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Examining Theoretical Predicators of Substance Use Among a Sample of Incarcerated Youth

David May
Eastern Kentucky University, dmay@soc.msstate.edu

Kelly Cooper
Eastern Kentucky University

Irina R. Soderstrom
Eastern Kentucky University, irina.soderstrom@eku.edu

G. Roger Jarjoura
Eastern Kentucky University

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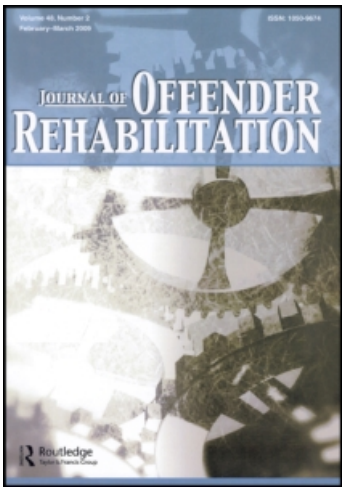

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Kelly Cooper [a]; David May [a]; Irina Soderstrom [a]; G. Roger Jarjoura [a]
[a] Eastern Kentucky University, Richmond, Kentucky, USA

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Examining Theoretical Predictors of Substance Use Among a Sample of Incarcerated Youth

KELLY COOPER, DAVID MAY, IRINA SODERSTROM, and G. ROGER JARJOURA

Eastern Kentucky University, Richmond, Kentucky, USA

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A wide variety of theoretical perspectives have been found to have an association with substance abuse. Most of these studies use data from samples of public school students and thus capture only part of the youth population. Using data from approximately 800 delinquents incarcerated in a Midwestern state, we examine the association between attitudes about drug and alcohol use and use of drugs and four theoretical perspectives: nonsocial reinforcement theory, social learning theory, social control theory, and strain theory. Our findings suggest that nonsocial reinforcement is the best predictor of both preference for and use of illegal substances among this sample, followed closely by social learning theory. Implications for policy and future research are also discussed.

KEYWORDS differential association, drug use, nonsocial reinforcement, theories of crime

INTRODUCTION

Each year, more than one in three arrests in the United States are related to drug and alcohol use (Federal Bureau of Investigation, 2009). The total societal cost of drug abuse approaches 200 billion dollars; over half of this total is costs related to crime (Office of National Drug Control Policy, 2004; Schiraldi, Beatty, & Holman, 2000). In 2003, a median of 70% of adult males and 72.6% of adult females that were arrested in 39 sites

Address correspondence to David May, PhD, Eastern Kentucky University, 521 Lancaster Ave., Stratton 205, Richmond, KY 40475, USA. E-mail: david.may@eku.edu

throughout the United States tested positive for one or more illicit drug (Zhang, 2004).

The relationship between substance abuse and crime is problematic for young people as well. About 1 in 10 youths in custody in juvenile residential facilities are incarcerated because of drug offenses and more than three in four juveniles reported use of at least one illicit drug in the past 30 days and two in three tested positive for an illicit drug at time of their detention (McClelland, Teplin, & Abram, 2004). Juvenile drug use is connected to recurring, chronic and violent delinquency that can continue well into adulthood (VanderWaal, McBride, Terry-McElrath, & Van Buren, 2001). Furthermore, substance use variables also predict involvement in violent crime (Lennings, Copeland, & Howard, 2003). Factors such as school and family problems, negative peer groups, and a lack of neighborhood social controls can lead to higher risk for both drug abuse and delinquency (May & Jarjoura, 2006).

According to a recent report, in 2004 juvenile courts in the United States handled an estimated 193,700 delinquency cases in which a drug offense was the most serious charge. From 1991–2004, the number of cases involving drug offenses that juvenile court handled more than doubled. Drug offense cases accounted for 12% of the delinquency caseload in 2004, compared to only 7% in 1985 (Snyder & Sickmund, 2008).

Given the problematic nature of drug use among juveniles, and the difficulties substance use causes for the juvenile justice system, a better understanding of the reasons for adolescent drug use is essential. Although a plethora of research exists that examines substance use and abuse among adolescents (see Gatins, 2005, for example), most of this research uses data from samples of public school students and thus makes generalizations about theoretical predictors of drug use based on samples of students in which the majority of students have not used drugs (particularly drugs other than marijuana), either in the past 30 days or in their lifetime. Consequently, the current knowledge about theoretical predictors of drug use among adolescents is somewhat limited.

In this study, we add to that limited literature by examining patterns of substance use among a sample of incarcerated adolescents. Additionally, we extend that literature by examining the impact that a relatively unknown theoretical perspective, nonsocial reinforcement theory, has on adolescent substance use. We find that nonsocial reinforcement theory is a powerful predictor of illicit drug use (and attitudes supportive of drug and alcohol use), and that effect remains even after controlling for well-known demographic and theoretical predictors of drug use. As such, we extend the extant literature in this area in a potentially powerful new theoretical direction with the hope that the findings from this research offer the hope of a better understanding of adolescent drug use and programs to deter that activity.

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ADOLESCENTS, SUBSTANCE ABUSE, AND CRIME: A LITERATURE REVIEW

Surveys of Youth

In the year 2000, more than half of high school seniors had tried some form of an illegal drug before their graduation, while just under a quarter of high school seniors were regular users (Office of National Drug Control Policy, 2008). In addition, Johnston, O'Malley, Bachman, and Schulenberg (2008b) found that, in 2008, 18.3% of high school seniors reported that they had used marijuana in the past 12 months and 43% of high school seniors reported having had at least one alcoholic beverage in the past 30 days. Although these numbers are alarming, each has decreased slightly in the past 10 years.

Since 1997 when adolescent marijuana use peaked, adolescent marijuana use has declined 16% among 12th graders, from 38.5% to 31.7% in 2007. Use of other drugs (including ecstasy, amphetamines, LSD, methamphetamines, PCP, Vicodin, Ketamine, and steroids) declined as well (National Institute on Drug Abuse, 2007). These studies indicate that in the general public, drug use among adolescents is actually declining. However, these surveys may underrepresent the youth who are most likely to use illicit drugs and engage in other forms of deviant crime and/or behavior. These types of surveys only reach students who are at school and fail to target those students who could be at higher risk of drug use (e.g., dropouts or institutionalized youth).

