the relationship between social bonds and crime desistance include inadequate measures of the timing of life events, an inability to assess the quality of the bonds established in employment and marriage, and the use of a sample population that has not met some threshold of serious offending. Additionally, small sample sizes result in a lack of power adequate to detect significant effects.

Heterogeneity or individual differences among research subjects that are unaccounted for may lead to incorrect conclusions about the relationship between life events and crime. Giordano and colleagues (2002) find that subjective measures of marriage and employment are not uniquely strong predictors of desistance within the context of their contemporary sample of serious adolescent female and male offenders. These results contrast those of Sampson and Laub (1993) who find strong support for the influence of social bonds on crime desistance. The greater racial heterogeneity of the sample used by Giordano and colleagues (2002) and differences in their life experiences were discussed as possible explanations for the disparity in findings.

The current study seeks to provide additional insight into the relationship between social bonds and drug use in adulthood. Using Sampson and Laub's (1993)

age-graded theory to guide the analyses the following research questions are answered:

- 1) Using traditional ordinary-least squares regression, do social bonds (i.e., job stability, occupation-related commitment, and marital stability) influence drug use controlling for age, welfare status, gender, and individual differences in the propensity to use drugs for an African-American sample in adulthood?
- 2) Once unobserved heterogeneity is controlled using Anderson and Hsiao's First-Differencing technique, is there a relationship between the change in social bonds and the change in drug use in adulthood for an African-American sample?

In addition to the two main research questions, two additional sub-analyses are conducted in this study to examine whether the relationship between social bonds and drug use frequency is moderated by gender and whether the relationship differs by drug type.

Chapter 3: Methods

Criminologists have yet to identify an agreed upon set of variables to explain changes in problem behavior over time; more specifically, the mechanisms that lead people into or away from crime as they age. Despite several criminological theories that have been developed to help guide the field's understanding of behavior change over the life course, questions remain as to whether the tenets of these theories impact all individuals similarly. For instance, tests of theories often use all white, male samples and claim that the results are generalizable to samples containing females and subjects belonging to different race groups (Gottfredson and Hirschi, 1990; Sampson and Laub, 1993). A goal of this research is to more clearly understand the influence that dynamic factors, such as employment and marriage, have on drug use frequency in adulthood. This chapter begins with a brief discussion of the criteria used to select a dataset appropriate for this research. The chapter describes the dataset analyzed in the current research and concludes with a discussion of the analytic strategy that is used to answer the research questions of interest.

Several criteria need to be met prior to choosing a particular dataset for this research. First, it is important to use data collected longitudinally since such data provides the researcher an opportunity to examine change in behavior over time. Second, the dataset needs to include measures of social bonds (i.e., dynamic factors) similar to those used in prior research, specifically Sampson and Laub's (1993) research. These dynamic variables should be measured at more than one data wave. Third, a goal of this research is to explore whether social bonds explain changes in

drug use among a more heterogeneous sample population. Therefore, the sample used in the current research includes black males and females. Since the opportunities to develop relationships in employment or marriage may vary over time, the fourth criterion is that the sample population experience adult role transitions during an historical period different from subjects analyzed in other life course studies. A criticism of Sampson and Laub's research is that the opportunities and experiences available to white men born in the late 1920s and early 1930s differ from the opportunities available to more contemporary and heterogeneous sample populations. Most research examining the longitudinal association between social bonds and anti-social behavior has not examined how such bonds influence drug use. Nielsen and colleagues (1999) as well as others (Sampson and Laub, 1993) have analyzed the relationship between social bonding measures and alcohol use; however, research on the link between multiple types of illicit drugs is limited.

The dataset which met the specified criteria outlined above was collected to assess the quality of health and the health needs of urban youth (Brunswick, 2002). The original study was designed to sample a cross-section of an inner-city community, Harlem, at one point in time but subsequently grew to a 26-year longitudinal study of developmental change starting in adolescence and continuing through to adulthood. The dataset includes measures of social bonds, drug use, and several covariates (including a lagged measure of drug use) to control for pre-existing differences in the propensity to use drugs. The data chosen for this research also extends previous life course research by analyzing variation in drug use over time among a sample of African American males and females. Life events are shaped by

the opportunities, social structure, and historical forces that surround individuals (Elder, 1998). The social context in which the original study was undertaken, the sample being adolescents of the post-war baby boom and growing up during the civil rights and feminist movements, provides a unique opportunity to test the importance of adult social bonds in explaining changes in drug use frequency. Rather than using a longitudinal dataset familiar to criminologists, the proposed research has the unique opportunity to use data virtually unexplored by the field.

Harlem Longitudinal Study of Urban Black Youth

Ann Brunswick's 26-year longitudinal study provides an opportunity to examine the changes in drug use over time with a sample of urban black youth (Brunswick, Messeri, and Titus, 1992; Brunswick and Messeri, 1986, 1999; Brunswick, 1980). The study participants were born in the 1950s and data were collected prospectively beginning during adolescence. Despite caution by many in the inner-city and university community, Dr. Brunswick successfully surveyed subjects about their health status and health needs from the late 1960s through the early 1990s (Brunswick, 2002).

The current research uses the first, second, and third data waves from this longitudinal assessment. The first wave of data includes 668 adolescents who were originally surveyed in the late 1960s. Subjects at wave one range in age from 12 to 17 years, with an average age of 14 years. Fifty-two percent of the sample is male and 48% is female. The second wave of data collection extends over two years, 1975 and 1976 when most of the panel members are 18 through 23 years old. On average,

subjects are 21 years of age at wave two. Ninety-four percent of the initial sample was located for wave two (Brunswick, Merzel, and Messerj 1985). The second wave of data includes 536 interviews which accounts for 80% of the initial sample and 89% of the subjects who remained residing in New York City at the second interview (Brunswick, 1980).¹ The wave two sample includes 277 (52%) black males and 259 (48%) black females. The third data wave is conducted in 1983 and 1984 (eight to nine years after wave two), when the majority of subjects are between the ages of 25 and 31 years. Data collection for wave three occurred 15 years after wave one. A total of 426 interviews are available for analysis at wave three, this includes 15 subjects who were surveyed at wave three and not at wave two. Eighty-six percent of the surviving wave two New York City sample and 72% of the surviving wave one sample is retained at wave three (Brunswick and Messeri, 1999). The sample consists of 210 (48%) black males and 216 (52%) black females. The analysis of drug use frequency at wave three is conducted on 411 subjects who were 28 years old, on average at wave three.² The 411 subjects surveyed at wave three represent 83% of the surviving wave two sample and 68% of the initial sample.

At all study times, data were collected through individual interviews conducted in respondents' homes by ethnic- and gender-matched interviewers following a structured interview schedule with mainly closed-ended questions (see Brunswick, 2002 for more details). A weighting factor was created at each data wave

¹ Due to economic reasons and wanting to ensure sample homogeneity, follow-up interviews were conducted only with subjects who resided in the metropolitan New York City area (Brunswick et al., 1985).

² The decision was made to include only 411 subjects at wave three because 15 subjects would be automatically dropped from the wave three regression analyses of drug use frequency because they did not complete the survey at wave two.

because of the over sampling of younger children at wave one.³ More specifically, younger children (i.e., ages 12 – 15) were sampled in all years of testing for wave one (1966 – 1970) while older children (i.e., ages 16 – 18) were sampled in years 1969 and 1970. In order to balance the sample, weighting factors will be applied based on the age group and gender of the respondents.⁴

Demographic Measures

Criminological research has uncovered several empirical regularities in offending (Nagin and Paternoster, 1991).⁵ Individuals' gender, age, and socio-economic status (SES) have been shown to be strongly correlated with offending. These covariates are included in the analyses to capture some of the pre-existing differences in the propensity to use drugs. While a relationship between race and crime has been uncovered, the strength of the relationship and its underlying mechanisms remain in question (Elliott, 1994; Piquero et al., 2002). In this research, race is a constant and therefore, the results will provide insight into the salience of social bonding variables for a sample of African Americans.

³ The formula to calculate the weighting factor is as follows: $Y_i = (X_1 + X_2)/(X_1 + 2X_2)$ where X_1 is the number of subjects in the younger group, X_2 is the number of subjects in the older group, and Y_i is the calculation of the weighting factor. When X_1 is defined as younger females, X_2 is defined as older females and when X_1 is defined as younger males, X_2 is defined as older males.

⁴ Weighted regression models will be run using the following weighting factors of drug use at wave two: .82 (younger females), .88 (younger males), .165 (older females), and 1.78 (older males). The weighted analysis of drug use at wave three will include the following weighting factors: .84 (younger females), .90 (younger males), 1.67 (older females), and 1.80 (older males). The coefficients from the unweighted and weighted regression outcomes will be compared and, if there is no significant difference in the coefficients, the unweighted regression outcomes will be reported.

⁵ The operationalization and coding for variables used in this study are displayed in Appendix A. Appendix B displays the bivariate correlations between the measures to be analyzed in this research and the dependent variables. Descriptive information for the demographic, social bonding and drug use variables is reported in Tables 1 through 4.

One of the most consistent findings in criminology is that males generally commit more crime than females (Nagin and Paternoster, 1991; Heimer, 2000). Criminological research has traditionally focused on males to the virtual exclusion of females. Therefore, in this research, gender will be included as a control variable and, in a portion of the analyses, a test will be conducted to assess whether gender moderates the relationship between the key social bonding variables of interest and drug use. Age is also included as a control variable in the analysis.

Research reveals an inverse relationship between income and crime. Individuals with poor economic prospects are more likely to be involved in crime (Piehl, 1998). The indicator of socio-economic status used across all three waves is whether the respondent receives welfare.⁶ Welfare is measured as a dichotomous variable at wave one where a value of one (1) is given if the respondent's parent indicated that the family receives welfare and a zero (0) is given if the respondent's parent reported that the family does not receive welfare.⁷ At waves two and three, respondents were asked to report from where they get their money and financial support. Welfare is provided as one response category. At wave one, 46% of the respondent's families indicate that they receive welfare and 54% report that they do

⁶ Originally, annual income was to be included in the analysis. Family/Household income is measured as an ordinal-level scale variable across each of the three waves of data. However, at wave one and wave two 17% and 42% of cases, respectively are missing data on this variable. With the large amount of missing data, the variable, welfare status, is included in the regression models as an indicator of socio-economic status. Income and welfare are significantly and negatively correlated at each data wave without being redundant (wave one, $r = -.366$, $p < .01$; wave two, $r = -.320$, $p < .01$; wave three, $r = -.580$, $p < .01$). Welfare, which is a dichotomous variable, has less than 2% missing data at each data wave.

⁷ At wave one, welfare assistance is a nominal-level variable with three response categories which include: Do not receive, Aid to Dependent Children (ADC), and Other. The variable is recoded such that respondents who report that they receive ADC or Other are scored as receiving welfare (i.e., given a value of one).

not receive welfare assistance. At wave two, 22% of the respondents indicate that they receive welfare while 78% respond that they do not. At wave three, 32% of respondents receive welfare and 68% do not receive welfare.

Research has uncovered a strong correlation between past behavior and the continuity of similar behavior in the future (Nagin and Paternoster, 1991; 2000). To control for observed individual differences in the propensity to engage in drug use, the following inter-related behavioral measures are included in the analysis: use of alcohol and use of cigarettes ($r = .303, p < .00$). While only two behavioral measures of drug use are available at wave one, they provide the best attempt at controlling for individual heterogeneity. Furthermore, it is an empirical question whether these measures adequately account for individual differences in the propensity to use drugs later in life.

The mechanisms related to cigarette and alcohol use in adolescence may be the same mechanisms responsible for continued use or the escalation of more serious drug use in adulthood. Respondents were asked at the first data wave to report the average number of alcohol drinks consumed per day and the average number of cigarettes smoked per day. The initial frequencies of these variables reveal that the data are highly positively skewed. The average number of alcohol drinks consumed and cigarettes smoked per day are recoded such that a value of one indicates the use of the substance and a value of zero indicates that the respondent does not use the substance. A summated scale for the two dichotomous drug measures at wave one is created and is included in the analysis. Sixty-eight percent of respondents at wave

one indicate that they never use alcohol or cigarettes, 23% report using either alcohol or cigarettes, and 9% report the use of both alcohol and cigarettes (N = 659).

Social Bonding Measures

Three general categories represent the key social bonding variables included in the analysis: job stability, commitment, and marital stability. The key variables are measured at waves two and three.⁸ At waves two and three, several measures underlie each of the three key social bonding categories. While the variables appear (on face value) to measure a dimension of the constructs of interest, certain variables are more strongly related to the outcome than others. Therefore, the variables included in the analysis are selected based on theory and prior research. Since each measure is analyzed individually (rather than as a scale), the analysis is exploratory so as to identify which variables best explain changes in drug use frequency over time.

Job Stability

Four measures are subsumed in the job stability category: 1) Employment status, 2) Short-term employment, 3) Long-term employment, and 4) Job satisfaction. In this research, there are two measures of job stability that are analyzed in relation to drug use frequency: long-term employment and short-term employment.⁹ The first

⁸ Measures of social bonds at wave one will be included in the analysis as control variables. The social bonding measures available at wave one include one measure of employment (i.e., whether the respondent is employed or not) and one measure of commitment to education-related goals (i.e., respondent's education aspirations). Education aspirations is correlated significantly with drug use at wave two ($r = -.09$, $p < .05$), the dependent variable of interest for wave one variables.

⁹ There are two reasons for including short-term employment in a portion of the analyses as compared to employment status. First, short-term employment and employment status are not conceptually distinct. Second, more information about a subject's current employment status is obtained from short-term employment because it is a continuous measure of the total number of months employed rather than a binary measure of whether or not the subject is employed. Note that there is a significant

measure is long-term employment. Long-term employment will be included in a portion of the analyses because it provides the richest information on job stability and it is the measure most similar to Sampson and Laub's theory (1993), which emphasizes the quality of social bonds rather than their mere presence. The variable, long-term employment, measures the average number of months worked per year from 1971 through 1974 for subjects interviewed in 1975 at wave two and from 1971 through 1975 for subjects interviewed in 1976 at wave two. The average number of months worked per year between wave one and wave two among respondents in the sample is approximately 4 months. At wave three, long-term employment is created by summing the number of months of part-time work and the number of months of full-time work for years 1976 through 1982 for respondents interviewed in 1983 and for years 1976 through 1983 for respondents interviewed in 1984.¹⁰ After summing the number of months worked, the average number of months employed is calculated for each respondent based on their interview date. The average number of months worked per year among respondents between waves two and three is approximately 7 months. Subjects who did not work at all in adulthood were given a score of zero (0).

The second job stability measure is short-term employment, which represents the number of months employed at one's current job. This variable is created by

relationship between short-term employment and employment status at waves two and three ($r = .67$, $p < .01$ and $r = .64$, $p < .01$, respectively). While the correlation is relatively high, Bachman and Paternoster (1997) suggest that collinearity may create problems when the inter-relationship between items reaches .70. Berry and Feldman (1985) also argue that an inter-item correlation of .80 may signal collinearity problems. There is also a significant and positive correlation between long-term and short term employment however, the two measures do not appear to be redundant ($r = .53$, $p < .01$ at wave two; $r = .56$, $p < .01$ at wave three).

¹⁰ The original data was coded such that the sum of full-time and part-time employment equals twelve months. For instance, if a respondent worked nine months at a full-time job in 1974 and five months at a part-time job in 1974, the number of months entered for part-time employment in 1974 would equal three months rather than five months.

subtracting the month and year of current employment from the month and year the subject was interviewed, among subjects currently working. If subjects are not currently working a value of zero is given for the short-term employment measure. At wave two, the total number of months of most recent employment for the total sample is 7 months and 24 months at wave three.

Commitment

At waves two and three there are multiple measures of commitment to conventional institutions with some of the measures tapping occupation-related commitment and others relating to education-related commitment.¹¹ At wave two, long-term schooling is the only measure of commitment that is significantly related to the composite measure of drug use frequency in early adulthood ($r = -.177, p < .01$). Similarly, at wave three, long-term schooling is the only measure of commitment that is negatively and significantly related to the composite measure of drug use frequency in later adulthood ($r = -.139, p < .01$). Therefore, long-term schooling is the only variable in the commitment category that is included in the regression analyses.

Long-term schooling measures the average number of months in school per year. At wave two, this variable is calculated by summing the number of months in school for years 1971 – 1974 among respondents interviewed in 1975 and in years 1971 – 1975 among respondents interviewed in 1976 and then dividing by the appropriate number of years. The average number of months in school per year between waves one and two reported by respondents in early adulthood is

¹¹ The variables subsumed under the commitment to occupation-related goals category at wave two include education aspirations, long-term schooling, and occupation aspirations and at wave three include the number of training jobs completed and long-term schooling.

approximately 6 months. Similar to the construction of long-term schooling at wave two, the average number of months in school per year at wave three is calculated for years 1976 – 1982 for respondents interviewed in 1983 and in years 1976 – 1983 for respondents interviewed in 1984. The average number of months in school per year between waves two and three reported by respondents at wave three is 1.6 months.

Marriage Stability

Research suggests that entrance into a stable, quality marriage is positively associated with conventional behavior and has a cumulative advantageous influence on future behavior (Sampson and Laub, 1993). Two marriage variables are available at waves two and three: 1) Marital status and 2) The percent of time married. The percent of time married variable is the variable of key theoretical interest. The percent of time married variable is significantly related to the dependent variable at wave two ($r = -.092$, $p < .05$) and, although not significantly correlated with the dependent variable at wave three, it is in the predicted direction ($r = -.072$, $p = .15$). The percent of time married variable may provide more information about the quality of the marital relationship as compared to a binary measure of current marital status.¹² Both variables will be included in the analysis to assess whether the conclusions obtained differ across measures.

The variable, percent of time married, is created using the date (month and year) of the respondent's wave two and wave three interview as well as the month and year that the marriage began and the month and year that the marriage ended.

¹² The marital stability measures at wave two have a bivariate correlation of .76 ($p < .01$) and at wave three have a correlation of .79 ($p < .01$). Since the bivariate correlations are high, it is likely that the marital stability measures are not theoretically distinct.

The total number of months married between waves is divided by the total number of months between waves and then multiplied by 100. This variable is a retrospective account of the percent of time married because information is obtained only at wave three. The average percent of time married is calculated for respondents who are currently married or who were married in the past. Subjects who are not married were given a score of zero on the percent of time married variable. The average percent of time married between waves one and two is approximately 3%.¹³ The average percent of time married between waves two and three reported by respondents at wave three is approximately 17%.¹⁴

Drug Use Measures

The dependent variable of interest in this research is self-reported past year drug use frequency.¹⁵ The use of self-report drug frequency measures provides the “nearest data source” to observations of actual behavior by overcoming limitations of official measures such as under-reporting and bias in the responding practices of criminal justice agencies (Thornberry and Krohn, 2000: 34). Drug use frequency is measured at waves two and three. Frequency of use in adulthood is analyzed using a

¹³ Due to the skewed distribution of the percent of time married variable, its values are transformed by taking the inverse and multiplying by -1. Based on this transformation, the average percent of time married is -0.92 on a scale ranging from -1.00 to -.01 (n = 515).

¹⁴ Four respondents' date of first marriage was during wave one of the study (1 respondent was married in 1969 and 3 respondents were married in 1970). In order to include the data from these four subjects, the year that their marriage began is recoded to 1971 (i.e., the first year post-wave one) and the month of their marriage is recoded to 1 (i.e., January). To ensure comparability across waves, the inverse of the percent of time married variable at wave three is calculated similar to wave two. Based on this transformation, the average percent of time married in later adulthood is -.71 on a scale ranging from -1.00 to -.01 (n = 401). While all analyses are run with the transformed percent of time married variables, for ease of interpretation, the results will refer to the variable by its original variable name (i.e., the percent of time married).

¹⁵ This variable is only asked to respondents who report that they used a particular drug in their lifetime. Subjects who respond that they never used a particular drug are given a value of zero for their drug frequency.

composite measure of drug use frequency as well as by performing drug-specific analyses. The composite measure of past year drug use frequency includes information from alcohol, marijuana, cocaine, heroin, and upper use. Drug-specific analyses are conducted using alcohol, marijuana, and cocaine frequency. All drug frequency variables are measured on a seven-point scale however, the response categories for alcohol frequency differ slightly from the other four variables. The response categories for the variable, frequency of alcohol use, include: 1) No use or No current drug use, 2) Every few months/Few times a year, 3) Once per month, 4) Few times per month, 5) Once or twice a week, 6) Every few days, and 7) Everyday. The other four drug frequency variables are measured with the following response categories: 1) No use or No current drug use, 2) Only tried once or twice, 3) Few times a year, 4) Once a month, 5) Few times per month, 6) Few times per week, and 7) Everyday.

