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Examining Adolescent Cocaine Use with Social Learning and Self-Control Theories

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An estimated 1.6 million adolescents use cocaine on a regular basis. Social learning theory and self-control theory are regularly used to explain adolescent substance use, but few studies have examined Hirschi's (2004) revised self-control theory. This study examines the efficacy of these three theories in explaining adolescent cocaine use using data from the 2011 Monitoring the Future survey. The study finds that Hirschi's (2004) revised theory and peer hard drug use predicted the probability of adolescent cocaine use in the previous 30 days. When examining cocaine use in the prior year, all three theoretical perspectives were significant predictor of cocaine use. The implications of the findings are discussed.

EXAMINING ADOLESCENT COCAINE USE WITH SOCIAL LEARNING AND SELF-CONTROL THEORIES

Adolescent cocaine use is still a problem in the United States. Between 2002 and 2003 it estimated 5.9 million people ages 12 or older had used cocaine (National Survey on Drug Use and Health [NSDUH] 2005). The rate of cocaine use among high school students in the United States has remained constant over the past 20 years at a rate of 5.9% in 1991 to a rate of 6.8% in 2011 (Youth Risk Behavior Survey, 2011). It is estimated that there were a total of 1.6 million

people ages 12 or older who use cocaine on regular basis, with 639,000 persons over the age of 12 using cocaine for the first time in the past 12 months (Substance Abuse and Mental Health Service Administration [SAMHSA] 2013). The data here show that adolescent cocaine use is still an important problem that needs explaining.

A large body of research has examined the theoretical predictors of substance use (see Pratt and Cullen 2000; Pratt et al. 2010). In particular, several studies have used social learning theory and self-control theory to explain substance use (Ansary and Luthar 2009; Arneklev et al. 1993; Higgins, Mahoney, and Ricketts 2009; Lee, Akers, and Borg 2004; Meneses and Akers 2011; Sussman, McCuller, and Dent 2003). Cocaine is often conceptualized as one type of hard drug, and has a small amount of theoretical attention from the criminological theoretical literature (Crum, Lillie-Blanton, and Anthony 1996; Corwyn and Benda 2000; Malouf, Stuewig, and Tagney 2012).

In this study, social learning and self-control theories are used to explain adolescent cocaine use. We present differential association as part of social learning theory, as well as measures for Gottfredson and Hirschi's (1990) self-control theory and Hirschi's (2004) revised self-control theory. As a result, the study makes a modest contribution to the literature by providing a multitheoretical test of adolescent cocaine use.

SOCIAL LEARNING THEORY

Social learning theory, as developed by Akers (1998), argues that people learn deviant behavior through the interactions with primary groups that provide negative role models, definitions conducive to crime, and positively reinforce deviant behavior. Akers developed this theory based on the prior work of Sutherland (1947), Skinner (1953), and his work with Burgess (Burgess and Akers 1966). The current formulation of social learning theory contains four components: definitions, differential association, imitation, and differential reinforcement.

First, differential association refers to the influence or exposure of delinquent peers on behavior. Exposure to delinquent peers can vary in frequency, duration, intensity, and priority. In addition, when an individual associates with a peer who holds favorable definitions to cocaine use, he or she is more likely to adopt similar definitions. Definitions refer to the attitudes and beliefs held by an individual toward the wrongfulness of a deviant behavior. The more an individual believes a particular behavior is wrong, the less likely he/she will participate in the behavior. Third, imitation refers to the extent individuals model his/her behavior after intimate role models. These role models can include family and close friends. Finally, differential reinforcement is the costs and benefits of partaking in certain behavior. An individual who receives positive rewards for using cocaine is likely to continue using the drug, while the converse is also true. The empirical research indicates that each of these four components are predictors of delinquent behavior across a variety of offenders and offenses (Pratt et al. 2010).