Surveys of Incarcerated Youth

The National Institute of Justice's Drug Use Forecasting Program found that urine-test data from male juvenile arrestees or detainees in 38 cities ranged from 52% positive (in Anchorage) to 80% positive (in New York) (National Institute of Justice, 2003). Studies conducted in other locales support this finding as well (Cho, Johnson, & Graf, 2000; Dembo, 1990; McClelland et al., 2004; Winters, Weller, & Meland, 1993). Consequently, data from a wide variety of sources suggest that substance abuse, delinquency, and criminal justice responses to substance abuse and delinquency are strongly related.

Demographic Factors Related to Substance Abuse Among Youth

Although researchers agree that there are a number of predictors of substance abuse among juveniles, including race, gender, and socioeconomic status, they often disagree on which ones are most important. A brief review of these correlates is included below.

GENDER

Males have historically accounted for the majority of drug offense cases processed in juvenile courts and accounted for 80 to 88% of drug violation

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cases between 1985 and 2004 (Snyder & Sickmund, 2008). Nevertheless, the female proportion of the juvenile drug offense caseload has increased from a low of 12% in 1991 to a high of 20% in 2004 and continues to rise (Snyder & Sickmund, 2008). A number of studies have also found that, when compared to males, greater proportions of females in detention had substance abuse disorders involving illicit drugs other than marijuana (Abram, Teplin, & McClelland, 2003; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002).

Race

As with most delinquent activities, race is an important predictor of illicit drug use as well. In a recent survey, American Indian or Alaska Native youths had the highest rate of illicit drug use in the last 30 days (12.6%) and their lifetime (54.6%) (National Survey on Drug Use and Health, 2009). The Monitoring the Future Survey found that the Hispanic population of 8th graders reported more substance use in the last 30 days than both White and Black counterparts (Office of National Drug Control Policy, 2007). Additionally, Johnston, O'Malley, Bachman, & Schulenberg (2008a) and Wallace, Bachman, O'Malley, Schulenberg, Cooper, & Johnston (2003) found that Blacks were less likely than Whites, Latinos, and American Indians to use most forms of illicit drugs. Consequently, contrary to other forms of delinquency and popular belief, Blacks are less likely to use drugs than their White, Latino, and American Indian counterparts.

Socioeconomic status

According to the National Survey on Drug Use and Health (NSDUH), youths in families with an income of less than $20,000 per year and $20,000 to $49,000 per year were more likely to have been classified as being in need of treatment for illicit drug use than youths from families with incomes of $75,000 or more (Substance Abuse and Mental Health Services Administration, 2007). Researchers using self-report surveys support this finding as well (Jarjoura, Triplett, & Brinker, 2002).

In sum, males, non-Blacks, and individuals from lower socioeconomic status backgrounds are more likely to engage in substance use than their counterparts. Additionally, these factors often interact with one another to predict both delinquent behaviors and substance abuse. In the next section of this paper, we will explore a number of theoretical predictors that have been found to predict both substance abuse and juvenile delinquency.

THEORETICAL PREDICTORS OF DELINQUENCY

In the following section, we discuss predictors of substance use and the findings from different theories regarding why adolescents engage in drug

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and/or alcohol use. The theories examined include (a) social learning theory, (b) control theory, (c) strain theory, and (d) nonsocial reinforcement theory.

Social Learning Theory

Social learning theory found its roots in differential association, created by Edwin Sutherland (1947) when he introduced his nine basic principles of differential association theory. Differential association theory suggests that crime results from learning deviant behaviors (including the techniques, rationalizations, motives, and drives) from deviant peers. As a result, youths who have delinquent peers are more likely to engage in delinquent behavior than those who do not have delinquent peers (May & Jarjoura, 2006; Warr, 2002).

Burgess and Akers (1966) revised Sutherland's nine propositions into a series of their own. Their reformulation of the theory attempted to describe more precisely how crime was learned by drawing from learning and behaviorism literature and emphasizing the relationship between behavior and reinforcement. Their seven principles of social learning theory are listed below:

1. Criminal behavior is learned through operant conditioning (p. 137);
2. Criminal behavior is learned both in nonsocial situations that are reinforcing or discriminative, and through that social interaction in which the behavior of other persons is reinforcing or discriminative for criminal behavior (p. 139);
3. The principal part of the learning of criminal behavior occurs in those groups which comprise the individual's major source of reinforcements (p. 140);
4. The learning of criminal behavior, including specific techniques, attitudes, and avoidance procedures, is a function of the effective and available reinforcers and the reinforcement contingencies (p. 141);
5. The specific class of behaviors which are learned and their frequency of occurrence are a function of the reinforcers which are effective and available, and the rules or norms by which these reinforcers are applied (p. 142);
6. Criminal behavior is a function of norms which are discriminative for criminal behavior, the learning of which takes place when such behavior is more highly reinforced than criminal behavior (pp. 143, 144); and
7. The strength of criminal behavior is a direct function of the amount, frequency, and probability of its reinforcement (Burgess & Akers, 1966, p. 144).

According to Burgess and Akers, then, criminal behavior is learned from one's intimate personal groups and is most likely to occur when it is reinforced by either social or nonsocial reinforcers that encourage that individual to engage in further delinquent activity.

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Both differential association theory and social learning theory have been the subject of much empirical research. Typically, tests of social learning theory involve measures that include attitudes that support crime, exposure to delinquent peers/family, and rewards or punishment for delinquency. Empirical tests consistently support these measures of social learning theory.

Many researchers have reviewed and supported the ideas of social learning theory in predicting criminal and delinquent behavior. Tests of these theories have typically examined the correlation between self-report delinquency and the number and/or activities of delinquent friends reported by adolescents. The association between delinquent peers and delinquency has proven to be among the strongest in delinquency research and is one of the most consistently reported findings in the delinquency literature (May& Jarjoura, 2006; Warr, 2002). In almost all studies where a measure of delinquent peers is included, the measure strongly predicts delinquency or crime (Warr, 2002).

Deviant peers also have a strong association with drug and alcohol use. Dull (1983) found that each type of drug use he examined was positively correlated with a friend's drug use. Additionally, the greater the number of friends who engaged in the use of drugs, the more likely the subject was to engage in the use of drugs. Haynie (2002) examined the connection between the number of delinquent friends an individual had and the extent of their delinquency. She concluded that youths who had all delinquent friends were twice as likely to engage in delinquency as youths with a mix of delinquent and nondelinquent friends (Haynie, 2002).