Since the frequency variable is a measure of lifetime frequency, it is necessary to indicate a reference period of drug use (e.g., frequency of current versus non-current/no use). Using a similar strategy employed by Brunswick and colleagues (1985), current use is defined by the subject's last reported use of particular drug. If subjects report the use of drugs within the past year (i.e., 365 days or less), their frequency of use is recorded. If subjects report that they did not use drugs within the past year (e.g., use more than 365 days in the past or no use), they are defined as non-current users and a zero is entered. Since the drug variables are not measured using the same response categories, the variables are transformed to z-scores to make comparisons across variables easier. The transformation to z-scores changes data

values to standard deviation units and indicates the position of each individual's score within the distribution of values for the variable. The composite measure of drug use frequency will be created by taking the maximum z-score across the five drug variables.

Table 4 reports descriptive information for the five drug measures as well as the composite drug frequency measure. At wave two and wave three, alcohol and marijuana frequency are most prevalent among respondents. Cocaine frequency is reported more frequently at wave three (in later adulthood) compared to wave two; however, the frequency of cocaine as well as heroin and uppers is relatively low compared to alcohol and marijuana.¹⁶

Validity and Reliability of Measures

Drug Use

The literature suggests that there is variability in the validity of self-reported drug use. This variability may be the result of reporting errors by study participants, problems in the construction of drug use variables, or difficulties in survey administration (Hser, 1997). Researchers acknowledge potential pitfalls in self-reports of drug use however, there is consensus among researchers that most reports of drug use are valid and reliable (Ball, 1967; Single, Kandel, and Johnson, 1975).

While steps were taken in the *Harlem Longitudinal Survey of Urban Black Youth* to reduce invalid self-reporting of drug use behavior (e.g., the use of interviewers whose

¹⁶ The distribution of heroin and upper frequency is highly skewed in the positive direction. These variables are transformed by taking their inverse and multiplying by -1 and values are then transformed to z-scores. Table 4 reports the mean and standard deviation for the inverted heroin and upper frequency measures.

race and gender matched the interviewees, reassurance that the responses provided would be kept confidential), questions remain about the complete accuracy of the subjects' reports. In order to have confidence in the data used in this analysis a high degree of validity and reliability need to be demonstrated. While it would be optimal to cross-validate measures of drug use in this study with official, parent, or teacher reports, such alternative reports are not available in this dataset. To assess the validity of drug use, two strategies will be undertaken. First, a comparison of drug use reported in the sample under investigation will be compared to drug use reported in other studies.¹⁷ Second, since drug use has been shown to be associated with other socially disapproved behavior such as delinquency (Botvin, 1990), the composite drug use frequency measure and the known correlates of crime will be analyzed to show that they are associated in the predicted direction. The correlates will include age, gender, welfare status, and individual differences in the propensity to use drugs.

Brunswick and Messeri (1999) assessed the reliability of drug reports for respondents who participated in the first three waves of the *Harlem Longitudinal Survey of Urban Black Youth* (N = 411). These researchers analyzed the consistency of drug reports at waves two and three. Consistency across a variety of drug measures resulted in reliabilities that ranged from 89% for alcohol to 56% for heroin use (Brunswick and Messeri, 1999). Seventy-one percent of subjects who reported the onset of heroin prior to wave two recalled the age of first heroin use within one year (Brunswick and Messeri, 1999). For other substances used prior to wave two,

¹⁷ The comparisons made across different sample populations focus on the prevalence of drug use rather than the frequency of use. While the dependent variable used in the proposed analysis is drug use frequency, the issues raised regarding variation in the prevalence of drug use across different sample populations are likely to be similar when analyzing drug use frequency.

between 40% and 54% of subjects reported age of first use within one year (Brunswick and Messeri, 1999). In an earlier report, Brunswick and Messeri (1986) found reliabilities of drug use at wave two to be similar to those reported in other studies of self-reported drug use.

While there is a growing consensus that minority inner-city communities are wrought with drug use, household and school surveys traditionally used to compare drug use among black and white youth consistently show lower prevalence and incidence among the former population (Brunswick and Rier, 1995). For instance, data collected in 1991 as part of the National Household Survey of Drug Abuse reports that lifetime and past year drug use among white adolescents exceeds that of black adolescents (for virtually all drug categories analyzed). A similar pattern of findings is also found when these youth are surveyed in adulthood (ages 18 – 25; Brunswick and Rier, 1995). Comparing the drug use reports from data collected as part of the National Longitudinal Survey of Youth (NLSY), Monitoring the Future (MF) survey, and General Household Survey (GHS), Mensch and Kandel (1988) find more under-reporting of drug use in the NLSY than in the other two national surveys. Despite an attempt to include subjects not usually targeted by national surveys, subjects surveyed as part of NLSY under-report their use of illicit drugs (other than marijuana) as compared to subjects involved in MF and GHS. The researchers also reveal that once respondents acknowledged their substance use, frequency of drug use appears to be accurately reported (Mensch and Kandel, 1988). Data from the NLSY suggests that the most severe rates of under-reporting are among blacks and women.

It is difficult to assess the validity of drug use measures because there appears to be differences in reporting not only across race groups but also depending on the location targeted for survey administration. For instance, in contrast to the research presented by Mensch and Kandel (1988) and other studies that show lower prevalence of drug use among blacks as compared to whites, Brunswick and Rier (1995) contend that the blacks targeted for national household and school surveys are likely to have achieved a degree of economic security that masks the problem of drug use experienced by many blacks living in inner-city neighborhoods. Brunswick and colleagues (1985) find that the lifetime prevalence of marijuana use among black males and females at ages 26 – 31 is 88% and the prevalence of cocaine is 54%. For most licit and illicit substances, rates of prevalence are higher among African Americans as compared to white respondents surveyed for the National Survey on Drug Abuse. The sample population targeted by Brunswick and colleagues appears to report a higher lifetime prevalence of marijuana and cocaine use compared to the GHS (1982) and the NLSY (1984). Specifically, data from the GHS (1982) identifies lifetime prevalence of marijuana and cocaine as 64% and 28%, respectively for adults 18 – 25 years old (Mensch and Kandel, 1988). Data collected from the NLSY (1984) reports the prevalence of marijuana and cocaine use as 65% and 18%, respectively for adults ages 19 – 27 years old (Mensch and Kandel, 1988). It is important to note that the inner-city subjects surveyed by Brunswick and colleagues (1985) are 25 – 31 years of age while comparison subjects in the national and household surveys are younger (ranging from 18 to 27 years of age). However, the researchers note that while predominately white samples show a reduced prevalence and incidence of

certain illicit drugs with age, the black sample surveyed by Brunswick and colleagues does not mimic that trend. Brunswick and Rier (1995) contend that sample selection strategies and the heterogeneity of the black population may lead to unreliable and unrepresentative conclusions about drug use among African Americans. Specifically, familiarity with interview staff and a perceived threat of social sanction may be of more concern to minority as compared to majority respondents (Mensch and Kandel, 1988). Due to limited research and divergent findings regarding the consistency of reports of drug use among different ethnic populations (Brunswick and Rier, 1995; Mensch and Kandel, 1988), researchers continue to have reservations about their quality and validity. Since the current research focuses on drug use in the past year rather than lifetime prevalence, the outcomes obtained may provide further insight into drug use among an urban sample of African Americans. Given previous research conducted by Brunswick and colleagues, drug use outcomes among this sample may be slightly higher compared to outcomes reported among non-white sample populations and minority subjects surveyed as part of a national or school-based research initiative.

The validity of the dependent variable is analyzed by comparing the drug measures to the known correlates of crime (see Tables 5-8). The correlates of crime included in this analysis are: gender, age, welfare (as a measure of socio-economic status), and prior drug use. With regard to respondents' gender, males in contrast to females report a higher mean frequency of drug use at waves two and three ($t = 5.457$, $p < .01$ and $t = 3.028$, $p < .01$, respectively). Although not significantly related to drug use at either data wave, age is positively correlated with the composite measure

of drug use frequency among subjects age 18 – 23 ($r = .052$) whereas an inverse relationship is uncovered among subjects age 25 – 31 ($r = -.011$). Across a few of the drug measures (i.e., the composite measure of drug use frequency and alcohol frequency), the data reveal a slightly different age-drug use pattern than has been reported in prior research on the age-crime relationship, which suggests that crime peaks in late adolescence and declines thereafter. There are several possible explanations for this slight departure from the age-crime curve. The first relates to the sample population targeted for this research. Unlike survey research, which targets general household and school populations, the patterning of drug use among a homogeneous inner-city community may differ from conventional populations (Mensch and Kandel, 1988). The second explanation relates to the composite measure of drug frequency included in this study. Since the primary dependent variable measured at waves two and three is created by taking the maximum z-score across alcohol, marijuana, cocaine, heroin, and upper frequency the age-drug pattern obtained when analyzing each of these drugs separately may differ slightly. For instance, Chen and Kandel (1995) find that alcohol, cigarette, and marijuana initiation follow a pattern similar to the age-crime curve (i.e., use of these drugs rise in late adolescence subsiding in the early 30s). In contrast, the researchers uncover that cocaine peaks in the early 20s and subsides in the 30s, which departs slightly from the age-crime curve.

After examining the bivariate correlations of the five individual drug measures and age at waves two and three, the results differ from those uncovered by Chen and Kandel (1995). Age is found to be positively related to alcohol frequency at waves

two and three and this pattern is found for heroin and upper frequency as well. In contrast, age is inversely related to marijuana and cocaine frequency at both data waves. The measure of alcohol frequency does not query subjects about their frequency of heavy drinking and therefore may only get at normative drinking, which may be less apt to follow a pattern similar to the age-crime curve.

At wave two, respondents receiving welfare have a lower frequency of the composite measure of drug use frequency as compared to those who do not receive welfare however, the difference is not significant ($t = -1.312, p = .19$). In comparison, at wave three, respondents receiving welfare have a higher mean frequency of drug use than respondents who report that they do not receive welfare ($t = 2.878, p < .01$).¹⁸ Prior drug use, measured as drug use propensity at wave one, is positively related to the composite measure of drug use frequency at wave two ($r = .162, p < .01$). Drug use frequency at wave two is analyzed in relation to its association with the composite measure of drug use frequency at wave three. The bivariate correlation between wave two and wave three drug use frequency is also significant ($r = .421, p < .01$).¹⁹

The two covariates that are most strongly and consistently related to past year drug use frequency at waves two and three are gender and prior drug use. While the composite measure of drug use frequency appears to decline with age, the

¹⁸ The mean differences in alcohol frequency for those receiving and not receiving welfare is not significant different at waves two or three. The mean difference in marijuana and cocaine frequency among those receiving and not receiving welfare is significant different at wave three but not at wave two (see Tables 6 - 8).

¹⁹ The bivariate correlations between past and current alcohol, marijuana, and cocaine frequency reveal significant positive relationships. However, drug use propensity in adolescence is not significantly correlated with alcohol frequency in early adulthood (see Table 6).

relationship is not significant. Similar to other studies of drug use the decline in drug use among subjects in this sample occurs later in adulthood (see Arnett, 1998). However, this pattern contrasts the sharp decline in reports of official crime that occurs in late adolescence (Gottfredson and Hirschi, 1990). Unlike socio-economic status measured during early adulthood, welfare is significantly and positively related to past year drug use frequency measured in later adulthood. The relationships analyzed in Tables 5 - 8 suggest that the dependent variables generally conform to the known correlates of crime uncovered in prior criminological research, although several relationships are not significant.

Attrition

Attrition will be discussed with regard to two aspects: 1) dropout from the study, and 2) missing data within the survey items. With regard to dropout from the study, 668 subjects were initially surveyed. By wave two, 89% of the surviving New York City sample completed surveys. Eighty-three percent of the surviving wave two sample completed surveys at wave three. Bivariate and multivariate statistics are analyzed with covariates at wave one used to explain survey completion at wave two and with covariates at wave two used to explain survey completion at wave three. Survey completion is a binary variable where subjects are given a score of one (1) if they complete the survey and subjects are given a score of zero (0) if they do not complete the survey. Tables 9 and 10 display the bivariate correlations uncovered for

survey completion at waves two and three, respectively.²⁰ Based on bivariate correlations, five wave one variables are significantly related to survey completion at wave two. These five variables include age ($r = -.112, p < .01$), grade level in school ($r = -.081, p < .05$), mother's education ($r = -.080, p < .05$), upset by personal problems ($r = -.112, p < .01$), and number of self-reported health problems ($r = .082, p < .05$). More specifically, younger subjects, subjects in a younger grade level, subjects whose mother obtained a lower level of education, subjects less upset by personal problems, and subjects with more self-reported health problems are more likely to complete the survey at wave two. After running a logistic regression model only 3 wave one covariates significantly explain survey completion at wave two. The three variables include age, upset by personal problems, and the number of self-reported health problems. Three covariates measured at wave two are significantly correlated with survey completion at wave three: gender ($r = -.086, p < .05$), often worried about the future ($r = .121, p < .01$), and involvement in a serious accident ($r = -.102, p < .05$). Specifically, females, subjects often worried about the future, and subjects not involved in a serious accident are more likely to complete the survey at wave three. After multivariate statistics were run, the only variable significantly related to survey completion at wave three is the variable, involvement in a serious accident. Due to the positive skew for this variable, values were dichotomized to indicate whether or not the subject was ever involved in a serious accident.

²⁰ Since this is an exploratory analysis of attrition a large number of variables are analyzed in relation to survey completion and reported in the data tables. For this cursory analysis, it is unnecessary to limit the analysis to variables that could be linked theoretically with survey completion.

The results from this cursory attrition analysis identify several variables that are significantly related to survey completion. All 3 of the 5 wave one correlates of survey completion are not significantly related to the dependent variables of interest. Involvement in a serious accident is the only wave two correlate of survey completion and it is not significantly related to the drug frequency variables measured at wave three. If the missing subjects are not missing (completely) at random, the results may be biased. Given that in this dataset there is at least one covariate at wave one and wave two that is related to survey completion and not the dependent variable, it is possible to investigate whether sample selection impacts the estimation of the parameters of interest. The examination of sample selection bias is further explored in the next chapter using Heckman's two-stage estimation procedure. Literature has reported several concerns with using this procedure. For instance, the selection model in Heckman's two-step procedure must include some covariates that are not included in the substantive model of interest. The reason for this is to reduce the threat of multicollinearity. However, often times it is difficult to justify the inclusion of such estimators in the selection model and not in the substantive model (Allison, 2002). Despite limitations, Heckman's procedure is recognized as a viable tool to control for sample selection bias and is used in this research.

Item non-response is also a concern that may impact the researcher's analysis especially since a common method to use for addressing non-response is listwise deletion. No more than 5% of the items have missing data on any of the variables to be included in the analysis (see Tables 1 - 3). If there is a systematic pattern to the

item non-response, common “fixes” such as listwise deletion may impact the validity of the obtained results.

Analytic Strategy

Of particular interest in this research is whether social bonding variables explain changes in drug use over time among a contemporary sample of African American males and females. A number of statistical techniques have been developed to effectively model change in criminal behavior over time. The level of sophistication in the construction of these models varies widely. An important aspect of modeling change in longitudinal analyses is taking steps to control for time-stable omitted variables that are correlated with included time-variant factors (Brame, Bushway, and Paternoster, 1999). Despite consensus about the importance of controlling for omitted variable bias, questions remain as to whether models incorporating covariates and an observed proxy measure of individual heterogeneity sufficiently account for such bias in contrast to more advanced statistical modeling procedures.

The analytic strategy proposed for this research is two-fold. First, traditional OLS regression is used to analyze the relationship between social bonds and drug use. The regression models include several covariates and a lagged measure of the dependent variable to control for observed individual differences in social bonds and drug use propensity. The lagged measure of the dependent variable also partially controls for the adjustment of behavior over time. This modeling strategy provides a baseline assessment of the association between dynamic, time-variant factors and

drug use frequency during adulthood prior to controlling for unobserved individual heterogeneity. Second, Anderson and Hsiao's (1981) first-differences equation is used to assess the extent to which unobserved time-stable propensity measures not controlled for in the OLS regression analysis change the interpretation of the parameter estimates of interest.²¹

OLS Regression Analysis

The first stage of the analysis uses “traditional” regression to analyze the relationship between social bonds and drug use in adulthood.²² The basic model to assess behavioral change over time is:

$$Y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it} \text{ with } i = 1, \dots, N; t = 1, \dots, 3$$

where α_i is the intercept of the model; x_{it} contains the social bonding, demographic, and lagged y regressors for individual i at time t; vector β contains the regression coefficients to be estimated by assumption $E(\varepsilon_{it}) = 0$ and $\text{Var}(\varepsilon_{it}) = \sigma_\varepsilon$. The inclusion of lagged y (along with other theoretically relevant covariates) at wave one as a regressor in the model provides the best opportunity (with the data available) to control for individual differences in establishing bonds to conventional society and in the propensity to use drugs. The type of regression model chosen for the analysis will depend on the extent to which the characteristics of the data meet assumptions of the model. For instance, traditional regression methods assume that all outcomes are

²¹ There are more complicated techniques to control for unobserved heterogeneity, especially when multiple waves of data are available. The data used for this research includes key variables measured at only two data waves and therefore, the first-differences equation provides a straight-forward approach to control for unobserved individual effects that remain stable over time.

²² Regression models will also be analyzed controlling for sample selection, correcting for heteroskedasticity, and applying weighting factors.

independent however, when using longitudinal data the error terms may be correlated across multiple observations of the same individuals (Lewis-Beck, 1980).

Autocorrelation may reduce efficiency of parameter estimates included in an OLS analysis as well as bias coefficients in the model. However, since the measurement periods span longer than yearly time periods and the data span different developmental periods (adolescence to middle-adulthood), autocorrelation may not severely impact the data (see a similar argument posed by Sampson and Laub, 1993).

Anderson and Hsiao's (1981) First-Differences Equation

To explore the relationship between social bonds and drug use, OLS models including lagged and concurrent covariates are used to account for the partial adjustment of behavior. With panel data, researchers have the ability to include a lagged measure of the dependent variable which may account for some of the persistent effects of the explanatory variables that remain stable over time and influence the relationship of interest (Beck and Katz, 1996). However, the major problem with this strategy is that, by construction, lagged y is correlated with the time-constant component of the disturbance term (Wawro, 2002). The non-zero correlation between lagged y and the disturbance term produces biased and inconsistent parameter estimates. As a result, inferences drawn from OLS models which include lagged y may be over-exaggerated and remain tentative at best.

In order to eliminate the bias and inconsistency produced by the introduction of lagged y in the OLS regression model, analyses are performed using Anderson and Hsiao's (1981) equation to obtain the first-differences estimator:

$$\Delta Y_{it} = \Delta X_{it}B + \Delta u_{it}$$

where ΔY_{it} is calculated by subtracting the dependent variable at wave two from the dependent variable at wave three (i.e., $Y_{it} - Y_{it-1}$), and similarly for the other variables.²³ The disturbance term contains two components: a fixed component (η_i) and a random component (\tilde{u}_{it}). It is assumed that $E\eta_i = E\tilde{u}_{it} = 0$ and that all \tilde{u}_{it} 's are independent of x_{it} 's. To the extent that the assumptions related to the disturbance term are violated, parameter estimates will be inconsistent and biased.

Anderson and Hsiao initially pointed out that first-differencing eliminates the problem of correlation between the lagged dependent variable and the individual-specific (time-constant) component of the disturbance term by moving lagged y from the right-hand side of the equation to the left-hand side. The calculation of the first-differences estimator is performed using wave two and wave three data only, since the key independent variables are measured similarly in those two waves only. The first-differences model explores how a change of one unit in x will lead to a change of B units in y over the given interval between measurements. Despite controls for omitted variable bias, problems related to endogeneity may still be present. However, given constraints of the data, the above model provides the best attempt at controlling for unobserved heterogeneity and its relation to omitted variable bias. Another issue is that the first-differences model can only include time-varying regressors.

Therefore, in order to conduct interaction analyses, the models are run separately for males and females and the estimates obtained are compared using Clogg's (1995) z -

²³ Subtracting each variable by its sample mean is an alternative strategy to the first-differences approach however, with only two waves of data using OLS with the sample means (i.e., the fixed effects estimator) is identical to the estimator obtained from first-differences.

test for model comparisons. Unlike the OLS analysis, which is basically a cross-sectional analysis with lagged control measures, the first-differences model captures change in behavior over time while controlling for unobserved heterogeneity.