A full exploration of the social learning process is complex and beyond the scope of this study. Social learning theory has previously been applied to a range of delinquent behaviors and drug use including alcohol, marijuana, cigarette use, and hard drug use (Akers and Lee 1999; Elliott, Huizinga, and Ageton 1985; Erickson, Crosnoe, and Dornbusch 2000). However, Akers (1998) argues that the complexity of the theory allows for an understanding of the social learning process through one piece. To clarify, Akers is saying that support for one piece of the social learning process is support for the theory and Krohn (1999) indicates that the learning

process primarily occurs through interaction with peers (i.e., differential association). Akers (1998) argues that differential association provides the proximity and the environment for the social learning process to take place, and that it is likely to be the most important part of the theory. In a meta-analysis of more than 100 studies, Pratt et al. (2010) show that differential association is the most assessed and important part of the theory.

Researchers do show support for the link between differential association and cocaine use. Crum et al. (1996) use data from 4th and 8th graders to show that differential association has a link with exposure to cocaine. Corwyn and Benda (2000) use data from 532 adolescents to show that differential association is a significant predictor of hard drug use that includes cocaine. Dembo, Wareham, Schmeidler (2007) use data from 278 justice involved juveniles to show that differential association (i.e., peer association) has a link with cocaine use. From this non-exhaustive review of the literature, we expect that peer association has a positive link with cocaine use.

SELF-CONTROL THEORY

Gottfredson and Hirschi (1990) argue that humans are rational beings who weigh the perceived costs and benefits of crime before deciding to commit the act. Gottfredson and Hirschi argue that all crimes and analogous behaviors exhibit similar characteristics, "short lived, immediately gratifying, easy, simple, and exciting" (1990:14). These characteristics make crime attractive and appealing to individuals with low self-control. Gottfredson and Hirschi indicate that persons with low self-control are "impulsive, insensitive, physical, risk taking, short-sighted, and non-verbal" (Gottfredson and Hirschi 1990:90). Gottfredson and Hirschi suggest that self-control influences the likelihood of crime; those individuals with higher levels of self-control are less likely to engage in delinquent behavior. Conversely, individuals with low self-control are unable to see the long-term consequences of their actions and the harm it may cause.

Gottfredson and Hirschi (1990) contend that low self-control is an individual propensity that becomes stable after the age of 8 and increases the likelihood of offending across the life course. The primary reason that low self-control develops is due to ineffective parenting. Effective parents develop affection with their children. As a result, the parent does monitors the child closely, recognizes delinquent behavior, and thus punishes the behavior when it occurs. Conversely, parents who do not show affection to their child, does not monitor the child's behavior, does not recognize deviant behavior, and does not punish (non-corporal) the deviant behavior are more likely to have kids who develop low self-control.

Researchers have expended a substantial amount of energy examining the link between self-control and criminal and deviant behavior to show a moderate effect (Pratt and Cullen 2000). In addition, researchers show that low self-control has a link with substance use that include cigarette smoking (Arneklev et al. 1993), drinking alcohol (Arneklev et al. 1993; Gibson, Schreck, and Miller 2004), binge drinking (Higgins and Tewksbury 2006), drug use (Wood, Pfefferbaum, and Arneklev 1993), and marijuana use (Jones, Lynam, and Piquero 2011). Malouf and colleagues (2012) use longitudinal data from 485 adult jail inmates to show that self-control has a link with substance use that includes cocaine. From this review of the literature, we expect that low self-control will have a positive link with cocaine use.

Hirschi expanded self-control in 2004. Hirschi argued that self-control is on a continuum, and the empirical research has focused extensively on low self-control at the expense of examining the

influence of high self-control. Hirschi argues that the emphasis on low self-control causes four issues. First, the discipline focuses on personality traits and emphasizes the motives of crime. Second, the focus on low self-control has little value for understanding why people do not break the law. Third, the extant literature does not explain how self-control operates. Finally, Hirschi argues that having more self-control is more desirable than having less self-control; therefore, the discipline should focus on the correlates of higher self-control. Hirschi moves self-control from a trait theory back to its roots as a control theory emphasizing the role of high self-control in inhibiting deviant behavior.