In sum, social learning theorists believe that criminal behavior is a learned behavior that is heavily influenced by peer pressure from peer groups or acquaintances. As the above research suggests, peer pressure from delinquent friends thus has a strong association with an individual's decisions to commit a wide variety of delinquent activities, including various types of drug and alcohol use.

Social Bond Theory

In his book, *Causes of Delinquency* (1969), Travis Hirschi developed what has become known as social bond theory. Hirschi's social bond theory argues that people abide by society's rules because social controls prevent them from committing crimes. It is when these controls break down or weaken that deviance is more likely (Akers, 2004).

Hirschi suggests that there are four elements of the social bond. The elements of the bond include attachment, commitment, involvement, and belief. Attachment develops when a juvenile bonds with others and forms an emotional concern with those individuals. The closer the attachment to these conformist individuals (caring parents, supportive teachers, etc.), the less likely the juvenile is to engage in criminal behaviors. Commitment is the extent

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to which a juvenile has an investment in the norms of society. Commitment to healthy institutions such as school, work, and home builds a stronger social bond for the juvenile. Involvement is the amount of energy or time that a juvenile engages in conformist activities such as school work, extracurricular activities, and family activities. Lastly, belief is the extent to which an individual believes in society's moral validity and laws (Hirschi, 1969).

According to this theory, then, if youths develop strong social bonds to conformity, then they will decrease their chances of becoming delinquent and/or engaging in delinquent behaviors such as using drugs or alcohol. Hirschi theorized that weak social bonds cause delinquency. Lilly, Cullen, and Ball (2007) review a number of studies that find empirical support for this theory.

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Strain Theory

Another theoretical perspective often linked to both delinquency and substance abuse is strain theory. Strain theory, originated by Robert Merton (1938), attempts to explain why crime is concentrated among the lower classes that have fewer legitimate opportunities for achievement (Agnew, 1992) and higher rates of crime (Akers, 2004). First presented in 1938, Merton's strain theory claims that people are more likely to pursue illegitimate means to attaining culturally prescribed goals when they are blocked from accessing the institutional means to these goals (Merton, 1938).

Merton suggested that there are two elements of social and cultural structure. The first element of structure is culturally assigned goals and aspirations (Merton, 1938). This is the assumption that people strive to have finer things in life including success, money, and material things. The second element of the social structure defines the acceptable mode for achieving the goals and aspirations set by society (Merton, 1938). Acceptable modes for achieving these goals include obeying laws and societal norms, seeking an education, and hard work. In order for society to maintain a normative function there must be a balance between aspirations and the means by which one fulfills such aspirations (Merton, 1938).

Merton identifies five possible modes of adaptation to strain caused by the restricted access to socially approved goals and means: conformity, innovation, rebellion, retreatism, and ritualism (Traub & Little, 1985). Conformity is the most common reaction. This is where one accepts the situation as it is and strives for success legitimately, or in a way that is socially acceptable and attainable. The second type of adaptation Merton refers to is called innovation. This is the most common deviant reaction (Akers, 2004). One strives to reach goals, but will try to illegitimately attain them. The majority of crime and delinquency will fit into this category of adaptive modes. This will also be the reaction when a person is out to obtain a financial gain, where he/she feels the rewards are far greater than the consequences.

Rebellion is another deviant mode of adaptation. This type discards the goals and the means of reaching those goals, and makes up his/her own system. This type usually is classified as violent. Merton claims alcoholics, drug addicts, vagrants, and the severely mentally ill persons are in a mode he calls retreatism. Retreatism refers to an escapist reaction where one isolates himself from society and gives up on both the goals and the effort to achieve them (Akers, 2004). Finally, a fifth mode of adaptation is ritualism. This person is tired of trying and has given up on the struggle of reaching that unattainable goal and instead is focusing on keeping what he or she has gained and is going to obey the norms of society.

Several theorists over the years have modified Merton's strain theory as the framework for the creation of a new theory. These derivatives include Cohen's (1955) ideas of status deprivation and the delinquent subculture; Cloward and Ohlin's (1960) differential opportunity theory; and Agnew's (1992) general strain theory. A number of recent works have supported one or more of these versions of strain theory (Lyons, 2002; Paternoster & Mazerolle, 1994).

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Nonsocial Reinforcement Theory

As mentioned earlier, differential association theorists have suggested that the social rewards (or reinforcements) an individual gains from approval of his delinquent peers encourage criminal acts and delinquency while social learning theorists added that nonsocial reinforcers may impact delinquency as well. As such, it is nonsocial reinforcements could encourage an individual to commit a deviant act; in other words, some individuals may receive an internal (or nonsocial) reward or reinforcement from committing a delinquent act. This type of reinforcement is not so obvious. These types of reinforcements result from internal gratifications rather than external ones. Wood, Cochran, Pfefferbaum, and Arneklev (1995) describe these reinforcers as nonsocial reinforcers and these reinforcers form the basis for nonsocial reinforcement theory.

Wood, Wilson, and Cochran (1997) suggest that nonsocial reinforcement theory is derived from two social psychological perspectives: edgework and arousal theory. Edgework is described by Lyng (1990) as engagement in voluntary risk-taking behaviors to give a sense of meaning to the inner criminal within the individual. He breaks down risk-taking and thrill-seeking activities into two separate approaches: (a) the personality predisposition model and the (b) intrinsic motivation model (Lyng, 1990). He suggests that the personality predisposition model assumes that an individual has one of two personality types; a risk-seeking personality or a shy nonrisk-seeking personality. Edgework engaging individuals tend to have a more risk-seeking personality. His intrinsic motivation approach is a more causal view of risky behaviors in that the need for stimulation or arousal encourages individuals

to find ways to introduce stress into their bodies. As such, those engaging in edgework do so because of an intrinsic motivation to fulfill a need (Lyng, 1990).