The purpose of the analytic strategy is to examine the extent to which a change in social bonds between early and later adulthood results in a change in drug use frequency during the same period. The OLS models with lagged controls do not answer questions regarding the causal relationship between social bonds and drug use frequency. However, they do provide insight on the association between social bonds and drug use for a sample of urban, black males and females. The OLS analysis is the first-step in understanding the relationships of interest whereas the first-differences equation takes the analysis one step further by trying to disentangle the causal relationship between social bonds and drug use frequency in adulthood.

Chapter 4: Results

This chapter is divided into two main sections. The first section presents traditional ordinary-least squares (OLS) regression results of the relationship between social bonds and drug use in adulthood controlling for observed individual differences in drug use propensity. The second section discusses findings using Anderson and Hsiao's (1981) first-differencing procedure to control for unobserved individual differences in drug use propensity. The first-differencing procedure also helps disentangle the causal relationship between social bonding variables and drug use frequency in adulthood. Of particular interest is whether the results obtained from the first-differences analysis modify the inferences drawn from the traditional OLS analysis. Within these two main sections, gender - and drug-specific results are also presented. These additional analyses will provide insight on the generalizability of the relationships uncovered from the regression models that use the full sample and a composite measure of drug-use frequency.

The OLS regression analysis includes lagged and concurrent demographic, social bonding, and drug use measures. The first-differences analysis also includes social bonding and drug use measures however, welfare status is the only demographic measure included in the analysis. Multiple social bonding variables are available in the dataset. While regression models are run substituting in various social bonding measures, results are primarily reported for the social bonding variables of greatest theoretical import: long-term schooling, long-term employment, and the percent of time married. To the extent that the substantive conclusions

change with the inclusion of different social bonding measures, the results are presented in the text.

OLS Regression Results

Table 11 displays the results from the unweighted OLS regression analysis of the composite measure of past year drug use frequency during early adulthood.²⁴ This table presents results from 482 subjects surveyed at wave two, which constitutes 80% of the surviving wave one sample. Thirteen percent of the variation in the composite measure of drug use frequency is accounted for by the variables in the regression model. The simultaneous test that each coefficient in the regression model is equal to zero is rejected ($F = 7.21, p < .01$). Of the ten coefficients estimated by the model, the five that are found to be significantly related to the dependent variable include drug use propensity, gender, long-term schooling, long-term employment, and the percent of time married. Conforming to prior research, the data reveal a strong predictive effect of prior drug use. Specifically, drug use propensity (i.e., the frequency of alcohol and cigarettes use) measured in adolescence is significantly and positively related to the composite measure of past year drug use frequency ($t = 2.10, p < .05$). On average, the composite measure of past year drug use frequency increases by .212 with each unit increase in drug use propensity, controlling for other

²⁴ OLS regression results are reported for the unweighted sample. Analyses were performed on the weighted sample and, based on model comparisons, the coefficients obtained from the unweighted and weighted models do not differ significantly. Also, OLS results were run using White's (1980) correction for heteroskedasticity. Most of the OLS results correcting for heteroskedasticity match the OLS results not correcting for heteroskedasticity. However, in one model of alcohol frequency, being married in early adulthood is significantly (and inversely) related to alcohol frequency in later adulthood. This finding is not revealed in the OLS analysis that does not correct for heteroskedasticity. Since most of the substantive conclusions do not change when correcting for heteroskedasticity, especially in the models of greatest theoretical interest, results from the original OLS models are reported in the text.

covariates in the model. Being male is significantly associated with the composite measure of drug use frequency ($t = 5.29, p < .01$) and within this regression model, gender has the strongest relationship with the dependent variable. Compared to females, the frequency of past year drug use among males is expected to be .656 units higher, on average, holding other covariates constant. Among the three key social bonding measures, long-term schooling has the strongest impact on the composite measure of drug use frequency in early adulthood. A one month increase in the average number of months in school per year between adolescence and early adulthood is expected to decrease past year drug use frequency measured in early adulthood by .074, holding other covariates constant ($t = -3.46, p < .01$).

Furthermore, as the average number of months respondents work per year between adolescence and early adulthood increases, past year frequency of drug use during early adulthood is expected to decrease by .041 ($t = -2.20, p < .05$). The higher the total number of months respondents are married between adolescence and early adulthood, the lower their frequency of drug use, controlling for wave one and wave two covariates ($t = -2.35, p < .05$). A one month increase in the number of months married between adolescence and early adulthood is expected to decrease past year frequency of drug use in early adulthood by .536, controlling for the other covariates in the model. The social bonding measures attempt to capture behavior between the first and second testing period. However, it is not possible to provide definite conclusions about the temporal ordering of social bonds and drug use and therefore, causality remains in question.

The lower portion of Table 11 displays the findings for the composite measure of past year drug use frequency in later adulthood. The analysis includes lagged demographic, social bonding, and drug use measures at wave two and concurrent wave three demographic and social bonding measures. Data from 386 subjects are analyzed, these subjects constitute 78% of the surviving wave two sample. Twenty percent of the variance in the composite measure of past year drug use frequency in later adulthood is accounted for by the model. The F statistic suggests that at least one of the slope coefficients differs significantly from zero ($F = 8.65, p < .01$). In stark contrast to the findings obtained for past year frequency of use in early adulthood, the only significant predictor of the composite measure of past year drug use frequency in later adulthood is the lagged measure of drug use frequency ($t = 7.87, p < .01$). The predicted value of drug use frequency in later adulthood for each unit increase in prior drug use frequency measured in early adulthood is .414, controlling for other covariates in the model. None of the lagged or concurrent estimates of the social bonding measures (i.e., long-term schooling, long-term employment, or the percent of time married) are significantly different from zero, and therefore do not have a linear relationship with the composite measure of past year drug use frequency in later adulthood.

To understand more clearly why the impact of the social bonding variables on the composite measure of drug use frequency during later adulthood disappears, supplemental regression models are run, which include: 1) early adulthood covariates only, 2) later adulthood covariates only, and 3) covariates measured in early and later adulthood. The measure of prior drug use frequency (i.e., the composite measure of

drug use frequency in early adulthood) is excluded from the supplemental analyses because its effect may mask the significance of the other covariates in the model. Five percent of the variation in drug use frequency in later adulthood is accounted for by the demographic and social bonding covariates measured in early adulthood. The *F* statistic is significant suggesting that at least one of the slope coefficients is linearly related to the dependent variable ($F = 3.53, p < .01$). When only including predictors measured in early adulthood, gender and long-term schooling are significantly related to the dependent variable. Compared to females, the expected frequency of past year drug use for males is .460 units higher, on average, controlling for other covariates in the model ($t = 3.15, p < .01$). Long-term schooling has a significant, predictive association with the composite measure of drug use frequency in later adulthood ($t = -2.66, p < .01$). Specifically, a month increase in the average number of months per year the respondent attends school between adolescence and early adulthood decreases past year drug use frequency in later adulthood by .066, controlling for other covariates in the model.

The next supplemental regression analysis includes demographic and social bonding covariates measured in later adulthood. Approximately six percent of the variation in the composite measure of past year drug use frequency in later adulthood is explained by the model and the *F* statistic is significant suggesting that at least one slope coefficient is linearly related to the dependent variable ($F = 4.06, p < .01$). Among the individual slope coefficients, the strongest predictor of drug use frequency in later adulthood is gender ($t = 3.04, p < .01$). Receiving welfare is also significantly related to drug use frequency in later adulthood ($t = 2.10, p < .05$). The average

difference in past year frequency of drug use measured in later adulthood between females and males is .437 and between those not receiving welfare and those receiving welfare is .365, holding the other variables in the model constant. None of the social bonding estimates are significantly related to the dependent variable at a *p*-level less than .05. Long-term schooling is found to have a moderate, significant association with drug use frequency in later adulthood ($t = -1.64$, $p = .10$); however, this effect does not meet conventional levels of significance.

The final supplementary analysis includes demographic and social bonding covariates measured during early and later adulthood (excluding prior drug use frequency measured in early adulthood). Seven percent of the variation in drug use frequency measured in later adulthood is explained by the ten covariates in the model. The *F* statistic is once again significant suggesting that at least one of the slope coefficients is linearly related to the dependent variable ($F = 2.84$, $p < .01$). Gender and welfare have a significant relationship with the composite measure of past year drug use frequency in later adulthood. Controlling for the other covariates in the model, the expected frequency of past year drug use measured in later adulthood is .440 units higher for males compared to females ($t = 2.87$, $p < .01$). The average difference in past year frequency of drug use between respondents not receiving welfare and those receiving welfare in later adulthood is .384 ($t = 2.12$, $p < .05$).

The OLS regression analyses reveal significant concurrent relationships between the social bonding variables and the composite measure of past year drug use frequency measured in early adulthood, net of other covariates in the model. In contrast, the only significant predictor of drug use in later adulthood is prior drug use

frequency.²⁵ Supplemental analyses performed on past year frequency of use in later adulthood, which excluded prior drug use frequency reveal that most of the concurrent and predictive effects of the social bonding variables remain insignificant. The only significant relationship uncovered from the supplemental analyses is an inverse (and predictive) association between long-term schooling measured in early adulthood and past year frequency of use in later adulthood, controlling for wave two covariates only. However, this significant association is eliminated when additional controls are included in the model, which may suggest that the significant association is spurious. The significant effects of the social bonding variables on drug use frequency in early adulthood may be the result of omitted variable bias. Similarly, the strong effect of the lagged drug frequency measure may be due to the fact that, by construction, it is correlated with the error term (Wawro, 2002).

OLS Sample Selection Results

The results obtained from the OLS analysis may be mis-specified as a result of sample selection bias. Specifically, attrition is a common obstacle faced in longitudinal research and if dropout from the research is not completely random the results may be biased. In the previous chapter a cursory analysis of survey completion at waves two and three was conducted using bivariate and multivariate statistics. Three significant wave one predictors of survey completion at wave two are uncovered: subject's age during adolescence, the number of self-reported health

²⁵ Additional regression models were analyzed to assess whether alternate measures of social bonds (i.e., short-term employment and marital status) available in the data produce similar results to those reported in the text. The substantive conclusions obtained from these additional OLS analyses mimic those described in the text and therefore, are not discussed in detail.

problems experienced during the survey period, and how often the subject is upset by personal problems. One significant wave two predictor is related to survey completion at wave three: subject's involvement in a serious accident.

Heckman's two-step estimation model is used to examine the potentially confounding effects of sample selection bias. This procedure includes the simultaneous estimation of two regression models, a probit model of survey completion and an OLS regression model of drug use frequency. In order to better capture the selection process underlying the data, the probit model must include some variables that are related to survey completion and not the dependent variable of interest (i.e., the model must include exclusionary restrictions; Allison, 2002). The three predictors of survey completion at wave two and the one predictor of survey completion at wave three fit this criterion.²⁶

To control for sample selection bias, lambda is created from the probit analysis and inserted into the OLS model of drug use frequency in early adulthood. The value of lambda differs depending on an individual's score on the observed predictors of survey completion. If the slope coefficient of lambda is insignificant in the regression analysis, then the variables used to characterize the selection process do not add anything significant to the explanation of drug use frequency. Based on the results obtained from Heckman's two-stage estimation procedure, sample selection does not appear to bias the estimates obtained from the regression analysis

²⁶ However, since there is only one binary predictor of survey completion at wave three, there is not much confidence that the Heckman model can adequately capture the selection processes underlying the data. After running the selection analysis for drug use frequency at wave three, the standard errors associated with the lambda predictor is slightly higher than the standard errors for the other covariates in the model. This may indicate the presence of multicollinearity. Therefore, the selection analyses for the drug frequency models at wave three are not reported in the text.

of drug use in early adulthood.²⁷ The substantive conclusions obtained when lambda is not included in the OLS analysis mimic those when lambda is included (see Table 11 and 12, respectively). Furthermore, lambda is insignificant when included in the analysis of drug use frequency in early adulthood ($z = -0.61$, $p = .54$). Therefore, the results obtained from the OLS analysis of drug use frequency in early adulthood do not appear to be biased by characteristics related to survey completion and, as a result, a higher level of confidence is achieved from the inferences drawn. Given the large amount of time between survey periods, it is also possible that the processes related to survey completion work themselves out over time.

OLS Drug-Specific Results

Drug-specific OLS regression analyses are conducted for measures of past year alcohol, marijuana, and cocaine frequency. The results are presented for past year alcohol frequency first, followed by past year marijuana and cocaine frequency. Similar to the analysis of the composite measure of drug use frequency, results are presented for those variables of greatest theoretical import. To the extent that the substantive conclusions differ when alternate social bonding variables are included in the regression models, such differences will be noted in the text.

The top portion of Table 13 displays the OLS regression results for alcohol frequency in early adulthood. The model includes lagged and concurrent demographic and social bonding measures as well as a measure of drug use propensity obtained during adolescence (i.e., ages 12 – 17). Four-hundred and sixty-

²⁷ Selection models for the composite measure of drug use frequency in early adulthood were analyzed for the alternate social bonding measures. No significant differences were uncovered between the OLS coefficients when controlling and not controlling for selection bias.

two cases are analyzed and approximately 9% of the variation is explained by the model. The F statistic is significant suggesting that at least one of the estimates is significantly related to past year alcohol frequency in early adulthood ($F = 4.60, p < .01$). There are two variables significantly related to the dependent variable: gender and long-term schooling. Being male is significantly related to alcohol frequency in early adulthood ($t = 4.33, p < .01$). The average difference in past year frequency of alcohol in early adulthood between females and males is .852. Also, for each additional month in school per year between adolescence and early adulthood, past year alcohol frequency in early adulthood is expected to decrease by .094, on average, holding other variables in the model constant ($t = -2.80, p < .01$). No other covariates in the model are significantly related to past year alcohol frequency in early adulthood.

The lower portion of Table 13 displays the OLS regression results from an analysis of past year alcohol frequency in later adulthood. In this model, lagged and concurrent demographic and social bonding measures are included in the analysis as well as a lagged measure of alcohol frequency in early adulthood. Data from 358 subjects is analyzed and approximately 20% of the variation in the dependent variable is accounted for by the model. While prior alcohol frequency is most strongly related to alcohol frequency in later adulthood ($t = 8.15, p < .01$), two additional variables are significantly related to the dependent variable: welfare status and long-term employment. Welfare status, which is a binary indicator of socio-economic status measured in later adulthood, is positively and significantly related to alcohol frequency measured during the same period ($t = 2.13, p < .05$). The average

difference in past year alcohol frequency between respondents who do not receive welfare and those who do receive welfare is .504. Long-term employment is also positively and significantly related to alcohol frequency in later adulthood ($t = 2.06$, $p < .05$). For each additional month employed per year between early and later adulthood, the expected frequency of past year alcohol use is expected to increase by .057, on average. This finding is in contrast to the underlying theory, which posits an inverse relationship between social bonds and problem behavior (Sampson and Laub, 1993).

The relationships uncovered in early adulthood for past year alcohol frequency are explored further controlling for sample selection bias using Heckman's two-step estimation procedure. The results from the selection analysis support the conclusions obtained for the OLS regression analysis, which did not control for sample selection bias. Specifically, gender and long-term schooling are significantly related to alcohol frequency in early adulthood ($z = 4.55$, $p < .01$ and $z = -2.56$, $p < .01$, respectively) (see Table 14). While lambda is not significant in the selection model of alcohol frequency in early adulthood ($z = -1.62$, $p = .10$), the standard error associated with the lambda coefficient is slightly higher compared to the other standard errors for the coefficients in the model which may suggest collinearity problems.

The OLS regression analysis of past year marijuana frequency in adulthood is displayed in Table 15. The top portion of the table displays the results for marijuana frequency in early adulthood among 481 subjects. The lagged and concurrent demographic, social bond and prior drug use measures explain approximately 11% of

the variation in past year frequency of marijuana. The F statistic is significant ($F = 6.12, p < .01$), which suggests that at least one of the variables is linearly related to the dependent variable. None of the social bonding variables are significantly related to past year marijuana frequency in early adulthood. However, drug use propensity (measured at ages 12 – 17), age, and gender are significantly related to the dependent variable. Drug use propensity in adolescence is significantly and positively related to marijuana frequency in early adulthood ($t = 2.80, p < .01$). The average difference in past year marijuana frequency in early adulthood between females and males is 1.354 ($t = 5.82, p < .01$). For each year subject's age, marijuana frequency in early adulthood is expected to decrease by .182, on average, controlling for other covariates in the model ($t = -2.12, p < .05$). These results support prior research on the correlates of crime (Paternoster et al., 1997). However, none of the key social bonding variables appear to explain any significant portion of the variation in marijuana frequency in early adulthood.

To explore further the relationship between social bonds and drug use in early adulthood, supplemental regression models are run, which include: 1) adolescent covariates only, 2) early adulthood covariates only, and 3) covariates measured in adolescence and early adulthood. The measure of drug use propensity (i.e., alcohol and cigarette frequency in adolescence) is excluded from the supplemental analyses because its effect may mask the significance of the other covariates in the model. The supplemental analyses reveal that when variables measured in adolescence are included in the model, gender is the only variable significantly associated with past year marijuana frequency in early adulthood. With approximately 8% of the variation

in marijuana frequency in early adulthood explained, gender is positively related to the dependent variable of interest ($t = 6.53, p < .01$). The average difference in past year marijuana frequency in early adulthood between females and males is 1.353. When only variables measured in early adulthood are included in the model, ten percent of the variation is explained in the dependent variable ($F = 9.68, p < .01$). Gender and long-term schooling are found to be significantly related to past year frequency of marijuana in early adulthood. Compared to females, the expected past year frequency of marijuana for males is 1.396 units higher, on average, controlling for other covariates in the model ($t = 6.18, p < .01$). For each additional month in school between adolescence and early adulthood, past year marijuana frequency is expected to decrease by .094, on average ($t = -2.57, p < .05$). When including demographic and social bonding covariates measured during adolescence and early adulthood (excluding drug use propensity), gender and long-term schooling retain their significant association with past year marijuana frequency in early adulthood. While only 10% of the variation in marijuana frequency is explained by the model, the joint effect of the model coefficients on the dependent variable is significant ($F = 5.95, p < .01$). The average difference in past year marijuana frequency in early adulthood between females and males is 1.332, on average ($t = 5.72, p < .01$). For each additional month in school between adolescence and early adulthood, past year frequency of marijuana is expected to decrease by .090, on average ($t = -2.34, p < .05$), controlling for other covariates in the model. These results may suggest that the relationship between past and future marijuana use masks the concurrent relationship between long-term schooling and past year marijuana frequency in early adulthood.

The lower portion of Table 15 displays results for past year marijuana frequency in later adulthood. Data from 383 subjects is analyzed and approximately 21% of the variation in the dependent is explained by the model. The F statistic is significant suggesting that at least one of the estimates is significantly related to marijuana frequency in later adulthood ($F = 9.32, p < .01$). The only variable significantly related to past year marijuana frequency in later adulthood is prior marijuana frequency measured in early adulthood ($t = 7.63, p < .01$). Supplemental analyses are run to examine whether excluding prior marijuana frequency measured in early adulthood from the regression analysis reveals any significant effects of the social bonding variables on marijuana frequency in later adulthood. When wave two correlates are included in the regression model, none of the social bonding variables are significant. However when only wave three covariates are included in the model, long-term schooling is significantly and inverse related to marijuana frequency measured in later adulthood ($t = -2.63, p < .05$). The analyses also reveal that gender is significantly related to the dependent variable in the positive direction ($t = 3.70, p < .01$). When both wave two and wave three covariates are included in the regression model, long-term schooling and gender retain their significance. For each additional month in school per year between early and later adulthood, past year marijuana frequency is expected to decrease by .133 ($t = -2.37, p < .05$). The average difference in past year frequency of marijuana use in later adulthood between females and males is .805 ($t = 3.02, p < .01$). The strength of the relationship between long-term schooling and past year frequency of marijuana in later adulthood will become clearer

when the lagged measure of marijuana frequency is differenced out of the equation in the first-differences analysis.²⁸

Table 17 presents data from the OLS analysis of past year cocaine frequency in adulthood. In the top portion of the table, the results of cocaine frequency in early adulthood among 481 subjects are presented. Approximately, 7% of the variation in the dependent variable is explained by the model. The *F* statistic is significant suggesting that there is at least one significant predictor of past year cocaine frequency in early adulthood ($F = 3.69, p < .01$). Gender, long-term schooling, and long-term employment are found to be significantly related to the dependent variable. Compared to females, past year cocaine frequency is predicted to be .616 units higher for males, on average ($t = 3.98, p < .01$). Both long-term schooling and long-term employment are inversely related to the dependent variable. For each additional month in school or employed per year, past year cocaine frequency is expected to decrease, on average, by .059 ($t = -2.23, p < .05$) and .047 ($t = -2.01, p < .05$), respectively, controlling for other covariates in the model.