Hirschi (2004) suggests that the inhibitors of deviant behavior are similar to the measures of social control theory—commitment, attachment, involvement, and belief. That is, an individual who partakes in delinquent activity lacks commitment, attachment, involvement, and/or belief in conventional activities. Hirschi argues that the inverse is also true, an individual with strong social bonds has inhibitors in place to prevent deviant activity when an opportunity presents itself. Therefore, Hirschi (2004) suggests that having high self-control is similar to having someone restrain her/his behavior.

Researchers have examined the revised version of self-control theory. Following Hirschi (2004), Piquero and Bouffard (2007) using self-generated measures of consequences, social bonds, and an attitudinal measure of self-control show that all three measures are able to explain crime and deviance among college students. Higgins and colleagues (2008) using self-generated measures of consequences, social bonds, and the Grasmick et al. (1993), they show that all three measures have a link with digital piracy. Using measures of social bonds and a modified version of the Grasmick et al. scale, Morris, Gerber, and Menard (2011) show all three measures of self-control have a link with delinquency. One study provides evidence that is specific to cocaine use. Jones et al. (2011) use data from juveniles that took part in the Drug Abuse Resistance Education (DARE) program to show that show that Hirschi's revised self-control theory—measured by inhibitors—has an effect on substance use, but the effect is partially mediated by rewards. Jones and colleagues (2011) suggests that Hirschi's (2004) revision needs additional research with different measures to understand the link with hard substance use. From this review of the literature, we expect that Hirschi's (2004) revised version of self-control will have a negative effect on cocaine use.

THE PRESENT STUDY

The literature indicates that social learning theory, self-control theory, and Hirschi's (2004) revised self-control theory are correlates of substance abuse. The extant research has examined the use of cocaine primarily as a measure of hard drug use. It is beneficial to disentangle the influence of social learning theory and self-control theory on cocaine use separately to examine whether these theories explain all forms of drug use. The following sections will provide the sample and measures used in this study, as well as the results and a discussion of the findings.

METHODS

Sample and Procedures

The current study uses data from form 2 of the 2011 Monitoring the Future Survey (MTF). In general, the MTF explores the lifestyles, behaviors, and values of contemporary American

youth. The 2011 MTF survey of a core survey as well as six different versions (forms). This study uses form 2 because it possesses theoretical measures of interest for this study was disaggregated into six questionnaire versions (forms), and this does not include the core survey. The total sample size for this study is 2,465.

Measures

Cocaine Use

We use two items as dependent measures in this study. The first measure was whether the participant ever used cocaine in the past year. The second measure was whether the participant ever used cocaine in the past 30 days. For both measures the participants marked their responses using a dichotomous measure: (0) "no" and (1) "yes."

Social Learning Theory

Differential association. One of the purposes of the present study was to examine the link between social learning theory and cocaine use (i.e., testing Akers' [1998] social learning theory). Differential association has been shown to have the strongest link of all of the social learning measures to behavior. Therefore, the first measure used three items to capture the participants' perceptions of the number of friends that use soft drugs (i.e., marijuana and alcohol use). The participants marked their responses using a 5-point Likert-type scale that was anchored by (0) "none" and (4) "all." The internal consistency was acceptable (Cronbach's alpha = 0.82).

The second measure used ten items to capture the participants' perceptions of the number of friends that use hard drugs (i.e., lysergic acid diethylamide [LSD], other hallucinogens, amphetamines, sedatives, tranquilizers, cocaine, heroin, pain relievers, inhalants, and crack). The participants marked their responses using a 5-point Likert-type scale that was anchored by (0) "none" and (4) "all." The internal consistency of the scale was acceptable (Cronbach's alpha = 0.93).