The second theory used as a foundation for nonsocial reinforcement is called arousal theory. Arousal theory describes the degree to which a person may be neurologically prone to criminality and the degree to which that predisposition varies among individuals (Cochran, Wood, & Arneklev, 1994). Arousal theory suggests that individuals who are more prone to criminality would display the following characteristics: hyperactivity, impulsivity, noncompliant behaviors, mind-altering drug use, and academic boredom, among others (Ellis, 1987). According to arousal theory, an individual will seek excitement when their higher brain centers are "starved," making them more prone to engage in crime and delinquency. Arousal theory has been used to better understand criminal behaviors, along with childhood hyperactivity, sensation-seeking behaviors, social gregariousness, extroversion, alcoholism and gambling (Ellis, 1987).

Wood et al. (1997) articulated the idea of nonsocial reinforcement theory when they suggested that criminal activity could be included as one of the risky behaviors explained by both edgework and arousal theories and that the risk of committing a criminal act produced a "high" that provides the intrinsic reward for the individual. Wood et al. (1997) supported this belief by arguing that "criminals tend to score high on impulsivity, hyperactivity, sensation seeking, and risk taking scales, while registering lower on self and social control scales" (p. 339).

Currently, there are relatively few studies that examine the impact of nonsocial reinforcement theory on delinquency. However, the limited number of studies available that examine the impact of this theory demonstrate significant support of nonsocial reinforcement theory (Jarjoura & May, 2000; May, 2003; Wood et al., 1997). Each of these studies is discussed in detail below.

Wood et al. (1997) suggested that thrill seeking and immediate gratification had strong, statistically significant influences on illegal drug and alcohol use among adolescents. They found that immediate gratification was the strongest predictor of frequency of marijuana and hard drug use (Wood et al., 1997).

Jarjoura and May (2000) found that nonsocial reinforcement (along with differential association) had the strongest association with delinquency among the juveniles in their sample. They determined that youths who were more prone to risk-seeking behaviors and dangerous activities were more likely to report that they have been involved in violent forms of delinquency.

May (2003) also examined the causes of violent delinquency among youth. He found that nonsocial reinforcement had a stronger correlation with violence than both differential association and social control. He suggests

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that youths engage in violent acts because of the internal reinforcements and natural highs or thrills they receive from that activity rather than the external or social reinforcements provided by peers and societal bonds.

Although there have been relatively few studies examining the effectiveness of nonsocial reinforcement theory in explaining delinquency, the available evidence suggests that nonsocial reinforcement theory may be yet another potentially powerful theoretical perspective that can be used to explain both delinquency and, more specifically, substance abuse.

Comparing Theoretical Predictors of Delinquency

A number of researchers have compared various theoretical perspectives against one another in an attempt to determine which theoretical perspective(s) is most effective in explaining various forms of delinquent activity. Generally, regardless of what theories are being considered, researchers generally find at least some support for each theory under consideration. For example, Hoffman (2003) determined that involvement in some delinquent activity (e.g., fighting, getting suspended or expelled from school, getting arrested) was associated with key variables from strain, social control, and differential association theories. Rebellon and Van Gundy (2006) found that use of marijuana and other illicit drugs was associated with strain, social bonding, and social learning theory. A number of other researchers have uncovered similar relationships. As such, employing a number of theoretical perspectives in explaining delinquency is often a fruitful effort.

STATEMENT OF THE PROBLEM

The above literature review has revealed a number of studies that indicate that social learning, social control, strain, and nonsocial reinforcement theories all have significant associations with serious delinquency and substance use. Nevertheless, relatively few studies have tested the impact of these theories using data from incarcerated youth and none of which we are aware test these four theories against one another using a sample of incarcerated juveniles, many of whom have engaged in frequent drug and alcohol use. As such, in this study, we will examine the relationship between social learning, social control, strain, and nonsocial reinforcement theory and drug-related delinquency among a sample of juvenile delinquents incarcerated in a Midwestern state. By doing so, we hope to extend the literature regarding these four theories and delinquency by examining their impact on (a) hard drug use, (b) soft drug use, and (c) attitudes toward substance use in general. The results from this study will provide additional evidence for the efficacy (or lack of) for these four theories in predicting delinquent behaviors and substance use.

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HYPOTHESES

In this study, we will test the following hypotheses:

- *H1*: Youths scoring higher on the four theoretical indexes will be more likely to have engaged in hard drug use at some point in their life than youths scoring lower on those indexes.
- *H2*: Youths scoring higher on the four theoretical indexes will be more likely to have engaged in soft drug use at some point in their life than youths scoring lower on those indexes.
- *H3*: Youths scoring higher on the four theoretical indexes will score higher on prodrug use (PDU) attitudinal scales than those scoring lower on the theoretical indexes.
- *H4*: Youths scoring higher on the four theoretical indexes will score higher on alcohol-seeking and use (ASU) scales than those scoring lower on the theoretical indexes.

Given their demonstrated association with both delinquency in general and drug use in particular, in this study we control for age, race, gender, and socioeconomic status. Although not a primary emphasis of this research effort, based on the extant research, we expect that a higher number of non-Blacks, older respondents, males, and those from lower socioeconomic statuses will be more likely than their counterparts to engage in both hard and soft drug use and score higher on the PDU and ASU scales.

METHODS

Respondents

The data used for this study were used previously by May and Jarjoura (2006) to study patterns of gun acquisition and use among serious juvenile delinquents. The data were gathered from self-report surveys administered to 808 juvenile delinquents incarcerated in one of nine state-operated juvenile correctional facilities in Indiana. Permission to initiate the self-report surveys was given by the Indiana State Department of Corrections. Descriptive statistices for the sample are presented in Table 1. Respondents were predominantly male (79.5%), and White (49.3%) although one in three respondents was Black (35.0%). Respondents ranged in age from 12 to 20 years with an average age of 16.12 years ($SD = 1.25$). Almost one in three (29.6%) reported that their family was on some form of public assistance at the time of their incarceration. All of the respondents in this sample have been adjudicated delinquent for engaging in some form of delinquency (and

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TABLE 1 Descriptive Statistics for Demographic Variables

Variable	*N*	Range	Mean	*SD*
Age	793	12–20	16.12	1.25
Gender (0 = Female/1 = Male): 20.5% Female/79.5% Male				
Race (0 = non-Black/1 = Black): 65% non-Black/35% Black				
Public Assistance (1 = Yes/0 = No): 29.6% received public assistance at time of incarceration				

generally serious delinquency), resulting in their commitment to the state correctional system from their local county juvenile court.