The lower portion of Table 17 displays the results from an analysis of past year cocaine frequency in later adulthood. Data from 383 subjects is analyzed. Approximately 22% of the variation in the dependent variable is explained by the model and the *F* statistic is significant ($F = 9.75, p < .01$) suggesting that at least one of the covariates is significantly related to the dependent variable. Only one variable is significantly related to past year cocaine frequency in later adulthood and that

²⁸ The regression models of marijuana frequency in adulthood were also run controlling for sample selection bias at wave two (see Table 16). The slope coefficients when controlling for selection do not differ significantly from the coefficients obtained when selection bias is not controlled for in the analysis.

variable is: prior cocaine frequency measured in early adulthood ($t = 8.77, p < .01$).

Supplemental analyses are run and additional effects are uncovered. When only wave two covariates are included in the model, only 3% of the variation is explained. Long-term schooling and the percent of time married are significantly related to cocaine frequency when only covariates measured in early adulthood are included in the model. For each one month increase in the number of months in school per year between adolescence and early adulthood, past year cocaine frequency in later adulthood is expected to decrease by .076, on average, controlling for other covariates in the model ($t = -2.32, p < .05$). Net of other covariates in the model, for each additional month married between adolescence and early adulthood, past year cocaine frequency in later adulthood is expected to decrease by .724 ($t = -2.21, p < .05$).

When only wave three covariates are included in the model ($R^2 = .05$), welfare and the percent of time married are found to be significantly related to past year cocaine frequency in later adulthood. The average difference in past year cocaine frequency in later adulthood between subjects who do not receive welfare and those who do receive welfare is .544 ($t = 2.37, p < .05$). For each additional month married between early and later adulthood, past year cocaine frequency in later adulthood is expected to decrease by .446 ($t = -2.12, p < .05$). However, when wave two and wave three covariates are included in the model ($R^2 = .06$), the only significant effect uncovered is a concurrent association between receiving welfare and cocaine frequency in later adulthood ($t = 2.18, p < .05$). Specifically, the average difference in past year cocaine frequency in later adulthood between subjects who do not receive welfare and those who do receive welfare is .522.

The results presented above describe the relationship between the social bonding variables of key theoretical interest and cocaine frequency in adulthood. While none of the conclusions from the other drug specific analyses differed when substituting alternate measures of social bonds available in the dataset, in certain instances, there are a few differences when substituting in alternate social bonding measures for past year cocaine frequency. A significant relationship between drug use propensity measured in adolescence is revealed when short-term employment and marital status are substituted for long-term employment and the percent of time married in early adulthood, respectively ($t = 2.19, p < .05$). With regard to past year cocaine frequency in later adulthood, when marital status is substituted for the percent of time married and long-term employment remains a covariate in the model, a significant inverse relationship is uncovered between being married and cocaine frequency ($t = -2.17, p < .05$). The results suggest that the average difference in past year cocaine frequency in later adulthood between subjects not currently married and subjects who are currently married is $-.431$. This regression model also reveals that for each additional month employed between adolescence and early adulthood, past year cocaine frequency in later adulthood is expected to increase by $.063$ ($t = 2.09, p < .05$).²⁹ While slight differences are uncovered in this alternate specification of the regression model, no appreciable increase in the amount of variation explained is

²⁹ According to the sample selection analysis, a significant relationship between drug use propensity and cocaine frequency in early adulthood is also uncovered when short-term employment or marital status is substituted for long-term employment or the percent of time married, respectively. However, the coefficients obtained when controlling and not controlling for selection bias do not differ significantly.

obtained and it is not certain whether the significant effects are revealed by chance alone.³⁰

Drug-specific analyses reveal an inverse relationship between at least some of the social bonding measures and alcohol and cocaine frequency in early adulthood, controlling for demographic and social bonding variables as well as a measure of drug use propensity. Specifically, long-term schooling is inversely related to past year alcohol and cocaine frequency in early adulthood. Long-term employment is also found to be inversely associated with past year cocaine frequency in early adulthood. These findings are further supported when additional controls for sample selection bias are included in the analysis. During later adulthood, the most consistent relationship uncovered in all the drug-specific models is that between prior and future drug use frequency. Certain social bonding variables are found to be significantly related to alcohol and cocaine frequency in later adulthood. A positive association between long-term employment and past year alcohol frequency is uncovered during later adulthood. In contrast, a positive (and predictive) relationship is uncovered between long-term employment and past year cocaine frequency in later adulthood. An inverse relationship is also uncovered between being married and past year cocaine frequency in later adulthood. However these relationships only surface when alternate social bonding variables are substituted for the variables of key theoretical interest in the analysis of cocaine frequency in later adulthood. The relationships uncovered from the drug-specific analyses do not disentangle the causal

³⁰ For the alternate model specification, $R^2 = .227$ while $R^2 = .224$ for the regression model including the variables of theoretical interest.

relationship between social bonds and drug use nor do they address concerns regarding the biasing effects of unobserved heterogeneity. Prior to addressing these concerns, the next section explores whether the relationships among the social bonds and drug use are moderated by gender.

OLS Interaction Results

Regression analyses are conducted to examine whether the relationship between social bonding variables and drug use frequency in adulthood is moderated by gender. Regression models are run separately for males and females and then the coefficients from each model are compared using Clogg's (1995) z-test for model comparisons (see also Paternoster et al., 1998). The results reported below indicate whether an interaction effect is present and the direction of the gender specific effects. Unless otherwise stated, only the effects of the social bonding variables of greatest theoretical import (i.e., long-term schooling, long-term employment, and the percent of time married) are presented. Analyses are performed for the composite drug frequency measure as well as for alcohol, marijuana, and cocaine frequency.

Tables 19 and 19a display the regression results for the composite measure of drug use frequency for males and females, respectively. In the top portion of the tables, results for past year frequency of use in early adulthood are displayed. Data are analyzed for 253 male subjects and 229 female subjects. The model explains approximately 5% of the variation in past year drug use frequency in early adulthood for males and approximately 12% of the variation in the dependent variable for females. For both males and females, long-term schooling is significantly and

inversely related to the composite measure of past year drug use frequency in early adulthood ($t = -2.19, p < .05$ and $t = -2.51, p < .05$, respectively). For males, each additional month in school per year between adolescence and early adulthood decreases past year drug use frequency in early adulthood by .074, on average. Similarly, for females, each additional month per year in school between adolescence and early adulthood decreases past year drug use frequency in early adulthood by .065, on average. For females, the percent of time married is inversely related to drug use frequency in early adulthood ($t = -2.66, p < .01$). A one month increase in the number of months married between adolescence and early adulthood decreases past year drug use frequency among females by .576, on average. Additionally, drug use propensity is significantly related to drug use frequency in early adulthood for females ($t = 2.51, p < .05$). While the analysis reveals significant main effects of the social bonding variables on drug use frequency in early adulthood for both males and females, no significant interaction effects are uncovered.

In the lower portion of Tables 19 and 19a, results for past year drug use frequency in later adulthood are reported for 191 male and 195 female subjects. The model explains approximately 24% of the variation in the composite measure of past year drug use frequency in later adulthood for males and approximately 16% of the variation in the dependent variable for females. For both males and females, prior drug use frequency is significantly related to past year drug use frequency measured in later adulthood ($t = 5.98, p < .01$ and $t = 4.76, p < .01$; respectively). For males only, long-term schooling is significantly related to past year drug use frequency in later adulthood ($t = -2.05, p < .05$). For each additional month in school per year

between early and later adulthood, past year drug use frequency is expected to decrease by .114, on average, controlling for other covariates in the model. The results from the model comparisons uncover a significant interaction effect for long-term schooling and drug use frequency in later adulthood ($z = -2.34, p < .05$). Based on the gender specific analyses, long-term schooling in later adulthood is significantly related to drug use frequency for males ($t = -2.05, p < .05$) and not for females ($t = 1.17, p = .24$). The higher the average number of months per year in school between early and later adulthood among males, as compared to females, the lower their self-reported frequency of drug use in later adulthood.

Tables 20 and 20a display the results from the analysis of past year alcohol frequency for males and females, respectively. In the top portion of the tables, the results are reported for 241 males and 221 females. The model explains approximately 9% of the variation in past year alcohol frequency in early adulthood for males and approximately 5% of the variation in the dependent variable for females. For males, the average difference in past year alcohol frequency between those who do not receive welfare and those who receive welfare in adolescence is .589 ($t = 2.32, p < .05$). Additionally, for each additional month in school per year between adolescence and early adulthood among males, past year alcohol frequency in early adulthood is expected to decrease by .140, on average ($t = -3.00, p < .01$). For females, when short-term employment is substituted for long-term employment, education aspirations measured in adolescence are inversely related to past year alcohol frequency in early adulthood ($t = -1.99, p < .05$). Despite the significant main effects, the model comparisons indicate that gender does not moderate the

relationship between the social bonding variables and alcohol frequency in early adulthood.

The lower portion of Tables 20 and 20a display the results for past year alcohol frequency in later adulthood for 176 males and 182 females, respectively. The model explains approximately 20% of the variation in past year alcohol frequency in later adulthood for males and approximately 29% of the variation in the dependent variable for females. For males, there are three significant main effects uncovered by the model: prior alcohol frequency ($t = 4.50, p < .01$), welfare ($t = 2.51, p < .05$), and long-term employment ($t = 2.55, p < .05$). For females, two main effects are found: prior alcohol frequency ($t = 7.02, p < .01$) and the percent of time married ($t = -2.58, p < .05$). For each unit increase in past year alcohol frequency in early adulthood, alcohol frequency in later adulthood is expected to increase by .352 for males and .410 for females, on average. Compared to subjects who report that they do not receive welfare, past year alcohol frequency is predicted to be .879 units higher among subjects who report that they do receive welfare. For each additional month per year employed between early and later adulthood, past year alcohol frequency is expected to increase by .110 among males, on average. For females, each additional month married between adolescence and early adulthood, alcohol frequency during later adulthood is expected to decrease by 1.009, on average. A significant interaction effect is uncovered between long-term employment and alcohol frequency in later adulthood ($z = 2.57, p < .05$). Specifically, the higher the average number of months per year employed between early and later adulthood, the higher the self-reported frequency of past year alcohol use in later adulthood for

males compared to females. While a significant main effect of long-term employment on alcohol frequency in later adulthood is uncovered for males ($t = 2.55$, $p < .05$), the relationship is not significant for females ($t = -1.01$, $p = .31$).

Tables 21 and 21a display the results from the analysis of past year marijuana frequency for males and females, respectively. In the top portion of the tables, the results for marijuana frequency in early adulthood are reported for 252 males and 229 females. The amount of variation explained by the models is approximately 9% for males and 4% for females. For males, drug use propensity ($t = 2.64$, $p < .01$), age ($t = -2.29$, $p < .05$), and long-term schooling ($t = -2.45$, $p < .05$) are significantly related to past year marijuana frequency in early adulthood. A unit increase in drug use propensity in adolescence increases marijuana frequency in early adulthood among males by .679, on average, controlling for other covariates in the model. Among males, for each year increase in respondent's age and for each additional month per year in school between adolescence and early adulthood, past year marijuana frequency in early adulthood is expected to decrease on average by .251 and .127, respectively. In contrast, no significant main effects are uncovered for females when including the social bonding variables of key theoretical interest in the regression model. However, when current marital status is substituted for the percent of time married, drug use propensity is significant at a p-value of less than .05. Comparing the slope coefficients from the regression models of past year marijuana frequency in early adulthood for males and females, a significant interaction effect is uncovered between long-term schooling and marijuana frequency. However, this interaction effect is only revealed when short-term employment is substituted for long-term

employment or when short-term employment and current marital status are substituted for long-term employment and the percent of time married, respectively. In general, the gender specific models display a significant main effect for the average number of months per year in school between adolescence and early adulthood and past year marijuana frequency in early adulthood for males ($t = -2.45$, $p < .05$). For females, long-term schooling is not significantly related to past year marijuana frequency in early adulthood ($t = .46$, $p = .64$).

The lower portion of Tables 21 and 21a display the results of past year marijuana frequency in later adulthood for 188 males and 195 females, respectively. The model explains approximately 22% of the variation in past year marijuana frequency in later adulthood for males and approximately 17% of the variation in the dependent variable for females. For both males and females, marijuana frequency measured in early adulthood is significantly and positively related to past year marijuana frequency in later adulthood ($t = 5.18$, $p < .01$ and $t = 5.22$, $p < .01$, respectively). For males and females, a unit increase in past year marijuana frequency in early adulthood, increases marijuana frequency in later adulthood by .402 and .345 (on average), respectively, controlling for other covariates in the model. For each additional month per year male respondents are in school between early and later adulthood, past year marijuana frequency is expected to decrease by .182, on average ($t = -2.06$, $p < .05$). The model comparisons find that gender does not moderate the relationship between the social bonding variables and past year marijuana frequency in later adulthood.

Tables 22 and 22a display the results from the analysis of past year cocaine frequency for males and females, respectively. In the top portion of the tables, the results of cocaine frequency in early adulthood are reported for 252 males and 229 females. The amount of variation in past year cocaine frequency in early adulthood explained by the models is approximately 4% for males and 8% for females. For males, none of the covariates in the model are significantly related to past year cocaine frequency in early adulthood. However, short-term employment is found to be inversely related (at a p-level of less than .05) to past year cocaine frequency in early adulthood. For females, drug use propensity measured in adolescence is the only variable significantly related to past year cocaine frequency in early adulthood. For each unit increase in drug use propensity in adolescence, past year cocaine frequency in early adulthood is expected to increase among females by .377, on average ($t = 2.65, p < .01$). In comparing the slope coefficients for males and females, no significant interaction effects are uncovered for past year cocaine frequency in early adulthood.

The lower portion of Tables 22 and 22a display the results for past year cocaine frequency in later adulthood for 189 males and 194 females, respectively. The models each explain approximately 24% of the variation in cocaine frequency in later adulthood for males and females. Cocaine frequency measured in early adulthood is positively related to past year cocaine frequency in later adulthood for both males and females ($t = 5.69, p < .01$ and $t = 6.47, p < .01$, respectively). The average difference in past year cocaine frequency in later adulthood among males who do not receive welfare and those who do receive welfare in later adulthood is

.792 ($t = 2.59, p < .05$). For each additional month married between early and later adulthood among females, past year cocaine frequency in later adulthood is expected to decrease by .650 ($t = -2.01, p < .05$). Despite different significant main effects for males and females, the model comparisons find that gender does not moderate any of the relationships between the social bonding variables and cocaine frequency in later adulthood.

The findings from the interaction analyses provide additional insight into the relationships between social bonds and drug use frequency in adulthood. Several significant main effects of the social bonding variables for males and females are uncovered from the analysis. However, only a few interaction effects are revealed. Gender appears to moderate the relationship between long-term schooling and past year marijuana frequency in early adulthood and between the composite measure of drug use frequency in later adulthood. The direction of interaction effects are stronger for males compared to females. It is important to note that the interaction effect between long-term schooling and marijuana frequency in early adulthood is revealed only when short-term employment is substituted for long-term employment. Gender also moderates the relationship between long-term employment and alcohol frequency in early adulthood. Specifically, the interaction analyses uncover a positive and significant relationship between long-term employment and past year alcohol frequency in later adulthood among males whereas the relationship is not significant for females. While the interaction effects contradict an underlying assumption of the theory motivating this research, which is that the theory can explain changes in behavior over time similarly for males and females, it is unclear whether

the interaction effects uncovered are “true” effects or whether they are the result of some random error in the data. To further explore the “true” presence of interaction effects in this data, interaction analyses are performed controlling for unobserved heterogeneity using the first-differences technique. The results from these analyses are discussed next.

First-Differences Results

Anderson and Hsiao’s (1981) first-differences equation is used to assess how changes in social bonds between waves two and three influence changes in drug use frequency during the same period. In each analysis, the following variables are included: the change in welfare status, long-term schooling, long term employment, and the percent of time married.³¹ Analyses are performed for the composite measure of past year drug use frequency as well as for alcohol, marijuana, and cocaine frequency. Interaction analyses are also performed to examine whether gender moderates the relationships of interest.

Table 23 presents the results from the first differences analysis of the change in the composite measure of past year drug use frequency between waves two and three. The top portion of the table displays the results for the full sample in which data from 386 subjects are analyzed. Only time-variant predictors are included in the model, which results in approximately 1% of the variation in the change in drug use frequency being explained by the model. The F statistic is not significant ($F = 1.22$, p

³¹ In a portion of the first-differences analyses, the change in short-term employment and the change in marital status are substituted for the change in long-term employment and the change in the percent of time married, respectively. When the conclusions differ using these alternate social bonding variables, the results are reported in the text.

= .29), which suggests that the slope coefficients, when examined collectively to predict changes in past year drug use frequency, equal zero. The effects of the individual slope coefficients are not significant (see Table 23), supporting the conclusion obtained from the *F* statistic. Of particular interest is the lack of significance among the social bonding change scores. Changes in social bonds between waves two and three do not add anything to our understanding of changes in drug use frequency in adulthood. When different social bonding variables are substituted into the analysis, the substantive conclusions remain unchanged.³²

First-Differences Drug-Specific Results

Table 24 displays the first-differences results for changes in alcohol frequency in adulthood.³³ Data from 358 subjects are analyzed. Only 1% of the variation in the change in alcohol frequency between early and later adulthood is accounted for by the model. The combined influence of the covariates in the model used to predict changes in past year alcohol frequency equal zero ($F = 1.21, p = .30$). However, one social bond predictor is significantly related to the dependent variable. Specifically, there is a positive relationship between changes in long-term employment between waves two and three and changes in alcohol frequency during the same period ($t = 1.97, p < .05$). This relationship is also found in the OLS analysis of alcohol frequency in later adulthood controlling for wave two and wave three covariates,

³² When substituting marital status for the percent of time married or short-term employment for long-term employment, the change in welfare status between wave two and wave three is inversely related to changes in drug use frequency in adulthood at a p-level of less than .05. However, the F-statistic remains insignificant.

³³ First-difference results using different combinations of the social bonding variables on changes in alcohol frequency mimic the findings uncovered from the analysis using the social bonding variables of greatest theoretical interest.

including a lagged measure of the dependent variable (see Table 14). However, since R^2 is not significantly different from zero ($F = 1.21, p = .30$), caution should be used when drawing conclusions about the strength of the positive relationship between long-term employment and alcohol frequency in adulthood.

Table 25 displays the results for the change in marijuana frequency between early and later adulthood and Table 26 presents the results for the change in cocaine frequency during the same time period. Data from 383 subjects is analyzed in both tables and less than 1% of the variation for either dependent variable is explained by the models. The joint effect of the independent variables used to explain changes in past year marijuana frequency and cocaine frequency equals zero ($F = .29, p = .81$ and $F = .53, p = .71$, respectively). No significant effects of the predictors are uncovered for either past year marijuana or cocaine frequency. These findings remain regardless of what social bonding measures are substituted into the models. These findings suggest that differencing-out the lagged measure of the dependent variable markedly reduces how well the models can explain changes in marijuana and cocaine frequency. In the OLS analysis, most of the models reveal only a significant effect of the lagged measure of the dependent variable in later adulthood.³⁴

First-Differences Interaction Results

The first-differences analysis discussed in the previous section is conducted separately for males and females and the slope estimates of the social bonding change

³⁴ Analysis of variance models were run for all drug variables and the results reveal that while there is a large portion of within-group variation in the data, there is very little between-group variation. Since the F-statistic used in OLS regression tests the ratio of between-group variation to within-group variation, the high amount of within-group variation explains the lack of significance for the first-differences regression models.

scores are compared using Clogg's (1995) z-test for model comparisons. In the traditional OLS interaction analysis, two significant interaction effects are uncovered in relation to the period between early and later adulthood. The first interaction effect uncovered in the traditional OLS analysis is a significant inverse relationship between long-term schooling and the composite measure of past year drug use frequency in later adulthood. The second interaction uncovered is a significant positive association between long-term employment and alcohol frequency in later adulthood. While the first-differences analysis is not directly comparable, the conclusions obtained, if similar, would provide additional support for the presence of an interaction effect while controlling for unobserved heterogeneity. Across the four drug frequency measures, only one interaction effect is uncovered. Specifically, gender appears to moderate the relationship between the change in long-term schooling and the change in drug use frequency ($t = -1.96, p = .05$). However, this interaction effect is not found among the change variables of greatest theoretical import. It is only when short-term employment is substituted for long-term employment that the interaction effect is revealed. Similar to the OLS interaction analysis (see Tables 19 and 19a), the inverse relationship between the change in long-term schooling and the change in drug use frequency favors males. It is also important to note that the F statistic for the first-differences regression model of the change in past year drug use frequency among males and females is not significant ($F = 1.33, p = .25$ and $F = .65, p = .62$, respectively). Therefore, caution should be used when interpreting the significant interaction effects. No interaction effects are uncovered from any of the other drug frequency measures.