We recognize that a current trend in criminology is the use of actual peer behavior when studying crime and deviance (Boman et al. 2011). We concur with Akers (1998) that perceptual measures will have a stronger impact than actual measures of peer deviance, and the perceptual measures will still reveal peer influence. Young and Weerman (2013) using social network data show that this is the case. Thus, we use perceptual measures of deviant peer association.

Self-Control Theory

Low self-control. To capture low self-control, similar to other studies that examine low self-control with drug use, we used measures of risk-taking (Wood et al. 1993). In the present study, we used two items as proxy measures of low self-control: "I get a kick out of doing dangerous things" and "I like to take some risks." This measurement is consistent with the measurement of the risk-taking portion of the Grasmick et al. (1993) scale. The participants marked their responses to these items using a 5-point Likert-type scale that was anchored by (1) "disagree" and (5) "agree." Higher scores on the measure indicated more non-social reinforcement. The correlation ($r = 0.82$) between the two items was high, suggesting that they can be combined into a single index.

Hirschi's self-control. The present study uses an attitudinal measure of perception of health risk as a measure of Hirschi's self-control. This is a proper measure for our study because it captures the essence of Hirschi's redefinition of self-control—seeing the consequences of their actions. Three items to capture the participants' perceptions that they think people risk harming themselves (physically or in other ways), if they try powder cocaine once or twice, occasionally, or regularly. The participants marked their response using a 5-point Likert-type scale that was anchored by (1) "no risk" to (5) "great risk." In addition, the Cronbach's alpha coefficient was 0.87 indicating that the measure had acceptable internal consistency.

Control Measures

Several control measures were used in this study. The first control measure was age, and it was captured as (0) "below 18 years old" and (1) "above 18 years old." The second control measure as biological sex—(0) "female" and (1) "male." The third measure was race—(0) "white" and (1) "non-white." The fourth measure was grade point average (GPA)—(0) "less than 3.0" and (1) "greater than 3.0." The fifth control measure was urban—(0) "non-metropolitan statistical area" and (1) "metropolitan statistical area."

ANALYSIS PLAN

The purpose of the present study is to determine which theoretical premise provides the better understanding of cocaine use. First, individuals that socially learn that cocaine is appropriate are likely to do so. Second, individuals that experience depression are likely to use cocaine. Third, individuals that have worn or broken bonds are likely to use used cocaine.

The analysis of these hypotheses takes place in a series of steps. The first step is a presentation of the descriptive statistics. The second step is a presentation of logistic regression. Binary logistic regression is used in this study because the dependent measure—cocaine use in the past year—is dichotomous (Pampel 2000). Multicollinearity may be an issue in binary logistic regression. Following Menard (2002), the tolerance measure is used to examine the extent of multicollinearity. Typically, tolerance levels that are closer to 0.20 indicate multi-collinearity is a problem.

RESULTS

Table 1 presents the descriptive statistics for the study. Cocaine use either in the past 30 days (1%) or one year (3%) is a relatively rare event. The low self-control average score is 6.53. The Hirschi (2004) self-control average score is 7.47. The average score for peer hard drug use is 2.88. The average score for peer soft drug use is 5.31. Fifty-six percent of the sample is over the age of 18. Fifty-two percent of the sample is male. Thirty-one percent of the sample are white. Seventy-two percent of the sample has a GPA over 3.0. Eighty percent of the sample lives in an urban area.

Table 2 presents the logistic regression analysis results. The results show that two measures are significant. Specifically, we support our expectation that Hirschi's (2004) revised version of

TABLE 1
Descriptive Statistics

Measures	Mean	Standard deviation	Minimum	Maximum
Cocaine use 30 days	0.01	—	0.00	1.00
Cocaine use 1 year	0.03	—	0.00	1.00
Low self-control	6.53	2.25	2.00	10.00
Hirschi low self-control	7.47	2.24	3.00	15.00
Peer hard drug use	2.88	4.85	0.00	40.00
Peer soft drug use	5.31	3.23	0.00	12.00
Age	0.56	—	0.00	1.00
Sex	0.52	—	0.00	1.00
Race	0.31	—	0.00	1.00
GPA	0.72	—	0.00	1.00
Urban	0.80	—	0.00	1.00