Data Collection

Data were collected through a survey consisting of questions that used a 6-point Likert type scale with *strongly agree* and *strongly disagree* at the extreme ends. The items used in this analysis were part of a larger set of questions examining attitudes and beliefs of the respondents as they related to problem solving skills, empathy toward their victims, locus of control, self esteem, risk taking, attitudes toward the police and the courts, anger control, perceptions of blocked opportunities, and social morality. Several questions were also included to elicit responses about various theoretical explanations of crime. Finally, because the focus of this particular study was a detailed examination of predictors of drug and alcohol attitudes and use, a number of questions were also included to collect data on these beliefs and experiences.

Data Analysis

After the survey data were cleaned in terms of coding and missing data, we developed four theoretically based indices and four scales intended to measure alcohol and drug use/seeking behavior and attitudes. We then conducted item analysis and factor analysis to assess the measurement validity and reliability of each measure. Four demographic variables were included to control for their impact on substance abuse attitudes and behaviors. All of the indexes, with one borderline exception, were found to exhibit strong internal reliability.

A description of each of the measures used in the regression models is presented next, along with a listing of all measures used in the study. Each measure is scored so that increases in scores represent higher levels of the construct. Table 2 presents descriptive statistics in the four theoretical predictor indices, as well as the four dependent variable indices.

Independent Variables

The independent variables for this study are as follows (a) a social learning index to represent the delinquent attitudes of the juveniles' peers; (b) a school attachment index to capture the degree in which a juvenile felt

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TABLE 2 Descriptive Statistics for Theoretical Predictors and Outcome Indices

Variable	*N*	Cronbach's alpha	Range	Mean	*SD*	Scale midpoint
Theoretical predictors						
Social learning (SL)	765	.74	6–36	22.38	6.33	21.0
School attachment (SA)	791	.67	4–24	15.87	4.47	14.0
Nonsocial reinforcement (NSR)	792	.83	7–42	26.21	7.84	24.5
Strain (S)	799	.66	5–30	16.18	5.29	17.5
Dependent variable indices						
Prodrug use attitude	776	.61	5–30	17.16	5.38	17.5
Soft drug use (pot, hallucinogens, amphetamines, barbiturates)	766	.79	0–4	1.69	1.43	2.0
Hard drug use (heroin, cocaine, crack)	776	.76	0–3	.58	.95	1.5
Alcohol seeking/Use	735	.79	0–5	2.87	1.78	2.5

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attached to their school and educational experience; (c) a nonsocial reinforcement index to capture the degree to which a juvenile achieves an intrinsic reward from participation in risky activities; and finally, (d) a strain index to capture the degree to which the juvenile agreed they had limited access to legitimate opportunities.

Descriptive Statistics for Scales

Social learning (SL)

The SL scale is a six-item index comprised of 6-point Likert-type items asking respondents to rate the prosocial attitudes of their peers. Respondents were asked to indicate the degree to which they agreed that their friends did the following: disapproved of trying drinks of an alcoholic beverage; disapproved of taking illegal drugs occasionally; disapproved of smoking one or more packs of cigarettes per day; were unlikely to break the law; think it's okay to break the law if they could get away with it; and would encourage me to pursue education after high school. All items were coded so that high scores on this composite scale indicated strong perceptions of social learning measured by negative peer influence (Cronbach's alpha = 0.74).

School attachment (SA)

The SA scale is a four-item index comprised of 6-point Likert-type items asking respondents how attached they felt to their school and educational experience. This scale will serve as a proxy for social control theory because the items on the questionnaire did a poor job of assessing other aspects of social control theory (e.g., belief, commitment, and involvement). The items required respondents to indicate the degree to which they agreed with the following statements: I like school; my coursework is interesting and

important; going to school is enjoyable; and school work generally is meaningful and important. Items were coded such that high scores on this composite scale indicated strong school attachment. Responses were scored so that those disagreeing with the above statements received the higher scores (Cronbach's alpha = 0.67).

Nonsocial reinforcement (NSR)

The NSR scale is an eight-item index comprised of 6-point Likert-type items intended to assess the respondents 'inclination toward risk-taking behaviors. The items required respondents to indicate the degree to which they agreed with the following statements: Sometimes I will take risks just for the fun of it; I like to test myself every now and then by doing something a little risky; I like to take chances; I sometimes find it exciting to do things for which I might get in trouble; Sometimes I rather enjoy going against the rules and doing things I'm not supposed to; The things I like to do best are dangerous; and Excitement and adventure are more important to me than peace and security (Cronbach's alpha = 0.82).

Strain (S)

The S scale is a five-item index comprised of 6-point Likert-type items asking respondents about their access to legitimate opportunities. The items required respondents to indicate the degree to which they agreed with the following statements: regardless of a good education, people like me will have to work harder to make a living; regardless of how hard I work, I will never be given the same opportunities as other kids; people like me are treated unfairly when it comes to getting a good job; society is against people like me; and laws are passed that keep people like me from succeeding. Items were coded such that high scores on this composite scale indicated more strain and stronger perceptions of blocked opportunities (Cronbach's alpha = 0.66).

Dependent Variables

Four dependent variables are examined in this study: (a) PDU, (b) lifetime soft drug use (SDU), (c) lifetime hard drug use (HDU), and (d) ASU. Each of these dependent variables is described in detail below. It is important to note that the terms "hard" and "soft" drug use are terms used for categorization purposes only and are categorized as such based on the exploratory factor analyses conducted with these items (available upon request from the authors).

Prodrug use (PDU) attitudinal scale

The PDU scale is a five-item index comprised of 6-point Likert-type items asking respondents about their attitudes toward illegal drug use. The items

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required respondents to indicate the degree to which they agreed with the following statements: If I took drugs nothing bad would happen to me; If I took drugs I would likely not get caught; People have the right to use crack/cocaine as long as it doesn't interfere with others; people have the right to choose whether to use pot; and the high of taking drugs is greater than the risk. Items were coded such that high scores on this composite scale indicated strong PDU attitudes (Cronbach's alpha = 0.61). The mean scale score was 17.16 (*SD* = 5.38) from a possible range of 5–30.