In conclusion, the only significant main effect of the social bonding variables uncovered from the first-differences analysis is a positive, association between changes in long term employment and changes in past year alcohol frequency in adulthood. This finding is uncovered despite the additional controls imposed for unobserved heterogeneity. The OLS analysis of alcohol frequency during later adulthood also found this positive relationship between long-term employment and alcohol frequency in later adulthood. As noted previously, this finding is contrary to the underlying theory. Furthermore, caution should be used when interpreting this finding because the *F* statistic is not significant and the amount of variation explained by the model is 1%. The interaction results obtained using the first-differences equation reveal only one significant interaction effect. For males, changes in long - term schooling are significantly and inversely related to change in past year drug use frequency. This interaction effect is also supported by the OLS interaction analysis of the composite measure of past year drug use frequency in later adulthood. It is important to note that the model revealing the interaction effect does not incorporate the social bonding variables of greatest theoretical import and the *F* statistic for the gender-specific models is not significant. Furthermore, the interaction effect is moderate with a t-statistic equal to -1.96 ($p = .05$).

Chapter 5: Discussion and Conclusions

In 1993, Sampson and Laub presented their age-graded theory of informal social control in their book, *Crime in the Making: Pathways and Turning Points through Time*. Using a sample of white males living in disadvantaged neighborhoods in Boston, the researchers examined the relationship between social bonds and crime over time. Sampson and Laub (1993) found that despite continuity in criminal behavior there is change. According to the authors, behavior change in adulthood is linked to attachments established in employment and in marriage. The strength and quality of the bonds established in marriage, for instance, influence crime and can redirect criminal trajectories. When these bonds are weakened, crime is likely to continue (Laub and colleagues, 1998).

Sampson and Laub (1993) argue that their research findings regarding the salience of social bonds in explaining changes in crime over time can generalize to different race and gender groups. While research has supported their argument, questions remain (see Giordano et al., 2002; Nielsen, 1999; Yamaguchi and Kandel, 1985; Piquero et al., 2002). Giordano and colleagues (2002), using a heterogeneous sample of offenders, find minimal independent effects of marital attachment and stable employment on crime desistance. However, the researchers find that respondents who experience both a stable marriage and stable employment are likely to desist from crime. It is important to note that the offenders most likely to experience both a stable marriage and stable employment represent approximately 16% of the total sample (N = 254) and the majority of these offenders are white

(Giordano et al., 2002). Among a largely African American sample of male offenders, Uggen (2000) finds support for employment as an effective constraint against recidivism among older, compared to younger, offenders. While some critics question how well Sampson and Laub's theory explains changes in criminal behavior among diverse sample populations (Tracy and Kempf-Leonard, 1996), prior research using more contemporary, heterogeneous sample populations appears to show some support for Sampson and Laub's (1993) theory.

The current research explored further the importance of social bonds in understanding changes in problem behavior, specifically drug use, among a contemporary sample of African-American males and females. The focus of this research was to examine whether the opportunities to establish bonds in education, employment or marriage are available for a sample population growing-up in a different historical period and espousing different sample characteristics than the sample analyzed by Sampson and Laub (1993). Analyses were conducted using data from Dr. Ann Brunswick's *Harlem Longitudinal Study of Urban Black Youth*. Subjects surveyed for the longitudinal study grew-up in families that had, on average, 5 people living in the household and approximately 45% of subjects had a father or step-father living in the house. Approximately, 54% of the respondents' mothers reported that they had some high school education or less (N = 605). This chapter provides an overview of the research findings from this study, discusses how the findings conform to and depart from the underlying theory, and identifies future research directions.

Overview of Research Findings

Two main research questions are examined in the current study. The first research question is whether adult social bonds (i.e., job stability, occupation-related commitment, and marital stability) influence drug use controlling for age, welfare status, gender, and individual differences in the propensity to use drugs among a sample of African-American males and females. The second research question is whether there is a relationship between social bonds and drug use in adulthood controlling for unobserved heterogeneity. The results from the traditional regression analyses reveal a significant inverse relationship between social bonds and past year drug use frequency in early adulthood. Specifically, between adolescence and early adulthood, the three social bonding variables of greatest theoretical import (i.e., long-term schooling, long-term employment, and the percent of time married) are significantly related to the composite measure of past year drug use frequency, controlling for several covariates. The slope coefficients for the social bonding variables are in the direction predicted by the underlying theory. The drug-specific analyses reveal less consistent effects of the social bonding variables. None of the social bonding variables are significantly related to past year marijuana frequency in early adulthood.³⁵ In contrast, long-term schooling is inversely and significantly related to past year alcohol and cocaine frequency in early adulthood. Long term employment is also inversely and significantly related to past year cocaine frequency in early adulthood. Despite the less consistent significant effects of the social

³⁵ When drug use propensity measured in adolescence is excluded from the regression model of past year marijuana frequency in early adulthood, long-term schooling is inversely and significantly related to marijuana frequency, controlling for the prior and concurrent wave's covariates.

bonding variables in the drug-specific analyses, most of the slope coefficients are in the inverse direction as suggested by the underlying theory. It is important to note that no more than 14% of the variation in any of the drug use frequency analyses is accounted for by the regression models analyzed in early adulthood.

Between early and later adulthood, there does not appear to be a clear relationship between social bonds and past year frequency of use. No more than 23% of the variation in the dependent variable of interest is accounted for by the regression models. Consistent with prior research, the strongest and often times the only predictor of past year drug frequency in later adulthood is the prior wave's measure of drug use. Certain social bonding variables reveal a significant association with past year alcohol and cocaine frequency in later adulthood. Although contrary to the underlying theory, long-term employment measured concurrently with past year alcohol frequency reveals a positive and significant association. While this finding is similar to results uncovered by Temple and colleagues (1991) who find that becoming employed is positively related to alcohol consumption among older and younger males as well as older females, their results are not significant. For cocaine frequency, a significant and predictive effect of long-term employment is uncovered as well as a concurrent effect of marriage. While long-term employment in early adulthood is positively related to past year cocaine frequency in later adulthood, being married in later adulthood is significantly and inversely related to cocaine frequency.³⁶ Supplemental analyses were conducted which excluded the lagged

³⁶ The significant effects of the social bonding variables for past year cocaine frequency in later adulthood are only revealed when the variable marital status is substituted for the percent of time married at waves two and three.

measure of the dependent variable. When wave two and wave three covariates are included in the model, the only significant relationship uncovered is an inverse association between long-term schooling and past year frequency of marijuana.

Interaction analyses were conducted by analyzing the OLS regression models for males and females separately. The slope coefficients for the social bonding variables were compared using Clogg's (1995) z-test of model comparisons. Three significant interactions among the social bonding variables are uncovered from the analyses. The results reveal that gender moderates the relationship between long-term schooling and past year marijuana frequency measured in early adulthood, as well as between long-term schooling and the composite measure of past year drug frequency in later adulthood. Gender also appears to moderate the relationship between long-term employment and past year alcohol frequency in later adulthood. This interaction effect of long-term employment and alcohol frequency is positive. For the interaction effects, the gender-specific regression results reveal that in all cases the main effects of the social bonding variables are significant for males and not significant for females.

The OLS regression findings used to answer the first research question present a somewhat complicated picture of the relationship between social bonds and frequency of use during adulthood. While the regression results reveal a significant, inverse relationship between social bonds and past year frequency of use in early adulthood for some of the drug measures analyzed, the relationship in later adulthood is less clear. The most consistent predictor of past year drug use frequency in later adulthood is the prior wave's measure of drug use frequency. It seems that the social

bonding variables included in this analysis, as guided by Sampson and Laub's theory (1993), do not significantly or directly influence drug use frequency in later adulthood, net of earlier drug use frequency.

The second research question examined whether there is a relationship between adult social bonds and drug use frequency controlling for unobserved heterogeneity using Anderson and Hsiao's (1981) first-differences procedure. The differencing technique controls for unobserved heterogeneity by differencing out the lagged measure of the dependent variable from the right-hand side of the equation. The first-differences analysis is performed for the full sample as well as separately for males and females. The results from the first-differences analysis reveal an insignificant relationship between changes in education, employment, and marriage and changes in the composite measure of drug use frequency in adulthood. Specifically, the F statistic is not significant ($F = 1.22$, $p = .29$) and only about 1% of the variation in the dependent variable is explained by the first-differences model. The first-differences analysis is also run with the individual drug measures: alcohol, marijuana, and cocaine frequency. For each model, no more than 2% of the variation in the dependent variable is explained and the only significant social bonding effect uncovered in the analysis is a positive relationship between the change in long-term employment and the change in alcohol frequency. Despite this significant finding, the F statistic remains insignificant ($R^2 = 1.4\%$, which suggests that we are unable to reject the hypothesis that the joint effect of the model covariates equal zero). The conflicting conclusions obtained from the F and t tests cautions against making any

definitive conclusions about the significant effect uncovered in the first-differences model of alcohol frequency.

Analysis of variance (ANOVA) models were run with each of the social bonding variables and each drug frequency measure to examine the amount of between- and within-group variation in the data. The ANOVA models reveal a large amount of within-group variation compared to between-group variation. The first-differences procedure uses the F test, which is the ratio of between group to within-group variation, to test the overall significance of the model. With a huge amount of within-group compared to between-group variation, the test is unlikely to find a significant effect of the overall model. Furthermore, since the analysis is unable to examine changes in levels of behavior over time, the likelihood of uncovering significant effects is limited.

First-difference models were run separately for males and females and their slope coefficients were compared using Clogg's (1995) z-test for model comparisons. No interaction effects are uncovered from the analysis among the variables of greatest theoretical import. Unlike the traditional regression interaction analyses, the relationship between long-term schooling and the composite measure of drug use frequency in later adulthood is not moderated by gender. Similarly, the first-differences alcohol interaction analysis does not reveal a positive interaction effect between the change in long-term employment and past year alcohol frequency in adulthood.

Of the two main analyses performed, the first-differences analysis provides a more controlled examination of the relationship between social bonds and drug use

frequency. The reason for this is two-fold: 1) it directly assesses how changes in social bonds explain changes in drug use frequency, and 2) it controls for unobserved heterogeneity (i.e., self-selection) by differencing out the lagged measure of the dependent variable from the right-hand side of the equation. Including a lagged measure of the dependent variable in the regression equation controls for the partial adjustment of behavior over time but, by construction, lagged y is correlated with the error term. A non-zero correlation between an included time-variant measure and the fixed-component of the disturbance term results in biased slope coefficients. The concern with the first-differences analysis conducted in this research is that it is a conservative technique for analyzing change over time because it does not account for variation in the levels of the variables. Since the length of time between the measurement periods spans between six and eight years, it may be difficult to uncover a significant effect of the social bonding variables on changes in drug use over time if the changes occur early in the measurement period.

Of additional concern is the inability to examine change in the key social bonding variables between adolescence and early adulthood. As reported above, several of the traditional OLS regression results reveal a significant inverse relationship between the social bonding variables and drug use frequency as suggested by the underlying theory. Individuals are likely to experience a large number of role transitions between adolescence and early adulthood. Therefore, it would have been beneficial to examine how changes in social bonding variables between adolescence and early adulthood influence changes in drug use frequency during the same period. However, the social bonding variables of key theoretical

interest are not available during adolescence and, as a result, it was impossible to analyze those results while subsequently controlling for unobserved heterogeneity. In the following section, the regression results are discussed in relation to how they conform to and depart from Sampson and Laub's (1993) findings. The following section provides potential explanations that account for any departures from their findings.

Generalizability of Sampson and Laub's Life-Course Theory

Sampson and Laub's theory states that the quality of attachments established in adulthood influence crime, despite stability in criminal behavior over time. The traditional regression analyses conducted in this research support the basic premise of their theory, at least for early adulthood. Specifically, schooling, employment and marriage are inversely related to drug use in early adulthood, net of drug use propensity. As stated in the previous section, the effects of the social bonding variables in early adulthood on drug use frequency may be over-estimated. The proxy measure of observed individual heterogeneity controlled for in the analysis of drug use frequency in early adulthood is drug use propensity measured in adolescence. The drug use propensity measure captures cigarette and alcohol use among subjects ages 12 – 17. This is a relatively weak control for individual heterogeneity compared to the measure of prior drug use frequency controlled for in the regression models of drug use frequency in later adulthood. Brunswick (2002) noted that prior to the first wave of data collection community residents were very outspoken about their concerns over the implementation of her impending research

study. Specifically, residents were cautious about their children answering questions about their substance use. As a result, subjects' self-reports of cigarette and alcohol use at wave one (in adolescence) may be under-reported more so than expected (Mensch and Kandel, 1988). While it is important to include a measure controlling for observed individual heterogeneity, limitations associated with the measure of drug use propensity in adolescence suggest that the significant effects of the social bonding variables and drug use propensity revealed in early adulthood may be an artifact due to omitted variable bias.

In fact, the effects of the social bonding variables on drug use frequency are reduced to non-significance when a stronger proxy measure of individual heterogeneity (i.e., drug use frequency in early adulthood) is controlled for in the analysis. In later adulthood, the most consistent correlate of drug use frequency is the prior wave's drug frequency measure. While there are instances where the social bonds exert a significant effect on drug use frequency in later adulthood, most of these relationships disappear in the first differences analysis. For instance, a significant inverse relationship was uncovered between being married and cocaine frequency in later adulthood, controlling for prior cocaine frequency. However in the first-differences analysis, this significant relationship is reduced to non-significance. Given the consistent link between the social bonding variables on drug use in early adulthood, there may be some residual effect of these social bonding variables on drug use in later adulthood via prior drug use frequency. When the first-differences models are run, this residual effect is wiped out as the lagged measure of the dependent variable is moved from the right-hand side of the equation to the left-hand

side of the equation. Overall, the analytic technique used in this research is unable to unpack the dynamic effect of the social bonding variables on drug use frequency in later adulthood. For the most part, OLS regression and first-differences analyses reveal insignificant effects of the social bonding variables on drug use frequency in later adulthood. With regard to the significant effects of the social bonding variables on drug use frequency in early adulthood, caution should be used when interpreting those conclusions as strong support for the underlying theory.

If the significant effects of the social bonding variables on drug use frequency in early adulthood are the result of omitted variable bias, then it may be more important to focus on the social bonding outcomes revealed in later adulthood. There are several potential explanations for the inconsistent findings uncovered in later adulthood. One explanation is that the inclusion of the lagged measure of the dependent variable in the traditional regression model may over-estimate its effect on the measure of drug use frequency in later adulthood and reduce the effect of the other covariates in the model. This would suggest that by including lagged y in the regression models of drug use frequency in later adulthood more conservative estimates of the social bonding predictors would be uncovered. However, based on the supplemental analyses that were performed, the social bonding estimates remain insignificant (for the most part) when lagged y is excluded from the regression models. Furthermore, those supplemental analyses reveal that the variation explained by the regression models is substantially reduced when the lagged measure of the dependent variable is excluded from the regression models.

It could be argued that lack of variation in the dependent variable explains the not so encouraging results in later adulthood. Similar to crime, drug use frequency generally declines with age. Laub and Sampson (2003: 22) argue that research examining crime desistance should use a sample population that has met some “reasonable threshold of frequency and seriousness” of offending. In fact, Brunswick and colleagues (1992) find a significant and positive relationship between being unmarried and unemployed in early adulthood and heavy drug use in later adulthood among subjects who reported regular use of either marijuana or cocaine prior to age 26. However, this effect is found among females only. The only drug measure used in the current research that attempts to measure problem drug use is the composite measure of drug use frequency. This composite measure of drug use frequency is created by taking the maximum z-score across five drug measures: alcohol, marijuana, cocaine, heroin, and uppers for each individual. Alcohol is the most frequent drug used in this sample in early and later adulthood. However, alcohol frequency may not capture problem drug use. Since the quantity of drinks consumed is not taken into account, drinking alcohol everyday may represent consumption of one beer everyday. Moreover, use of cocaine or heroin a few times a week may be more problematic than drinking everyday. While drug-specific analyses were conducted to analyze the influence of social bonds on more “hard-core” drugs, over half of the sample reported no use of cocaine during early and later adulthood and at least 95% of the sample reported no use of heroin and uppers. Due to the lack of variation among heroin and upper frequency, drug-specific analyses were not performed for these variables. The lack of effects of the social bonding variables on

drug use in later adulthood may be because the sample population has not met a “reasonable threshold of frequency and seriousness” as argued by Laub and Sampson (2003: 22). It is important to note that one problem with this explanation is that low variation in the dependent variable is also an issue in early adulthood despite the significant effects for the social bonding variables on drug use frequency.

It is difficult to argue that the inconsistent effects of the social bonding variables in later adulthood are the result of low variation in the independent variables. Except for long-term schooling, respondents reported more involvement in employment and marriage in later adulthood. For instance, subjects reported attending school between adolescence and early adulthood for 6 months per year on average, compared to 1.6 months per year on average among subjects surveyed at wave three. In contrast, the average number of months per year employed in later adulthood is higher than in early adulthood. Subjects worked for an average of 4 months per year between adolescence and early adulthood whereas between early and later adulthood subjects worked for an average of 7 months per year. While only 10% of the sample at wave two reported being married, 26% reported being married at wave three in later adulthood. Despite the lower level of involvement in employment and marriage for subjects in early adulthood, the social bonding variables are significantly related to the drug use frequency. It is important to note that while there is a higher level of involvement in employment and marriage in later adulthood, the percentage of subjects married during later adulthood is considerably lower than among the Glueck sample analyzed by Sampson and Laub (1993). In fact, 66% of the men in the Gluecks’ sample were married by the age 31 follow-up survey

(Glueck, 1968) whereas only 26% of subjects in the current sample were married in later adulthood (i.e., between ages 25 – 31). It is not clear whether lack of variation in the independent variables is an adequate explanation for the inconsistent effects of the social bonding variables in later adulthood. There are fewer respondents married between adolescence and early adulthood (i.e., 10%) yet, a significant effect is revealed between the percent of time married on drug use frequency.

Another potential explanation may relate to how the social bonding variables are measured in the current research. While Sampson and Laub (1993) include the length of time employed at one's present job (similar to the current analysis) to measure job stability, they create composite measures of job stability and marital attachment using multiple variables (see Sampson and Laub, 1993: 145). In contrast to Sampson and Laub (1993) who are also able to characterize a subject's work habits or the nature of one's marital relationship and family bonds, the variables available and incorporated in the current research measure the length of time spent in school, employed, and married. One could argue that the longer the subject is immersed in conventional institutions, the less likely the subject is to behave in a way that would jeopardize the social capital acquired from these relationships. However, in the current research, a long period of employment may signal a high-rate of job turnover or multiple part-time jobs rather than full-time, stable employment. Therefore, it is not clear whether the social bonding variables available in this dataset adequately capture stability in a way that would reflect strong attachments to education, employment or marriage. Two of the social bonding variables are average measures of length of time in school and the length of time employed. These variables are may

not adequately capture changes that occur in drug use over time. With time intervals ranging between waves spanning between 6 and 8 years, changes in the independent variables that occur early in the interval may be too distant to affect changes that occur in the dependent variable later in the interval.

Two additional explanations for the null effects of the social bonding variables on drug use in later adulthood relate to 1) the salience of social bonds to explain drug use compared to crime desistance, and 2) the opportunities to acquire education, a stable job, and a stable marriage for a sample of African American males and females. The etiology and treatment of drug use continue to be explored in the research community. It may be that changes in drug use are less motivated by external constraints and more motivated by internal drives. If drug use is the result of a particular set of personality traits (e.g., temperament, low impulse control) then any effect of marriage on behavior change may be a result of those traits rather than a result of the bonds developed in marriage. However, a fairly established body of evidence suggests that drug use and crime are different manifestations of the same underlying processes (Fagan, Weis, and Cheng, 1990). Elliott, Huizinga, and Ageton (1985) find that peer associations directly impact delinquency and drug use whereas an indirect effect is explained by family and school process variables. While only a limited amount of variation is explained by the social bonding and social learning variables, Elliott and colleagues (1985) argue that the findings support the notion that delinquency and drug use are influenced by a common set of correlates and not the result of two separate etiological processes. It is the set of correlates underlying the behaviors that remains in question (Fagan et al., 1990). In an analysis of behavior

change in adulthood, Sampson and Laub (1993) examine the relationship between social bonds and excessive drinking and find a significant (and predictive) effect of job stability and attachment to spouse controlling for several covariates, including a measure of drug use propensity. While the research base is limited, other researchers find support for the inhibitory effects of social bonds on drug use in adulthood. White and Bates (1995) find that marriage and peer associations are significantly related to cocaine cessation. There appears to be a body of research that finds social bonds particularly salient in explaining changes in not only criminal behavior but also other forms of deviance, such as drug use.

Of additional importance is whether the available opportunities to engage in and establish relationships in school, employment and marriage are similar for minority, inner-city residents in the mid-1970s and early 1980s as they were for the white males analyzed by Sampson and Laub (1993). In an ethnographic analysis of the working poor living in Harlem in the 1990s, Newman (1999) discusses how the intersection of age, race, and gender restrict the opportunities of many minorities in the inner-city. Youth have a difficult time acquiring jobs within the urban community, especially when the demand for low-paying jobs is high and the supply of jobs is low. Young adults often find themselves competing against older and, often times, more highly educated members of the community. Newman (1999) finds that the connections that family members have with others in the community is one of the most important resources available for youth who are trying to enter the work force. In fact, the amount of human capital achieved through one's family ties may constrain involvement in criminal behavior more so than the attachments made in employment,

especially when those obtaining employment appear to be of a rather select group (Newman, 1999).

Research has shown that schooling has become increasingly important to inner-city residents, especially in relation to employment. Enrollment in school is a key selling point for youth looking for employment (Newman, 1999). Being enrolled in school is often more attractive to employers than a completed high-school degree because it shows that the applicant is currently connected to an institution that requires structure and discipline, similar to the requirements of a job. While an education is not a sufficient condition for upward mobility in the work world, it seems to be necessary. With a scarcity of jobs in the inner-city, employers can be selective in their hiring practices and most employers do not want to hire high-school dropouts. Furthermore, research has revealed that employment is linked to marriage (Wilson, 1987). Research suggests that black women and men weigh economic security very highly when deciding to marry more so than white women and men (Cherlin, 1998).

Questions remain about the salience of marriage in contemporary society with particular concerns expressed over the recent declines in marriage and increases in the divorce rate (Cherlin, 1998; Giordano et al., 2002). Research has shown that between the periods 1945 – 1950 and 1975 – 1980 the percent of time black women spent married over a lifetime declined from 40% to 22% (Cherlin, 1998). The relatively low percentage of married subjects in the Harlem sample may have been influenced by the explosion of crack-cocaine markets in New York City during the mid-1980s. The subsequent increases in the prison population during this time period may have

influenced the number of eligible marital partners in the urban community. The availability and suitability of marriage partners as well as changes in the institution of marriage may influence how salient marriage is among inner-city residents in contemporary society (Cherlin, 1998; Giordano et al., 2002).

The current research using an urban sample of African-American males and females does not overwhelmingly corroborate the findings from Sampson and Laub's research. While the findings of drug use frequency in early adulthood show support for the underlying theory, no consistent significant effects of the social bonding variables are uncovered in later adulthood. Most of the significant effects of the social bonding variables uncovered in this analysis are measured concurrently with drug use frequency compared to the significant, predictive effects found in Sampson and Laub's (1993) research. Despite the availability of longitudinal data, the results represent correlations among the variables and do not disentangle the temporal ordering among the measures or explore, in great detail, the causal effects. The first-differences analysis more adequately addresses the issue of change in the behavior over time. However, no significant effects among the change-score variables are uncovered and less than 2% of the variation in drug use frequency is accounted for in the models. Based on the amount of variation explained in the traditional OLS and first-differences regression analyses, a lot of the variation in drug use frequency remains to be explained. In the following section, future research directions are discussed with a specific focus on religiosity, a bonding variable found to consistently influence drug use frequency in adulthood.

Future Research Directions

It makes intuitive sense that no matter what historical period or group of subjects is analyzed, healthy relationships and social bonds are likely to inhibit involvement in crime or drug use. The concern here is whether the opportunities to develop such bonds are more or less abundant over time and for different race and sex groups. It could be that the opportunities to acquire stable employment for some sample populations may not be available if individuals have not acquired a high-level of education or sufficient occupational-related skills. Reaching a sufficient level of education may make individuals more marketable for long-term, stable employment. The results from this analysis suggest that the opportunities to establish relationships in certain institutions may be limited for certain sample populations living in a certain historical period and social context. While education, employment, and marriage reveal no significant effects on drug use frequency in later adulthood, future research should explore whether significant effects are revealed for other similarly situated sample populations and whether alternate institutions may be of particular importance in redirecting criminal and drug trajectories.

Supplemental analyses were conducted to explore the salience of alternate measures of social bonding variables on changes in drug use frequency in later adulthood. Based on prior research (Brunswick et al., 1992; Bachman, O'Malley, Schulenberg, Johnston, Bryant, and Merline, 2002), church attendance was incorporated into the regression models. This variable measures the number of times the subject attends church per month. A measure of prior and concurrent church

attendance was analyzed to assess the salience of religiosity on drug use frequency.³⁷ It is hypothesized that an inverse relationship exists between religiosity and drug use frequency (see Bahr, 1998; Kandel, 1980). The results from the regression analyses reveal an inverse relationship between religiosity and drug use frequency in early and later adulthood. Moreover, in the first-differences analysis, changes in religiosity in adulthood significantly influence changes in drug use frequency. Analyses for the individual drug measures (i.e., alcohol, marijuana, and cocaine frequency) also reveal the same inverse relationship between religiosity and drug use in adulthood. Unlike school, employment and marriage, religiosity significantly and inversely influences drug use frequency in early *and* later adulthood, net of prior drug use frequency. Most of the social bonding variables in early adulthood remain significant when church attendance is included in the regression model. However, long-term employment is reduced to a less conventional level of significance (i.e., $p < .10$). In later adulthood, the only two variables significantly related to drug use frequency include prior drug use frequency and a concurrent measure of church attendance. Regression models were run separately for males and females and the slope coefficients were compared using Clogg's z-test for model comparisons. The relationship between church attendance measured in adolescence and drug use frequency measured in early adulthood appears to be moderated by gender however, neither of the main effects are significant. Specifically, church attendance in adolescence is inversely related to the composite measure of drug use frequency in

³⁷ Only the regression models incorporating the social bonding variables of greatest theoretical interest were analyzed.

early adulthood for females ($t = -1.485$, $p = .139$). Conversely, the influence of church attendance in adolescence on the composite measure of drug use frequency in early adulthood is positive and not significant for males ($t = 1.392$, $p = .165$).

While some research suggests that religiosity mediates the relationship between marriage and drug use in adulthood (see Bachman et al., 2002), the cursory analysis performed herein suggests that marriage retains its direct effect on the composite measure of drug use frequency in early adulthood, despite controls for religiosity. Religiosity is found to be relatively stable over time (Bachman et al., 2002). Therefore, it is not clear whether religiosity is the result of individual characteristics (i.e., less impulsive individuals are more likely to be religious) or the result of the environment (e.g., growing up in a religious household). While there are several explanations for why religion matters, these supplemental results do not provide insight on the mechanism by which religion is inversely related to drug use frequency in adulthood.

The significant effect of religiosity on changes in drug use in adulthood supports the basic premise of Sampson and Laub's (1993) life-course theory. Unlike Laub and Sampson (2003) whose current research does not reveal any inhibiting effect of religiosity on the criminal behavior for a sub-sample of the delinquent white men born in Boston during the 1920s and early 1930s, this research finds a very strong relationship between religiosity and drug use. Future research should continue to explore the importance of employment, marriage, and education as well as religion.

Like most research, the ability to make strong inferences about the key relationships of interest depends heavily on the strength of the measures available in

the dataset and the statistical models available to explore the relationships of interest. The variables available in the current dataset do not measure the strength or quality of ties to school, employment, or marriage. Even the measure of religiosity (i.e., frequency of church attendance per month) does not capture the quality of attachment to church. The definition of the social bonding measures may need to be expanded in future research. Specifically, it may be relevant to explore the salience of civil unions as well as marriage on changes in problem behavior in adulthood. While Horney and colleagues (1995) found a positive relationship between living with a girlfriend and criminal recidivism, it would be interesting to explore whether this finding remains across different sample populations. While the dataset used for the current research does have information available on living with a significant other, the information is only available at wave three, in later adulthood.

To explore further the relationship between social bonds and drug use, future research may want to examine additional waves of the *Harlem Longitudinal Study of Urban Black Youth*. The use of four data waves may provide additional flexibility in the type of analytic strategy that can be employed to examine the relationships of interest, especially if the variables of interest are similarly measured for at least three waves of data. By extending the number of data waves, greater variation may be uncovered in the frequency of adult role transitions experienced by subjects as they age as well as in the measures of drug frequency. The use of different modeling techniques may provide results that differ from those uncovered in the current research. In the current research, the dependent variable is ordinal but it shares properties similar to that of a classic frequency measure. For certain drugs such as

cocaine the amount of variation is limited and it may be beneficial to conduct more discrete analyses to examine change in behavior over time.

The current research provides additional insight on the salience of social bonds in explaining changes in drug use over time. Future research should continue to analyze criminological theories using diverse sample populations. Also, datasets may have alternate measures of social bonds that are important to understanding behavior change over time. It was only when supplemental analyses were performed with religious attendance that stronger support was uncovered for changes in drug use frequency over time. With regard to criminal justice policy, the ties established to religious organizations may be of particular importance when addressing prisoner re-entry. Research indicates that prisoners re-entering society often do not have high education qualifications and often lack the occupation-related skills to secure a stable job once released (Lynch and Sabol, 2001). Lack of stable income and a checkered past may also make these newly released prisoners ill-prepared to develop positive relationships in society. The opportunities to acquire employment or a suitable marriage partner may be limited for newly released prisoners. As a result, church may provide an environment where prisoners can receive free counseling by a religious leader and escape familiar criminal networks on the street. While this is not to say that the criminal justice system should force newly released prisoners to “find God”, it is to say that active participation in a local community organization whose purpose is to serve those most in-need may be a suitable place to begin establishing social capital in conventional society. With increases in government funds allocated to faith-based organizations, there are opportunities to evaluate programs offered by

religious institutions and to explore the salience of religiosity as a mechanism of social control in contemporary society among diverse populations.

Appendices

Appendix A: Operationalization and Coding of Variables

Variable	Description	Coding
Age	Respondent's age	Continuous variable that ranges from 12 to 17 years of age at wave one, 18 to 23 years of age at wave two, and 25 to 31 years of age at wave three.
Gender	Respondent's gender	Dichotomized variable where males are coded as one (1) and females as zero (0).
Welfare	Respondent's welfare status	Welfare status was originally created as a nominal-level variable but is recoded as a binary variable where receiving welfare is scored as one (1) while not receiving welfare is scored as zero (0).
Drug Use Propensity	Summated scale of respondent's daily alcohol and daily cigarette frequency	The daily alcohol and cigarette frequency measures are highly skewed and, as a result, are recoded into binary variables. The recoded variables are then summed to create the drug use propensity measure, which ranges in value from zero (0) to two (2).
Long-term Employment	Respondent's average number of months worked per year between 1971 through 1983	Continuous scale variable that ranges in value from 0 to 12 months. This variable is created at waves two and three.
Short-term Employment	Respondent's total number of months worked at current job	The variable ranges in value from 0 to 67 months at wave two and from 0 to 104 months at wave three. A value of zero represents subjects who are not currently working or who have been working less than one month.

Appendix A: Operationalization and Coding of Variables

Variable	Description	Coding
Education Aspirations	Respondent's education aspirations	The variable is an ordinal-level measure at wave one. The variable is recoded to represent four general response categories: High School (1), Some college (2), Four years of College (3), Graduate school (4)
Long-term Schooling	Average number of months in school between 1971 and 1983	Continuous scale variable that ranges in value from 0 to 12 months. This variable is created for waves two and three.
Marital Status	Respondent's marital status	Dichotomized variable where respondents who are married are given a score of one (1) whereas respondents who are not married are given a score of zero (0).
Percent of Time Married	Percent of time married between data waves	Retrospective measure of the percent of time married between data waves. The variable is measured on a continuous scale ranging in values from 0 to 100 percent. The total number of months married between waves is divided by the total number of months between waves and then multiplied by 100. The distribution of this variable measured between waves one and two is highly skewed and, as a result, the values are transformed by taking the inverse of the variable multiplied by -1.

Appendix A: Operationalization and Coding of Variables, Continued

Variable	Description	Coding
Drug Frequency	Frequency of drug use in the past year	Five drug frequency measures are included in the analysis: alcohol, marijuana, cocaine, heroin, and upper frequency. All variables are continuous in nature. Higher values indicate a higher frequency of drug use. To reduce the skewed distribution of the heroin and upper frequency measures, the data values are transformed by taking the inverse multiplied by -1. Since alcohol is measured on a slightly different scale than the four other drug measures, the drug measures are converted to z-scores. A composite drug frequency measure is calculated by taking the maximum z-score value across the five variables.

Appendix B: Bivariate Correlations between Social Bonds and Drug Frequency

	Drug Frequency (18 - 23)	Drug Frequency (25 - 31)
Job Stability Measures		
Long-term Employment	-.018 (n = 534)	-.074 (n = 411)
Short-term Employment	-.042 (n = 534)	-.147** (n = 411)
Commitment to Occupation-related Goals Measures		
Long-term Schooling	-.177** (n = 535)	-.139** (n = 410)
Marital Stability Measures		
Married	-.044 (n = 536)	-.103* (n = 411)
Percent of Time Married ^a	-.092* (n = 515)	-.072 (n = 401)

* $p < .05$, ** $p < .01$

^a Due to the skewed distribution of this variable, the values are transformed by taking the inverse and multiplying by -1.

Appendix B1: Bivariate Correlations between Social Bonds and Alcohol Frequency

	Alcohol Frequency (18 - 23)	Alcohol Frequency (25 - 31)
Job Stability Measures		
Long-term Employment	.069 (n = 507)	.060 (n = 393)
Short-term Employment	.042 (n = 507)	-.042 (n = 393)
Commitment to Occupation-related Goals Measures		
Long-term Schooling	-.166** (n = 508)	-.073 (n = 392)
Marital Stability Measures		
Married	-.013 (n = 509)	-.006 (n = 393)
Percent of Time Married ^a	-.036 (n = 490)	.003 (n = 384)

* p < .05, ** p < .01

^a Due to the skewed distribution of this variable, the values are transformed by taking the inverse and multiplying by -1.

Appendix B2: Bivariate Correlations between Social Bonds and Marijuana Frequency

	Marijuana Frequency (18 - 23)	Marijuana Frequency (25 - 31)
Job Stability Measures		
Long-term Employment	.070 (n = 531)	.011 (n = 410)
Short-term Employment	.040 (n = 531)	-.052 (n = 410)
Commitment to Occupation-related Goals Measures		
Long-term Schooling	-.061 (n = 532)	-.171** (n = 409)
Marital Stability Measures		
Married	-.095* (n = 533)	-.112* (n = 410)
Percent of Time Married ^a	-.122** (n = 512)	-.121* (n = 400)

* p < .05, ** p < .01

^a Due to the skewed distribution of this variable, the values are transformed by taking the inverse and multiplying by -1.

Appendix B3: Bivariate Correlations between Social Bonds and Cocaine Frequency

	Cocaine Frequency (18 - 23)	Cocaine Frequency (25 - 31)
Job Stability Measures		
Long-term Employment	-.045 (n = 531)	-.025 (n = 410)
Short-term Employment	-.086* (n = 531)	-.065 (n = 410)
Commitment to Occupation-related Goals Measures		
Long-term Schooling	-.109* (n = 532)	-.124* (n = 409)
Marital Stability Measures		
Married	-.076 (n = 533)	-.115* (n = 410)
Percent of Time Married ^a	-.078 (n = 512)	-.134** (n = 400)

* p < .05, ** p < .01

^a Due to the skewed distribution of this variable, the values are transformed by taking the inverse and multiplying by -1.

Tables

Table 1: Descriptive Statistics for Independent Variables at Wave One

Variables	% Missing	Mean or %
Age ^a	0.9%	14 (1.64)
Gender	0.0%	
Male		52%
Female		48%
Welfare	1.2%	46%
Drug Propensity ^a	1.3%	.41 (.65)
Educational Aspirations	2.7%	
High school		29%
Some college		14%
Four years of college		51%
Graduate school		6%
Currently Employed	0.6%	9%

^a Standard deviation in parentheses

Table 2: Descriptive Statistics for Independent Variables at Wave Two

Variables	% Missing	Mean or %
Age ^a	0.0%	20.5 (1.44)
Gender	0.0%	
Male		52%
Female		48%
Welfare	1.1%	22%
Long-term Employment ^a	0.4%	3.83 (3.28)
Short-term Employment ^a	0.4%	7.37 (13.97)
Long-term Schooling ^a	0.2%	6.17 (3.27)
Percent of Time Married ^{ab}	3.9%	3.42 (14.99)
Currently Married	0.0%	10%

^a Standard deviation in parentheses

^b To reduce the skewed distribution of this variable, the values are transformed by taking the inverse and multiplying by -1. The inverted value is -.92 (SD = .258) (range of values: -1.00 to -.01).

Table 3: Descriptive Statistics for Independent Variables at Wave Three

Variables	% Missing	Mean or %
Age ^a	0.0%	28 (1.57)
Gender	0.0%	
Male		48%
Female		52%
Welfare	0.2%	32%
Long-term Employment ^a	0.0%	6.94 (4.36)
Short-term Employment ^a	0.0%	23.78 (30.86)
Long-term Schooling ^a	0.2%	1.59 (2.36)
Percent of Time Married ^{ab}	2.4%	16.96 (31.63)
Currently Married	0.0%	26%

^a Standard deviation in parentheses

^b To ensure the comparability of the percent of time married across waves two and three, the inverse of the percent of time married at wave three is taken and multiplied by -1. The inverted value is -.71 (SD = .260) (range of values: -1.00 to -.01).

Table 4: Descriptive Statistics for Past Year Drug Frequency

Variable	Wave Two (1975 – 1976)	Wave Three (1983 – 1984)
N of Cases	509	393
Alcohol Frequency		
No use or No current use	16%	13%
Every few months	8%	12%
Once per month	6%	8%
Few times per month	15%	15%
Once or twice a week	23%	31%
Every few days	18%	13%
Everyday	14%	8%
Mean ^a	3.28 (1.98)	3.09 (1.83)
N of Cases	533	410
Marijuana Frequency		
No use or No current use	37%	45%
Only tried once or twice	2%	2%
Few times a year	4%	9%
Once a month	4%	4%
Few times per month	13%	12%
Few times per week	24%	15%
Everyday	16%	13%
Mean ^a	2.91 (2.43)	2.34 (2.39)
N of Cases	533	410
Cocaine Frequency		
No use or No current use	75%	64%
Only tried once or twice	4%	3%
Few times a year	5%	11%
Once a month	4%	4%
Few times per month	7%	10%
Few times per week	4%	6%
Everyday	1%	2%
Mean ^a	0.79 (1.56)	1.19 (1.80)

^a Standard deviation in parentheses.

Table 4: Descriptive Statistics for Past Year Drug Frequency, Continued

Variable	Wave Two (1975 – 1976)	Wave Three (1983 – 1984)
N of Cases	536	411
Heroin Frequency ^b		
No use or No current use	96%	95%
Only tried once or twice	0.4%	1%
Few times a year	0.4%	0.5%
Once a month	0.2%	0.5%
Few times per month	1.0%	1%
Few times per week	1.9%	0.5%
Everyday	1.1%	1.5%
Mean ^a	0.16 (0.89)	0.17 (0.89)
N of Cases	533	410
Upper Frequency ^b		
No use or No current use	97%	98.3%
Only tried once or twice	0.7%	0.2%
Few times a year	1.1%	1.0%
Once a month	0.4%	***
Few times per month	0.2%	0.2%
Few times per week	0.2%	***
Everyday	0.4%	0.3%
Mean ^a	0.08 (0.54)	0.05 (0.41)
Maximum Drug Frequency ^c		
Mean ^a	0.96 (1.34)	1.00 (1.36)

^a Standard deviation in parentheses.