Soft drug use (SDU)

The SDU scale is a four-item index comprised of No (0) or Yes (1) responses to questions of whether respondents had ever used marijuana ("grass, pot, or hash"), hallucinogens ("PCP, LSD, acid, mushrooms, or peyote"), amphetamines ("uppers or speed"), or barbiturates ("downers or reds"). Items were summed across the four items for totals of how many of the four drugs they had ever used (Cronbach's alpha = 0.79). The mean score for the index was 1.69 (*SD* = 1.43) from a possible range of 0–4.

Hard drug use (HDU)

The HDU scale is a three-item index comprised of No (0) or Yes (1) responses to questions of whether respondents had ever used cocaine ("coke"), crack, or heroin ("horse or smack"). Items were summed across the three items for totals of how many of the three drugs they had ever used (Cronbach's alpha = 0.76). The mean score for the index was 0.58 (*SD* = 0.95) on the score range of 0–3.

Alcohol-seeking and use (ASU)

The ASU scale is a five-item index comprised of No (0) or Yes (1) responses to questions of whether they have ever done the following: been drunk in public place; bought liquor; drove car while drunk; been passenger with drunk driver; or had alcoholic beverages. Items were summed across the five items for totals of how many of the five alcohol-seeking and use behaviors in which they had ever participated (Cronbach's alpha = 0.79). The mean scale score was 2.87 (*SD* = 1.78) from a possible score range of 0–5.

RESULTS

Multivariate Analyses

In separate stepwise linear regression models, the four dependent variables (the HDU index, the SDU index, the PDU index, and the ASU index) were

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TABLE 3 Multivariate Stepwise Linear Regression Results for Prodrug Use Attitudinal Scale

	B	*SE*	Beta	Sig.
Nonsocial reinforcement (NSR)	.289	.025	.407	.000
School attachment (SA)	.224	.043	.182	.000
Race (0 = non-Black; 1 = Black)	1.723	.393	.148	.000
Strain (S)	.139	.052	.092	.007
Social learning (SL)	.142	.040	.128	.000
Gender (0 = Female; 1 = Male)	1.096	.428	.084	.011
Constant	−.499	1.305		
df	639			
f	52.98			
R^2	.334			
Adjusted R^2	.328			

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regressed onto the four demographic variables and the four theoretical predictors. These results are displayed in Tables 3–6, respectively.

The stepwise linear regression results for the regression of the PDU scale on the eight predictors are presented in Table 3. The results indicated that six predictors were statistically significant and accounted for 33.4% of the model variance. Specifically, having a stronger PDU attitude was associated with having higher levels of nonsocial reinforcement (e.g., prone to receive intrinsic gratification from risky behavior) (B = 0.289; $p < .001$), higher levels of strain (B = 0.139; $p < .001$), higher levels of negative peer influence (B = 0.142; $p < .01$), lower levels of school attachment (B = 0.224; $p < .001$), being Black (B = 1.723; $p < .001$), and being male (B = 1.096; $p < .05$). The results of this model fully support Hypothesis 1, which predicted that all four theoretical indexes would have a positive association with a higher score on the PDU attitudinal scale.

The stepwise linear regression results of regressing the SDU index on the eight predictor variables are presented in Table 4. The results indicated that five predictors were statistically significant, and accounted for 27.3%

TABLE 4 Multivariate Stepwise Linear Regression Results for Soft Drug Use Scale (Pot, Hallucinogens, Amphetamines, Barbiturates)

	B	*SE*	Beta	Sig.
Race (Black = 1)	−1.078	.109	−.348	.000
Social learning (SL)	.049	.011	.164	.000
Nonsocial reinforcement (NSR)	.039	.007	.208	.000
Gender (Male = 1)	.277	.121	.080	.023
Age	.089	.041	.076	.030
Constant	−1.674	.692		
df	624			
f	46.46			
R^2	.273			
Adjusted R^2	.267			

TABLE 5 Multivariate Stepwise Linear Regression Results for Hard Drug Use Scale (Heroin, Cocaine, Crack)

	B	*SE*	Beta	Sig.
Race (0 = non-Black; 1 = Black)	−.370	.079	−.182	.000
Age	.113	.029	.148	.000
Nonsocial reinforcement (NSR)	.019	.005	.152	.000
Constant	−1.614	.493		
df	621			
f	20.35			
R^2	.090			
Adjusted R^2	.085			

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of the model variance. Specifically, having used a higher number of the four soft drugs in one's lifetime was associated with being non-Black (B = −1.078; $p < .001$), having higher levels of negative peer influence (B = 0.049; $p < .001$), having higher levels of nonsocial reinforcement or intrinsic gratification from risk-taking behaviors (B = 0.039; $p < .001$), being older (B = 0.089; $p < .05$), and being male (B = 0.277; $p < .05$). Because the impact of the school attachment index and the strain index on the SDU index were not statistically significant, the results of this model partially support Hypothesis 2, which predicted that all four theoretical indexes would have a positive association with a higher score on the SDI.

The results of regressing the HDU scale on the eight predictors are presented in Table 5. The results indicate that three predictors had a statistically significant association with HDU and accounted for only 6.8% of the model variance. Specifically, having used a higher number of the three hard drugs was associated with being non-Black (B = −0.370; $p < .001$), being older (B = 0.113; $p < .001$), and having higher levels of nonsocial reinforcement or risk-taking behaviors (B = 0.019; $p < .001$). Because neither the impact of the strain index nor the school attachment index on the HDI was statistically significant, the results of this model partially support Hypothesis 3, which predicted that all four theoretical indexes would have a positive association with a higher score on the hard drug use index. As such, neither the strain nor school attachment index predicted drug use for the respondents in this sample, regardless of what type of drug is being considered.

The results of regressing the ASU scale on the eight predictors are presented in Table 6. The results indicate that six predictors were statistically significant, and accounted for 19.2% of the model variance. Specifically, participating in a greater number of ASU behaviors was associated with having higher levels of negative peer influence (B = 0.061; $p < .001$), being older (B = 0.265; $p < .001$), having higher levels of nonsocial reinforcement or risk-taking behaviors (B = 0.042; $p < .001$), having less school attachment (B = .049; $p < .01$), being non-Black (B = −0.308; $p < .05$), and not receiving public assistance at the time of their incarceration (B = −0.277; $p < .05$).