^b To reduce the skewed distribution of heroin and upper frequency, the frequency measures were inverted and multiplied by -1. The mean of the transformed heroin variable is -.988 (SD = .090). The mean of the transformed upper variable is -.965 (SD = .158).

^c Drug frequency measures were converted to z-scores then the maximum z-score was taken to create a maximum drug frequency measure.

Table 5: Validity of Drug Frequency Measures

Correlates	Drug Use Frequency (18 – 23)	Drug Use Frequency (25 – 31)
Gender ^a		
Males	1.254 (1.43)	1.204 (1.59)
Females	0.640 (1.15)	0.802 (1.07)
	t = 5.457**	t = 3.028**
Age ^b		
	0.052	-0.011
Welfare ^a		
Receive welfare	0.814 (1.19)	1.29 (1.49)
Do not receive welfare	1.000 (1.38)	0.859 (1.27)
	t = -1.312	t = 2.878**
Prior Drug Frequency ^b	0.162**	0.421**

^a Mean values with standard deviations in parentheses.

^b Pearson correlations.

** p < .01

Note: Table presents the relationships between wave two covariates and wave two drug use as well as between wave three covariates and wave three drug use.

Table 6: Validity of Alcohol Frequency Measures

Correlates	Alcohol Frequency (18 – 23)	Alcohol Frequency (25 – 31)
Gender ^a		
Males	3.736 (1.94)	3.269 (1.96)
Females	2.801 (1.90)	2.936 (1.68)
	t = 5.472**	t = 1.799
Age ^b		
	0.055	0.040
Welfare ^a		
Receive welfare	2.981 (2.098)	3.344 (1.992)
Do not receive welfare	3.360 (1.938)	2.981 (1.746)
	t = -1.778	t = 1.746
Prior Drug Frequency ^b	0.079	0.434**

^a Mean values with standard deviations in parentheses.

^b Pearson correlations.

** p < .01

Note: Table presents the relationships between wave two covariates and wave two alcohol frequency as well as between wave three covariates and wave three alcohol frequency.

Table 7: Validity of Marijuana Frequency Measures

Correlates	Marijuana Frequency (18 – 23)	Marijuana Frequency (25 – 31)
Gender ^a		
Males	3.602 (2.259)	2.873 (2.413)
Females	2.177 (2.406)	1.845 (2.269)
	t = 7.037**	t = 4.434**
Age ^b		
	-0.042	-0.069
Welfare ^a		
Receive welfare	2.584 (2.385)	2.692 (2.449)
Do not receive welfare	3.009 (2.444)	2.182 (2.353)
	t = -1.649	t = 2.013*
Prior Drug Frequency ^b	0.137**	0.429**

^a Mean values with standard deviations in parentheses.

^b Pearson correlations.

** p < .01

Note: Table presents the relationships between wave two covariates and wave two marijuana frequency as well as between wave three covariates and wave three marijuana frequency.

Table 8: Validity of Cocaine Frequency Measures

Correlates	Cocaine Frequency (18 – 23)	Cocaine Frequency (25 – 31)
Gender ^a		
Males	1.080 (1.787)	1.303 (1.807)
Females	.501 (1.227)	1.099 (1.796)
	t = 4.375**	t = 1.145
Age ^b		
	-0.016	-0.021
Welfare ^a		
Receive welfare	0.840 (1.628)	1.610 (2.085)
Do not receive welfare	0.787 (1.546)	1.007 (1.623)
	t = 0.321	t = 2.922**
Prior Drug Frequency ^b	0.127**	0.424**

^a Mean values with standard deviations in parentheses.

^b Pearson correlations.

** p < .01

Note: Table presents the relationships between wave two covariates and wave two cocaine frequency as well as between wave three covariates and wave three cocaine frequency.

Table 9: Wave One Predictors of Survey Completion at Wave Two

Predictors	Survey Completion ^a Total Sample
Age (n = 668)	-0.112**
Male (n = 668)	-0.035
Number of persons in household (n = 668)	0.061
Number of rooms in household (n = 659)	-0.016
Length of time at present residence (n = 657)	0.034
Length of time residing at present neighborhood (n = 659)	0.067
Grade in school (n = 664)	-0.081*
Education aspirations (n = 650)	-0.008
Father's Education (n = 268)	-0.083
Mother's Education (n = 605)	-0.080*
Annual income (n = 552)	-0.063
Receive welfare (n = 660)	0.037
Number of persons living on income (n = 647)	0.063
Occupation aspirations (n = 633)	0.031
Employed (n = 664)	-0.018
Number of hours work per week (n = 68)	-0.158
Number of clubs belong to (n = 668)	0.014
Total number of hours watch television per day (n = 662)	0.050
Total number of times go to the movies per month (n = 659)	0.034
Total number of times attend church per month (n = 652)	0.037
Total number of close friends (n = 633)	0.003
Number of pregnancies (n = 181)	-0.010
Total number of children (n = 18)	-0.325
Often worry about the future (n = 661)	0.012
Want to change a lot about myself (n = 657)	-0.051
Feel unhappy most of the time (n = 663)	-0.037
I am no good (n = 656)	-0.034
I feel useless (n = 658)	-0.061
Upset by personal problems (n = 659)	-0.112**
Total number of self changes (n = 333)	0.007
Total number of serious injuries in the past year (n = 668)	0.002
Frequency of punishment (n = 655)	0.019
Poor health status (n = 667)	0.037
Total number of self-reported health problems (n = 668)	0.082*
Health limits activity (n = 664)	0.061
Total number of school days missed due to health in past year (n = 635)	0.005
Have nervous/emotional trouble (n = 665)	0.030
Drug propensity (n = 659)	-0.053

* Significant at the .05 level (2-tailed)

** Significant at the .01 level (2-tailed)

^a Survey completion is coded one (1) for completing the wave two survey.

Table 10: Wave Two Predictors of Survey Completion at Wave Three

Predictors	Survey Completion ^a Total Sample
Age (n = 536)	-0.031
Male (n = 536)	-0.086*
Number of persons in household (n = 532)	0.026
Length of time at present residence (n = 535)	0.071
Number of different neighborhoods lived in (n = 283)	-0.008
Last grade completed (n = 376)	-0.042
Education aspirations (n = 460)	0.012
Long-term schooling (n = 535)	0.079
Annual income (n = 311)	0.053
Receive welfare (n = 530)	0.031
Number of months on welfare (n = 111)	-0.079
Occupation aspirations (n = 516)	0.005
Employed (n = 536)	-0.007
Long-term employment (n = 534)	-0.061
Short-term employment (n = 534)	-0.005
Number of hours work per week (n = 479)	0.006
Belong to a club or group (n = 532)	0.044
Number of formal groups belong to (n = 530)	-0.015
Total number of hours watch television per day (n = 531)	0.031
Total number of times go to the movies per month (n = 534)	-0.013
Total number of times attend church per month (n = 531)	0.083
Total number of times go to the bar per month (n = 533)	0.062
Total number of close friends (n = 515)	-0.011
Friends outside of the neighborhood (n = 533)	0.029
Married (n = 536)	-0.002
Are you pregnant (n = 259)	0.047
Total number of pregnancies (n = 170)	-0.083
Have a child (n = 536)	-0.027
Total number of children (n = 205)	-0.063
Often worry about the future (n = 534)	0.121**
Want to change a lot about myself (n = 533)	-0.069
Feel unhappy most of the time (n = 533)	-0.005
I am no good (n = 532)	-0.011
I feel useless (n = 532)	-0.009
Upset by personal problems (n = 532)	0.039
Involved in a serious accident (n = 536)	-0.102*
Total number of health worries (n = 534)	0.071
Total number of self-reported health problems (n = 536)	0.026
Health limits activity (n = 512)	-0.007

* Significant at the .05 level (2-tailed)

** Significant at the .01 level (2-tailed)

^a Survey completion is coded one (1) for completing the wave three survey.

Table 10: Wave Two Predictors of Survey Completion at Wave Three, Continued

Predictors	Survey Completion ^a Total Sample
Total number of school days missed due to health in past year (n = 536)	0.036
Have nervous/emotional trouble (n = 536)	0.042
Number of drugs around here (n = 536)	-0.048
Number of friends who use drugs (n = 533)	-0.011
Number of cigarettes per day (n = 534)	-0.030
Alcohol frequency (n = 509)	-0.052
Marijuana frequency (n = 533)	-0.073
Cocaine frequency (n = 533)	-0.054
Heroin frequency (n = 536)	-0.001
Upper frequency (n = 533)	-0.083
Trouble with drugs or alcohol (n = 536)	0.001
Been treated for drugs or alcohol (n = 467)	-0.070
Number of times in treatment (n = 31)	0.117
Number of illicit drugs used (n = 536)	-0.082

* Significant at the .05 level (2-tailed)

** Significant at the .01 level (2-tailed)

^a Survey completion is coded one (1) for completing the wave three survey.

Table 11: OLS Regression Models Predicting Drug Frequency in Adulthood

Independent Variables (N = 482)	Drug Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	1.005	1.015	0.99
Drug Propensity (12 – 17)	0.212	0.101	2.10*
Age (18 – 23)	-0.007	0.046	-0.14
Gender ^b	0.656	0.124	5.29**
Welfare (12 – 17)	-0.050	0.116	-0.43
Welfare (18 – 23)	-0.221	0.154	-1.43
Education Aspirations (12 – 17)	-0.062	0.061	-1.01
Long-term Schooling (18 – 23)	-0.074	0.021	-3.46**
Employed (12 – 17)	-0.116	0.208	-0.55
Long-term Employment (18 – 23)	-0.041	0.019	-2.20*
Percent of Time Married (18 – 23)	-0.536	0.228	-2.35*
R ² = .133			
Independent Variables (N = 386)	Drug Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	1.980	1.448	1.36
Prior Drug Frequency (18 – 23)	0.414	0.053	7.87**
Age (25 – 31)	-0.061	0.048	-1.26
Gender ^b	0.212	0.145	1.46
Welfare (18 – 23)	0.229	0.182	1.26
Welfare (25 – 31)	0.217	0.169	1.27
Long-term Schooling (18 – 23)	-0.007	0.026	-0.27
Long-term Schooling (25 – 31)	-0.019	0.030	-0.64
Long-term Employment (18 – 23)	0.032	0.024	1.38
Long-term Employment (25 – 31)	0.005	0.020	0.27
Percent of Time Married (18 – 23)	0.009	0.265	0.03
Percent of Time Married (25 – 31)	-0.095	0.167	-0.57
R ² = .203			

^a Drug use frequency represents the maximum frequency reported across the five drug frequency measures: alcohol, marijuana, cocaine, heroin, or uppers. Higher values represent a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* p < .05, ** p < .01.

Table 12: Testing the Impact of Sample Selection Bias on Drug Frequency

Probit Model: Step One			
Variables	Survey Completion (18 - 23)		
	b	Std. Error	z-test
Variables (N = 610)			
Constant	2.529	0.509	4.94**
Age (12 – 17)	-0.107	0.036	-2.97**
Number of self-reported health problems (12 – 17)	0.058	0.018	3.12**
Amount upset by personal problems (12 – 17)	-0.293	0.095	-3.07**
OLS Regression Model: Step Two			
Variables	Drug Frequency ^a (18 – 23)		
	b	Std. Error	z-test
Variables (N = 480)			
Constant	0.824	1.054	0.78
Drug Propensity (12 – 17)	0.220	0.100	2.19*
Age (18 – 23)	0.007	0.051	0.14
Gender ^b	0.664	0.124	5.34**
Welfare (12 – 17)	-0.041	0.114	-0.36
Welfare (18 – 23)	-0.222	0.152	-1.46
Education Aspirations (12 – 17)	-0.057	0.060	-0.09
Long-term Schooling (18 – 23)	-0.074	0.021	-3.48**
Employed (12 – 17)	-0.103	0.206	-0.50
Long-term Employment (18 – 23)	-0.041	0.081	-2.26*
Percent of Time Married (18 – 23)	-0.534	0.225	-2.37*
Lambda	-0.343	0.563	-0.61

Selection Criterion (Rho) =- .279

^a Drug use frequency represents the maximum frequency reported across the five drug frequency measures: alcohol, marijuana, cocaine, heroin, or uppers. Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* p < .05; ** p < .01

Table 13: OLS Regression Models Predicting Alcohol Frequency in Adulthood

Independent Variables (N = 462)	Alcohol Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	3.417	1.636	2.09*
Drug Propensity (12 – 17)	0.096	0.161	0.60
Age (18 – 23)	0.001	0.074	0.02
Gender ^b	0.852	0.197	4.33**
Welfare (12 – 17)	0.186	0.184	1.00
Welfare (18 – 23)	-0.308	0.244	-1.26
Education Aspirations (12 – 17)	-0.150	0.097	-1.53
Long-term Schooling (18 – 23)	-0.094	0.034	-2.80**
Employed (12 – 17)	-0.193	0.343	-0.56
Long-term Employment (18 – 23)	-0.011	0.030	-0.38
Percent of Time Married (18 – 23)	-0.362	0.360	-1.00
$R^2 = .093$			
Independent Variables (N = 358)	Alcohol Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	1.654	2.040	0.81
Prior Alcohol Frequency (18 – 23)	0.389	0.048	8.15**
Age (25 – 31)	-0.019	0.068	-0.28
Gender ^b	-0.174	0.200	-0.86
Welfare (18 – 23)	-0.192	0.249	-0.77
Welfare (25 – 31)	0.504	0.236	2.13*
Long-term Schooling (18 – 23)	-0.006	0.037	-0.18
Long-term Schooling (25 – 31)	0.014	0.043	0.34
Long-term Employment (18 – 23)	0.005	0.033	0.15
Long-term Employment (25 – 31)	0.057	0.028	2.06*
Percent of Time Married (18 – 23)	-0.539	0.359	-1.50
Percent of Time Married (25 – 31)	0.211	0.230	0.91
$R^2 = .201$			

^a Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* $p < .05$, ** $p < .01$.

Table 14: Testing the Impact of Sample Selection Bias on Alcohol Frequency

Probit Model: Step One			
Variables	Survey Completion (18 - 23)		
	b	Std. Error	z-test
Variables (N = 590)			
Constant	2.560	0.514	4.98**
Age (12 – 17)	-0.114	0.036	-3.13**
Number of self-reported health problems (12 – 17)	0.058	0.018	3.11**
Amount upset by personal problems (12 – 17)	-0.269	0.096	-2.80**
OLS Regression Model: Step Two			
Variables	Alcohol Frequency ^a (18 – 23)		
	b	Std. Error	z-test
Variables (N = 460)			
Constant	2.303	1.758	1.31
Drug Propensity (12 – 17)	0.144	0.160	0.90
Age (18 – 23)	0.079	0.086	0.92
Gender ^b	0.904	0.198	4.55**
Welfare (12 – 17)	0.202	0.181	1.11
Welfare (18 – 23)	-0.309	0.240	-1.29
Education Aspirations (12 – 17)	-0.155	0.096	-1.61
Long-term Schooling (18 – 23)	-0.086	0.033	-2.56*
Employed (12 – 17)	-0.161	0.334	-0.48
Long-term Employment (18 – 23)	-0.012	0.029	-0.42
Percent of Time Married (18 – 23)	-0.330	0.352	-0.94
Lambda	-1.540	0.950	-1.62
Selection Criterion (Rho) =- .724			

^a Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* p < .05; ** p < .01

Table 15: OLS Regression Models Predicting Marijuana Frequency in Adulthood

Independent Variables (N = 481)	Marijuana Frequency ^a (18 – 23)		
	b	Std. Error	t-ratio
Constant	5.543	1.907	2.90**
Drug Propensity (12 – 17)	0.530	0.189	2.80**
Age (18 – 23)	-0.182	0.086	-2.12*
Gender ^b	1.354	0.233	5.82**
Welfare (12 – 17)	0.133	0.217	0.61
Welfare (18 – 23)	0.118	0.289	0.40
Education Aspirations (12 – 17)	-0.034	0.114	-0.29
Long-term Schooling (18 – 23)	-0.061	0.040	-1.52
Employed (12 – 17)	0.050	0.396	0.12
Long-term Employment (18 – 23)	0.002	0.035	0.07
Percent of Time Married (18 – 23)	-0.630	0.428	-1.47
$R^2 = .115$			
Independent Variables (N = 383)	Marijuana Frequency ^a (25 – 31)		
	b	Std. Error	t-ratio
Constant	2.655	2.559	1.03
Prior Marijuana Frequency (18 – 23)	0.375	0.049	7.63**
Age (25 – 31)	-0.058	0.085	-0.68
Gender ^b	0.394	0.256	1.53
Welfare (18 – 23)	-0.305	0.315	-0.96
Welfare (25 – 31)	0.355	0.298	1.18
Long-term Schooling (18 – 23)	-0.007	0.046	-0.16
Long-term Schooling (25 – 31)	-0.073	0.053	-1.37
Long-term Employment (18 – 23)	0.039	0.041	0.95
Long-term Employment (25 – 31)	-0.010	0.035	-0.30
Percent of Time Married (18 – 23)	0.103	0.462	0.22
Percent of Time Married (25 – 31)	-0.344	0.293	-1.17
$R^2 = .217$			

^a Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* $p < .05$, ** $p < .01$.

Table 16: Testing the Impact of Sample Selection Bias on Marijuana Frequency
 Probit Model: Step One

Variables (N = 609)	Survey Completion (18 - 23)		
	b	Std. Error	z-test
Constant	2.540	0.510	4.98**
Age (12 – 17)	-0.108	0.036	-3.00**
Number of self-reported health problems (12 – 17)	0.059	0.018	3.15**
Amount upset by personal problems (12 – 17)	-0.296	0.095	-3.10**

OLS Regression Model: Step Two

Variables (N = 479)	Marijuana Frequency ^a (18 – 23)		
	b	Std. Error	z-test
Constant	5.058	1.986	2.55**
Drug Propensity (12 – 17)	0.554	0.189	2.93**
Age (18 – 23)	-0.147	0.096	-1.53
Gender ^b	1.374	0.234	5.87**
Welfare (12 – 17)	0.141	0.215	0.66
Welfare (18 – 23)	0.118	0.286	0.42
Education Aspirations (12 – 17)	-0.034	0.113	-0.30
Long-term Schooling (18 – 23)	-0.057	0.039	-1.44
Employed (12 – 17)	0.069	0.392	0.18
Long-term Employment (18 – 23)	0.002	0.034	0.06
Percent of Time Married (18 – 23)	-0.616	0.423	-1.45
Lambda	-0.749	1.053	-0.71

Selection Criterion (Rho) = -0.321

^a Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* p < .05; ** p < .01

Table 17: OLS Regression Models Predicting Cocaine Frequency in Adulthood

Independent Variables (N = 481)	Cocaine Frequency ^a (18 – 23)		
	b	Std. Error	t-ratio
Constant	2.011	1.266	1.58
Drug Propensity (12 – 17)	0.203	0.125	1.62
Age (18 – 23)	-0.048	0.057	-0.85
Gender ^b	0.616	0.154	3.98**
Welfare (12 – 17)	-0.116	0.144	-0.80
Welfare (18 – 23)	-0.009	0.192	-0.04
Education Aspirations (12 – 17)	-0.119	0.076	-1.56
Long-term Schooling (18 – 23)	-0.059	0.027	-2.23*
Employed (12 – 17)	-0.053	0.260	-0.20
Long-term Employment (18 – 23)	-0.047	0.023	-2.01*
Percent of Time Married (18 – 23)	-0.301	0.284	-1.06
$R^2 = .073$			
Independent Variables (N = 383)	Cocaine Frequency ^a (25 – 31)		
	b	Std. Error	t-ratio
Constant	2.868	1.875	1.52
Prior Cocaine Frequency (18 – 23)	0.483	0.055	8.77**
Age (25 – 31)	-0.094	0.063	-1.50
Gender ^b	-0.225	0.189	-1.18
Welfare (18 – 23)	-0.138	0.234	-0.58
Welfare (25 – 31)	0.364	0.220	1.65
Long-term Schooling (18 – 23)	-0.036	0.034	-1.08
Long-term Schooling (25 – 31)	-0.047	0.039	-1.20
Long-term Employment (18 – 23)	0.049	0.031	1.59
Long-term Employment (25 – 31)	0.037	0.026	1.45
Percent of Time Married (18 – 23)	-0.256	0.342	-0.74
Percent of Time Married (25 – 31)	-0.364	0.216	-1.68
$R^2 = .224$			

^a Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* $p < .05$, ** $p < .01$.

Table 18: Testing the Impact of Sample Selection Bias on Cocaine Frequency

Probit Model: Step One			
Variables	Survey Completion (18 – 23)		
	B	Std. Error	z-test
Variables (N = 609)			
Constant	2.5072	0.510	4.91**
Age (12 – 17)	-0.1064	0.036	-2.94**
Number of self-reported health problems (12 – 17)	0.0590	0.018	3.13**
Amount upset by personal problems (12 – 17)	-0.2929	0.095	-3.06**
OLS Regression Model: Step Two			
Variables	Cocaine Frequency ^a (18 – 23)		
	b	Std. Error	z-test
Variables (N = 479)			
Constant	1.768	1.308	1.35
Drug Propensity (12 – 17)	0.214	0.124	1.72
Age (18 – 23)	-0.029	0.063	-0.46
Gender ^b	0.626	0.154	4.05**
Welfare (12 – 17)	-0.093	0.141	-0.66
Welfare (18 – 23)	-0.012	0.188	-0.07
Education Aspirations (12 – 17)	-0.103	0.075	-1.37
Long-term Schooling (18 – 23)	-0.062	0.026	-2.37*
Employed (12 – 17)	-0.028	0.255	-0.11
Long-term Employment (18 – 23)	-0.048	0.023	-2.10*
Percent of Time Married (18 – 23)	-0.306	0.279	-1.10
Lambda	-0.537	0.701	-0.77
Selection Criterion (Rho) = -.349			

^a Higher values indicate a higher frequency of use.

^b Dichotomized variable where males are given a score of one (1) and females are given a score of zero (0).

* $p < .05$; ** $p < .01$

Table 19: OLS Regression Models Predicting Drug Frequency in Adulthood among Males

Independent Variables (N = 253)	Drug Use Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	1.777	1.655	1.07
Drug Propensity (12 – 17)	0.131	0.166	0.78
Age (18 – 23)	0.001	0.071	0.01
Welfare (12 – 17)	-0.006	0.184	-0.03
Welfare (18 – 23)	-0.447	0.338	-1.32
Education Aspirations (12 – 17)	-0.073	0.097	-0.75
Long-term Schooling (18 – 23)	-0.074	0.034	-2.19*
Employed (12 – 17)	-0.041	0.308	-0.13
Long-term Employment (18 – 23)	-0.045	0.029	-1.55
Percent of Time Married (18 – 23)	-0.313	0.551	-0.56
R ² = .056			
Independent Variables (N = 191)	Drug Use Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	2.040	2.421	0.84
Prior Drug Frequency (18 – 23)	0.495	0.083	5.98**
Age (25 – 31)	-0.042	0.080	-0.52
Welfare (18 – 23)	0.564	0.376	1.50
Welfare (25 – 31)	0.361	0.267	1.35
Long-term Schooling (18 – 23)	0.015	0.043	0.35
Long-term Schooling (25 – 31)	-0.114	0.056	-2.05*
Long-term Employment (18 – 23)	0.047	0.040	1.20
Long-term Employment (25 – 31)	-0.007	0.033	-0.22
Percent of Time Married (18 – 23)	0.492	0.585	0.84
Percent of Time Married (25 – 31)	0.006	0.264	0.02
R ² = .245			

^a Drug use frequency represents the maximum frequency reported across the five drug frequency measures: alcohol, marijuana, cocaine, heroin, or uppers.

* p < .05, ** p < .01.

Table 19a: OLS Regression Models Predicting Drug Frequency in Adulthood among Females

Independent Variables (N = 229)	Drug Use Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	0.913	1.217	0.75
Drug Propensity (12 – 17)	0.288	0.114	2.51*
Age (18 – 23)	-0.010	0.056	-0.19
Welfare (12 – 17)	-0.085	0.139	-0.61
Welfare (18 – 23)	-0.126	0.157	-0.80
Education Aspirations (12 – 17)	-0.045	0.072	-0.62
Long-term Schooling (18 – 23)	-0.065	0.026	-2.51*
Employed (12 – 17)	-0.224	0.279	-0.80
Long-term Employment (18 – 23)	-0.039	0.024	-1.66
Percent of Time Married (18 – 23)	-0.576	0.216	-2.66**
R ² = .121			
Independent Variables (N = 195)	Drug Use Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	1.798	1.604	1.12
Prior Drug Frequency (18 – 23)	0.297	0.062	4.76**
Age (25 – 31)	-0.049	0.054	-0.90
Welfare (18 – 23)	0.101	0.181	0.55
Welfare (25 – 31)	0.056	0.221	0.25
Long-term Schooling (18 – 23)	-0.037	0.029	-1.30
Long-term Schooling (25 – 31)	0.036	0.031	1.17
Long-term Employment (18 – 23)	0.004	0.027	0.17
Long-term Employment (25 – 31)	-0.001	0.025	-0.05
Percent of Time Married (18 – 23)	-0.153	0.262	-0.58
Percent of Time Married (25 – 31)	-0.224	0.200	-1.12
R ² = .159			

^a Drug use frequency represents the maximum frequency reported across the five drug frequency measures: alcohol, marijuana, cocaine, heroin, or uppers.

* p < .05, ** p < .01.

Table 20: OLS Regression Models Predicting Alcohol Frequency in Adulthood among Males

Independent Variables (N = 241)	Alcohol Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	6.322	2.322	2.72**
Drug Propensity (12 – 17)	0.072	0.233	0.31
Age (18 – 23)	-0.101	0.100	-1.00
Welfare (12 – 17)	0.589	0.254	2.32*
Welfare (18 – 23)	-0.749	0.454	-1.65
Education Aspirations (12 – 17)	-0.045	0.135	-0.33
Long-term Schooling (18 – 23)	-0.140	0.047	-3.00**
Employed (12 – 17)	-0.265	0.440	-0.60
Long-term Employment (18 – 23)	0.006	0.040	0.16
Percent of Time Married (18 – 23)	-0.213	0.737	-0.28
R ² = .094			
Independent Variables (N = 176)	Alcohol .Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	3.939	3.378	1.16
Prior Alcohol Frequency (18 – 23)	0.352	0.078	4.50**
Age (25 – 31)	-0.130	0.111	-1.17
Welfare (18 – 23)	0.260	0.496	0.52
Welfare (25 – 31)	0.879	0.349	2.51*
Long-term Schooling (18 – 23)	0.001	0.061	0.01
Long-term Schooling (25 – 31)	0.052	0.076	0.68
Long-term Employment (18 – 23)	0.023	0.054	0.43
Long-term Employment (25 – 31)	0.110	0.043	2.55*
Percent of Time Married (18 – 23)	-0.364	0.747	-0.48
Percent of Time Married (25 – 31)	-0.081	0.348	-0.23
R ² = .196			

^a Higher values indicate a higher frequency of use.

* p < .05, ** p < .01.

Table 20a: OLS Regression Models Predicting Alcohol Frequency in Adulthood among Females

Independent Variables (N = 221)	Alcohol Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	0.409	2.359	0.17
Drug Propensity (12 – 17)	0.099	0.223	0.44
Age (18 – 23)	0.164	0.109	1.50
Welfare (12 – 17)	-0.337	0.272	-1.24
Welfare (18 – 23)	-0.096	0.306	-0.31
Education Aspirations (12 – 17)	-0.276	0.141	-1.95
Long-term Schooling (18 – 23)	-0.031	0.050	-0.61
Employed (12 – 17)	-0.242	0.555	-0.43
Long-term Employment (18 – 23)	-0.062	0.046	-1.36
Percent of Time Married (18 – 23)	-0.236	0.422	-0.56
R ² = .052			
Independent Variables (N = 182)	Alcohol Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	-0.654	2.413	-0.27
Prior Alcohol Frequency (18 – 23)	0.410	0.058	7.02**
Age (25 – 31)	0.098	0.082	1.20
Welfare (18 – 23)	-0.518	0.270	-1.91
Welfare (25 – 31)	-0.298	0.337	-0.88
Long-term Schooling (18 – 23)	-0.050	0.044	-1.14
Long-term Schooling (25 – 31)	-0.008	0.048	-0.18
Long-term Employment (18 – 23)	-0.005	0.041	-0.12
Long-term Employment (25 – 31)	-0.038	0.038	-1.01
Percent of Time Married (18 – 23)	-1.009	0.390	-2.58*
Percent of Time Married (25 – 31)	0.434	0.304	1.42
R ² = .293			

^a Higher values indicate a higher frequency of use.

* p < .05, ** p < .01.

Table 21: OLS Regression Models Predicting Marijuana Frequency in Adulthood among Males

Independent Variables (N = 252)	Marijuana Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	10.111	2.544	3.97**
Drug Propensity (12 – 17)	0.679	0.257	2.64**
Age (18 – 23)	-0.251	0.109	-2.29*
Welfare (12 – 17)	0.416	0.283	1.46
Welfare (18 – 23)	0.002	0.519	0.01
Education Aspirations (12 – 17)	0.004	0.150	0.02
Long-term Schooling (18 – 23)	-0.127	0.052	-2.45*
Employed (12 – 17)	0.062	0.484	0.12
Long-term Employment (18 – 23)	-0.025	0.045	-0.57
Percent of Time Married (18 – 23)	0.940	0.846	1.11
$R^2 = .092$			
Independent Variables (N = 188)	Marijuana Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	2.811	3.850	0.73
Prior Marijuana Frequency (18 – 23)	0.402	0.078	5.18**
Age (25 – 31)	-0.052	0.128	-0.41
Welfare (18 – 23)	-0.417	0.584	-0.71
Welfare (25 – 31)	0.167	0.413	0.40
Long-term Schooling (18 – 23)	-0.025	0.068	-0.36
Long-term Schooling (25 – 31)	-0.182	0.088	-2.06*
Long-term Employment (18 – 23)	0.061	0.061	1.00
Long-term Employment (25 – 31)	0.002	0.050	0.05
Percent of Time Married (18 – 23)	-0.117	0.894	-0.13
Percent of Time Married (25 – 31)	-0.132	0.406	-0.32
$R^2 = .218$			

^a Higher values indicate a higher frequency of use.

* $p < .05$, ** $p < .01$.

Table 21a: OLS Regression Models Predicting Marijuana Frequency in Adulthood among Females

Independent Variables (N = 229)	Marijuana Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	3.273	2.971	1.10
Drug Propensity (12 – 17)	0.448	0.279	1.60
Age (18 – 23)	-0.097	0.136	-0.71
Welfare (12 – 17)	-0.139	0.340	-0.40
Welfare (18 – 23)	0.416	0.382	1.08
Education Aspirations (12 – 17)	-0.094	0.177	-0.53
Long-term Schooling (18 – 23)	0.029	0.063	0.46
Employed (12 – 17)	-0.398	0.681	-0.58
Long-term Employment (18 – 23)	0.011	0.057	0.20
Percent of Time Married (18 – 23)	-0.823	0.527	-1.56
R ² = .041			
Independent Variables (N = 195)	Marijuana Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	1.566	3.523	0.44
Prior Marijuana Frequency (18 – 23)	0.345	0.066	5.22**
Age (25 – 31)	-0.023	0.119	-0.20
Welfare (18 – 23)	-0.269	0.391	-0.68
Welfare (25 – 31)	0.530	0.486	1.09
Long-term Schooling (18 – 23)	0.021	0.064	0.33
Long-term Schooling (25 – 31)	0.007	0.068	0.11
Long-term Employment (18 – 23)	-0.007	0.059	-0.12
Long-term Employment (25 – 31)	-0.023	0.055	-0.43
Percent of Time Married (18 – 23)	0.373	0.574	0.64
Percent of Time Married (25 – 31)	-0.648	0.438	-1.47
R ² = .174			

^a Higher values indicate a higher frequency of use.

* p < .05, ** p < .01.

Table 22: OLS Regression Models Predicting Cocaine Frequency in Adulthood among Males

Independent Variables (N = 252)	Cocaine Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	3.332	2.068	1.61
Drug Propensity (12 – 17)	0.037	0.208	0.18
Age (18 – 23)	-0.060	0.089	-0.67
Welfare (12 – 17)	-0.085	0.230	-0.37
Welfare (18 – 23)	0.061	0.422	0.14
Education Aspirations (12 – 17)	-0.186	0.122	-1.52
Long-term Schooling (18 – 23)	-0.073	0.042	-1.73
Employed (12 – 17)	-0.024	0.385	-0.06
Long-term Employment (18 – 23)	-0.050	0.036	-1.39
Percent of Time Married (18 – 23)	-0.121	0.688	-0.17
$R^2 = .036$			
Independent Variables (N = 189)	Cocaine Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	2.021	2.774	0.72
Prior Cocaine Frequency (18 – 23)	0.393	0.069	5.69**
Age (25 – 31)	-0.082	0.092	-0.89
Welfare (18 – 23)	-0.175	0.435	-0.40
Welfare (25 – 31)	0.792	0.306	2.59*
Long-term Schooling (18 – 23)	-0.034	0.050	-0.69
Long-term Schooling (25 – 31)	-0.005	0.065	-0.09
Long-term Employment (18 – 23)	0.069	0.045	1.52
Long-term Employment (25 – 31)	0.042	0.037	1.14
Percent of Time Married (18 – 23)	-0.543	0.665	-0.81
Percent of Time Married (25 – 31)	-0.118	0.301	-0.39
$R^2 = .237$			

^a Higher values indicate a higher frequency of use.

* $p < .05$, ** $p < .01$.

Table 22a: OLS Regression Models Predicting Cocaine Frequency in Adulthood among Females

Independent Variables (N = 229)	Cocaine Frequency ^a (18 – 23)		
	B	Std. Error	t-ratio
Constant	1.366	1.509	0.91
Drug Propensity (12 – 17)	0.377	0.142	2.65**
Age (18 – 23)	-0.034	0.069	-0.49
Welfare (12 – 17)	-0.129	0.173	-0.74
Welfare (18 – 23)	-0.019	0.194	-0.10
Education Aspirations (12 – 17)	-0.050	0.090	-0.56
Long-term Schooling (18 – 23)	-0.042	0.032	-1.32
Employed (12 – 17)	-0.057	0.346	-0.16
Long-term Employment (18 – 23)	-0.047	0.029	-1.62
Percent of Time Married (18 – 23)	-0.329	0.268	-1.23
R ² = .082			
Independent Variables (N = 194)	Cocaine Frequency ^a (25 – 31)		
	B	Std. Error	t-ratio
Constant	3.176	2.577	1.23
Prior Cocaine Frequency (18 – 23)	0.637	0.098	6.47**
Age (25 – 31)	-0.089	0.087	-1.02
Welfare (18 – 23)	-0.069	0.287	-0.24
Welfare (25 – 31)	-0.234	0.357	-0.65
Long-term Schooling (18 – 23)	-0.046	0.047	-1.00
Long-term Schooling (25 – 31)	-0.067	0.050	-1.35
Long-term Employment (18 – 23)	0.056	0.044	1.29
Long-term Employment (25 – 31)	-0.006	0.040	-0.15
Percent of Time Married (18 – 23)	-0.054	0.419	-0.13
Percent of Time Married (25 – 31)	-0.650	0.323	-2.01*
R ² = .244			

^a Higher values indicate a higher frequency of use.

* p < .05, ** p < .01.

Table 23: First-Differences OLS Regression Models Predicting Changes in Drug Frequency in Adulthood

Independent Variables (N = 386)	Changes in Drug Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.060	0.139	0.43
Changes in Welfare Status	-0.279	0.146	-1.90
Changes in Long-term Schooling	-0.026	0.023	-1.16
Changes in Long-term Employment	-0.014	0.019	-0.73
Changes in Percent of Time Married	-0.118	0.186	-0.63
$R^2 = .013$			

Independent Variables (Males only, N = 191)	Changes in Drug Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	-0.259	0.243	-1.06
Changes in Welfare Status	-0.256	0.226	-1.12
Changes in Long-term Schooling	-0.076	0.038	-2.02*
Changes in Long-term Employment	-0.021	0.032	-0.68
Changes in Percent of Time Married	-0.046	0.282	-0.16
$R^2 = .028$			

Independent Variables (Females only, N = 195)	Changes in Drug Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.270	0.162	1.66
Changes in Welfare Status	-0.272	0.189	-1.43
Changes in Long-term Schooling	0.010	0.029	0.36
Changes in Long-term Employment	-0.011	0.023	-0.48
Changes in Percent of Time Married	-0.193	0.245	-0.78
$R^2 = .014$			

* $p < .05$

Table 24: First-Differences OLS Regression Models Predicting Changes in Alcohol Frequency in Adulthood

Independent Variables (N = 358)	Changes in Alcohol Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	-0.230	0.209	-1.09
Changes in Welfare Status	-0.053	0.217	-0.24
Changes in Long-term Schooling	0.018	0.031	0.52
Changes in Long-term Employment	0.056	0.029	1.97*
Changes in Percent of Time Married	0.121	0.273	0.44
R ² = .014			

Independent Variables (Males only, N = 176)	Changes in Alcohol Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	-0.977	0.369	-2.64*
Changes in Welfare Status	0.002	0.330	0.00
Changes in Long-term Schooling	-0.042	0.059	-0.72
Changes in Long-term Employment	0.103	0.047	2.21*
Changes in Percent of Time Married	-0.052	0.408	-0.12
R ² = .039			

Independent Variables (Females only, N = 182)	Changes in Alcohol Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.193	0.238	0.80
Changes in Welfare Status	0.005	0.281	0.02
Changes in Long-term Schooling	0.036	0.043	0.84
Changes in Long-term Employment	0.019	0.035	0.57
Changes in Percent of Time Married	0.382	0.358	1.06
R ² = .012			

* p < .05

Table 25: First-Differences OLS Regression Models Predicting Changes in Marijuana Frequency in Adulthood

Independent Variables (N = 383)	Changes in Marijuana Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	-0.297	0.254	-1.17
Changes in Welfare Status	0.059	0.265	0.22
Changes in Long-term Schooling	0.025	0.042	0.61
Changes in Long-term Employment	-0.015	0.034	-0.45
Changes in Percent of Time Married	-0.158	0.334	-0.47
$R^2 = .003$			

Independent Variables (Males only, N = 188)	Changes in Marijuana Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	-0.879	0.403	-2.17*
Changes in Welfare Status	-0.235	0.368	-0.64
Changes in Long-term Schooling	-0.030	0.063	-0.47
Changes in Long-term Employment	0.005	0.050	0.11
Changes in Percent of Time Married	0.320	0.448	0.71
$R^2 = .008$			

Independent Variables (Females only, N = 195)	Changes in Marijuana Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.116	0.333	0.35
Changes in Welfare Status	0.356	0.389	0.91
Changes in Long-term Schooling	0.065	0.058	1.12
Changes in Long-term Employment	-0.030	0.048	-0.63
Changes in Percent of Time Married	-0.684	0.503	-1.35
$R^2 = .029$			

* $p < .05$

Table 26: First-Differences OLS Regression Models Predicting Changes in Cocaine Frequency in Adulthood

Independent Variables (N = 383)	Changes in Cocaine Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.393	0.178	2.21*
Changes in Welfare Status	0.050	0.185	0.27
Changes in Long-term Schooling	-0.016	0.029	-0.54
Changes in Long-term Employment	0.0002	0.024	0.01
Changes in Percent of Time Married	-0.298	0.234	-1.27
R ² = .006			

Independent Variables (Males only, N = 189)	Changes in Cocaine Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.001	0.314	0.00
Changes in Welfare Status	0.196	0.286	0.68
Changes in Long-term Schooling	-0.030	0.049	-0.62
Changes in Long-term Employment	0.029	0.039	0.74
Changes in Percent of Time Married	-0.190	0.350	-0.54
R ² = .010			

Independent Variables (Females only, N = 194)	Changes in Cocaine Frequency between Early and Later Adulthood		
	B	Std. Error	t-ratio
Constant	0.637	0.207	3.07**
Changes in Welfare Status	-0.079	0.242	-0.32
Changes in Long-term Schooling	-0.023	0.036	-0.64
Changes in Long-term Employment	-0.027	0.030	-0.92
Changes in Percent of Time Married	-0.400	0.313	-1.27
R ² = .015			

* p < .05, ** p < .01

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