TABLE 6 Multivariate Stepwise Linear Regression Results for Alcohol Seeking/Use Scale

	B	*SE*	Beta	Sig.
Social learning (SL)	.061	.015	.168	.000
Age	.265	.053	.185	.000
Nonsocial reinforcement (NSR)	.042	.009	.181	.000
School attachment (SA)	.049	.016	.123	.002
Race (Black = 1)	−.308	.144	−.081	.033
Public assistance (Yes = 1)	−.277	.140	−.074	.048
Constant	−4.211	.923		
df	599			
f	23.51			
R^2	.192			
Adjusted R^2	.184			

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DISCUSSION AND CONCLUSIONS

The purpose of this research was to examine theoretical predictors of substance use and attitudes among incarcerated youth in an attempt to add to the extant literature regarding this topic. We examined the relationship between substance use attitudes and behaviors and four theoretical perspectives—social learning theory (negative peer influences), nonsocial reinforcement (thrill seeking behaviors), strain (the disjunction between society's goals and a youth's means to obtain those goals), and social bond theory (school attachment), controlling for other factors shown to lead to delinquent behaviors (age, gender, race, and social class). The findings presented here suggest that each of the theoretical and demographic variables play some role in predicting substance use and attitudes toward substance use among incarcerated youth. Our hope is that the findings from this research have provided information that will fill the existing gaps in literature concerning predictors of substance use among incarcerated youth.

Nonsocial Reinforcement Theory

The results presented here suggest that nonsocial reinforcement is the strongest theoretical predictor of substance use among incarcerated youth, regardless of the type of substance being examined (e.g., whether alcohol, hard drugs, or soft drugs). Those youth who were most prone to receive intrinsic gratification from high risk and thrill seeking behaviors were significantly more likely than their counterparts to engage in each of the substance use activities. It makes sense that thrill seekers and risk takers tend to engage in the use of drugs and alcohol, as they are both considered risky behaviors that can have physical, neurological, and social effects on the users' bodies. These findings are similar to what Wood et al. (1995) suggested by finding that thrill seeking and immediate gratification had

strong, statistically significant influences on illegal drug and alcohol use among adolescents. Wood and his colleagues found that immediate gratification was the strongest predictor of frequency of marijuana and hard drug use. May, Nichols, and Eltzroth (1999) supported those findings as well.

May et al. (1999) examined the association between nonsocial reinforcement and substance abuse among a sample of high school adolescents, controlling for the effect of differential association along with a number of demographic variables. Both nonsocial reinforcement and differential association had a statistically significant association with participation in the behaviors explored in their study; however, differential association was a stronger predictor when examining risk-taking behaviors. May and his colleagues concluded that the influence of delinquent peers might be more important than the intrinsic gratification individuals receive from taking risks for less serious delinquency such as alcohol, tobacco, and drug use. In their study, they suggested further research be extended to more serious criminal behaviors and activities.

This study was an attempt to further extend that research suggestion by studying incarcerated youth rather than school sample populations. The youth surveyed in this sample were serious delinquents who were involved with more than just drugs and/or alcohol. The findings presented here, however, contradict those of May and his colleagues, as nonsocial reinforcement theory serves as a better predictor for substance use activities among these respondents than any other theoretical perspective. As such, future efforts should continue to explore the efficacy of this theory with samples of both incarcerated youth and public school students as well.

Intuitively, it makes sense that nonsocial reinforcement would have a strong association with substance use among the respondents in this sample. Incarcerated youths obviously are attracted to thrill seeking or risky behaviors and are more likely to engage in criminal activities than a sample of youths collected from a public school setting, giving the researchers a more appropriate sample for this scale. The fact that these respondents are also juveniles is another key component. Adolescents tend to think in the "now" rather than think ahead about consequences and are attracted to risky behaviors because of the hormonal changes they experience during puberty (Erickson, 1980). With this in mind, incarcerated youth tend to be the perfect population to study in regards to nonsocial reinforcement and substance use predictors and it makes sense that this theory is the strongest predictor when considering the population sampled.

It is important to note that nonsocial reinforcement is the best theoretical predictor in this sample, even when controlling for three other empirically supported theoretical predictors (strain, social learning, and social control). This finding suggests that some youths engage in substance use because of an intrinsic (not an external) reward they receive from substance abuse.

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Mind and behavior do not exist without brain activity. Research suggests that genetics also play a role in establishing risk for alcoholism and other addictions (Langbehn, Cadoret, Caspers, Troughton, & Yucuis, 2003; Uhl, Liu, Walther, Hess, & Naiman, 2001).

With this in mind, it only makes sense that a juvenile's intrinsic gratification gained from both risky behavior in general and substance abuse in particular is both biological and psychological. According to these findings, then, those juveniles who begin their delinquency do so because of the internal high that they get from the delinquent involvement. The fact that they receive internal gratification from their substance use makes two potentially addictive factors work together to encourage continued substance use: the neurophysiological high received from the body's chemicals as the youth engages in risky behavior and the pharmaceutical high caused by the use of the drugs. This makes the relationship between nonsocial reinforcement theory and substance use and abuse particularly strong and potentially devastating.

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Social learning theory

The second strongest theoretical predictor in this particular study is social learning theory. The respondents' delinquent peers had a strong influence on the youths' involvement in substance use as the social learning index was significant in three of the four models. The findings presented here support a large body of research presented earlier that suggest the delinquent activities and attitudes of one's peers strongly influences the individuals own delinquency (Dull, 1983; Matsueda & Heimer, 1987). Particularly for juveniles, peers are one of the most influential motivators in their lives; the social rewards they receive from their delinquent peers are thus important reasons why they continue to engage in substance use.

Social control theory

The third strongest theoretical predictor in this study was social bond theory. One of the major criticisms of social bond theory is that it explains nonserious delinquency better than more serious delinquency. This holds true in this study as well. Lack of school attachments did not have a statistically significant association with either SDU or HDU but did have a significant association with both PDU attitude and ASU regression models. As such, the findings presented here provide only weak support for social control theory, particularly when compared with the two perspectives discussed above. This finding is also not surprising, given the nature of the sample and the pervasiveness of the negative experiences they probably had with school prior to their incarceration.

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STRAIN THEORY

The fourth and least relevant of the theoretical predictors was strain theory. Strain was a significant predictor only in the PDU attitude regression model. Those respondents' who felt the greatest disjunction between societal goals and access to legitimate means to reach those goals were more likely to have PDU attitudes than their counterparts. A partial explanation for the relatively weak impact of strain theory in this study may be the operationationalization of strain used here. Merton (1938) describes alcoholics and drug addicts in a category he calls "retreatism." His definition claims that this type of individual displays an escapist reaction where he isolates himself from society and gives up on both the goals and the efforts to achieve them. Considering that this study operationalized strain as the disjunction between societal goals and means (a category Merton would consider to be innovators) and its relationship with substance and alcohol use, it makes sense that the strain theory wasn't as significant of a predictor. If alcoholics and drug users fall into the retreatism category and give up on their goals and means to achieve them, then it makes sense that strain would be the least relevant when studying substance use of incarcerated youth, as the measure used here was designed to identify those youths with the greatest disjunction between their goals and the means to achieve those goals. Future research should include measures adapted from Agnew's general strain model, as it appears to have greater success in predicting all forms of delinquent activity than Merton's classical strain theory used here.

DEMOGRAPHICS

Each of the demographic variables included in the study had a significant impact on substance use in at least one model. Males were significantly more likely than females to score higher on the PDU attitude scale and the SDU scale. Older respondents were significantly more likely to have engaged in both HDU and SDU at some point in their lives. Both these findings are supportive of previous research in this area (NDCS, 2003).

Non-Blacks scored significantly higher than Blacks on both the SDU scale and HDU scale, while Blacks scored higher than non-Blacks on the PDU scale and the ASU scale. There are at least two explanations for these ambiguous findings. First, it may be that these ambiguous findings are due to the unique nature of the sample under study here. Although youth from large urban and small rural areas are both represented in this sample, we did not have a measure of the population in which the youth resided prior to their incarceration. It could be that race is interacting with place of residence to cause these ambiguous associations; it could also be that, when controlling for seriousness of offense which is naturally done by using a sample of incarcerated offenders, the impact of race on substance use is

obviated. A second explanation might also be due to an acceptance in the lower class Black culture that selling drugs is an acceptable way to make money. This may be particularly true with crack cocaine, where it is common to have Black dealers selling to Whites, but not using themselves. Conversely, the stigma of selling and using drugs may be greater among Whites than Blacks, although this stigma may vary by class and urbanicity as well. Future research should continue this exploration of drug use and how it varies by race among serious juvenile delinquents.

In summary, the respondents in this sample engage in the use of drugs and alcohol largely because of the internal gratification that he or she receives (nonsocial reinforcers) during and after the behavior and the encouragement they receive from their negative peer influences. Because there is no apparent attachment, or at least attachment to school, then there is nothing discouraging the behaviors and thus substance abuse is likely to occur.

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Limitations and Recommendations for Future Research

While the findings from this study shine new light on adolescent drug use among juveniles who have engaged in serious delinquency, this study is not without limitations. First, and most importantly, the incarcerated nature of this sample limits the generalizability of these findings. The youths in this sample would generally be considered as serious delinquents; as such, the finding that nonsocial reinforcement has the strongest association with substance use in this sample may not necessarily be replicated among samples using incarcerated youths. Nevertheless, based on this finding, future research should consider nonsocial reinforcement theory as a viable explanation of substance use and attempt to replicate these findings among larger, more heterogeneous samples.

Secondly, the measures used in this study to represent the theoretical perspectives under study could have been improved. Although each theoretical perspective had measures of some components of that perspective, we cannot claim that the indicators presented here capture all dimensions of any of those perspectives. As such, future research should use better indicators to represent the theoretical perspectives under study here to determine if these relationships hold true with better measures of these theories.

Despite these limitations, the findings of this study paint a fairly clear picture that in order to tackle substance abuse and delinquency in adolescents, one must examine and address a wide variety of predicting factors. Future research on predictors of substance use should focus on motivational influences and social support, which could prove to be important factors in treatment success. In addition, contextual factors, such as rural and urban environments, warrant further scientific consideration.

The significant impact of nonsocial reinforcement theory in this study should encourage researchers to continue to explore biological and neurophysiological factors that are associated with substance use. Clarifying the role played by each of the biological, social, and psychological fields gives greater understanding of how they interact in the development and endurance of addiction. While this effort focuses on psychological and social factors, the new paradigm for understanding addiction is not simply psychosocial, but should be a meld between biosocial and psychological exploration.

POLICY IMPLICATIONS

Policy implications for this study are numerous. We have determined that nonsocial reinforcement does have a significant association with drug and alcohol use. Consequently, it should be noted early in adolescence that this compulsion and reward system exists. Therefore, influential individuals in the lives of youth should look to channel this compulsion in a more positive direction, allowing the youth to experience the internal gratification and similar high when engaging in healthy risk-taking adventures instead of the unhealthy activities considered here. Parents need to be educated to learn how to recognize such behavior and be given examples of how to channel and stimulate positive involvement. The issue is when a juvenile engages negatively and a negative peer supports the behavior which channels the negative high. If we know this peer influence and intrinsic gratification are so important, then why not assist them in positive stimulation and have a positive peer or other attachment to support or encourage positive behavior? Not everyone is going to understand the extreme complexity of the human brain and chemicals that already exist, nor will every parent care about this. However, educating the public of this issue could make a huge difference in the lives of youth, especially those youth who tend to have a weak self control factors and who are prone towards delinquency.

Incarcerated juveniles should also be educated on the brain and how it functions. Most of them will find this quite interesting and be able to better understand their addictions. Many juveniles think of the mind altering effects of drugs or alcohol as temporary effects that, when they subside, allow the brain goes back to normal. This puts them in control. If we educated our youth about the lack of control that they experience even when they take the drugs and alcohol away, many of them would develop a deeper understanding. If we discussed drug or alcohol use as if it were Alzheimer's disease, it would paint a clearer picture for our youth.

Curriculums can also be implemented in juvenile correctional facilities that focus on the detrimental effects of substance use on the body. The curriculum should be scientific based and should be implemented by trained

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individuals to have the best outcome. Intuitively, it is assumed that most treatment facilities would offer some type of drug and alcohol education curriculum. However, in a 1997 survey of short- and long-term juvenile correctional facilities, the Substance Abuse and Mental Health Services Administration found that only 36% offered some type of substance abuse treatment (Altschuler & Brash, 2004). The findings of this study and many studies like this one emphasize the relevance and importance of treating the offenders and making the most of their incarceration because these juveniles will soon be back out on the streets.

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