TABLE 2
Logistic Regression Analysis for Cocaine Use in 30 Days

Measure	b	S. E.	Exp(b)	Tolerance
Low self-control	0.13	0.13	1.13	0.86
Hirschi's self-control	−0.48**	0.08	0.62	0.97
Peer hard drug use	0.14*	0.03	1.15	0.78
Peer soft drug use	0.05	0.09	1.05	0.75
Age	0.13	0.55	1.13	0.97
Sex	−0.29	0.53	0.75	0.94
Race	−0.34	0.61	0.71	0.96
GPA	−0.49	0.53	0.81	0.94
Urban	−0.21	0.58	0.81	0.97

Model Diagnostics: Model Chi-Square: 62.77**, −2 Log Likelihood: 133.18, Cox & Snell R-Square: 0.04, Nagelkerke R-Square: 0.33

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

self-control reduces the likelihood of cocaine use by 38% (b = –0.48, Exp(b) = 0.62, or 38% decrease). In other words, those that see that cocaine use is risky to their health (i.e., a consequence) are less likely to use the drug. Further, the results provide support for our expectation that social learning theory will have a link with cocaine use. Specifically, they show that associating with peers that use hard drugs are 15% more likely to use cocaine in the past 30 days (b = 0.14, Exp(b) = 1.15, 15% increase).

Table 3 presents the logistic regression analysis that examines the effect of self-control and social learning theories in the context of one year cocaine use. The results show that individuals with low self-control are 53% more likely to have used cocaine in the past year (b = 0.42, Exp(b) = 1.53, 53% increase). This is supportive of our expectation that low self-control is likely to have a positive link with cocaine use. Further, the results show that our expectation that Hirschi's (2004) self-control will have a negative link with cocaine use. In fact, the results show, in these

TABLE 3
Logistic Regression Analysis for Cocaine Use in 1 Year

Measure	b	S. E.	Exp(b)	Tolerance
Low self-control	0.42**	0.10	1.53	0.86
Hirschi's self-control	−0.33**	0.06	0.72	0.97
Peer hard drug use	0.12*	0.02	1.13	0.78
Peer soft drug use	0.10	0.07	1.10	0.75
Age	0.17	0.35	1.18	0.97
Sex	0.23	0.34	1.26	0.94
Race	−0.07	0.39	0.93	0.96
GPA	0.38	0.37	1.46	0.94
Urban	0.45	0.43	1.57	0.97

Model Diagnostics: Model Chi-Square: 110.39**, –2 Log Likelihood: 297.49, Cox & Snell R-Square: 0.07, Nagelkerke R-Square: 0.30

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

data, that there is a 28% decrease in the likelihood of cocaine use in the past year (b =−0.33, Exp (b) = 0.72, 28% decrease). This is supportive of Hirschi's (2004) view that understanding the consequences of a behavior (i.e., risk of health) is likely to reduce instances of the behavior. Finally, the results indicate that associating with peers that use hard drugs increase the likelihood of cocaine use 13% (b = 0.12, Exp(b) = 1.13, 13%). This is supportive of our expectation that social learning theory will have a positive effect on cocaine use.

DISCUSSION

The purpose of this study is to make two contributions. First, this study provides an examination of the link between social learning theory and cocaine use. Second, this study provides an examination of the link between self-control theory (Gottfredson and Hirschi 1990; Hirschi 2004) and cocaine use.

The results are supportive of social learning theory. Specifically, the results suggest that associating with peers, especially hard drug using peers, increases the likelihood of cocaine use. The result is consistent with the literature (Crum et al. 1996; Corwyn and Benda 2000; Dembo et al. 2007). This suggests that peer influence is taking place in the perception of this behavior. To clarify, the perception of this behavior indicates that other parts of social learning theory are taking place, and their cumulative effect as indicated in the peer association is responsible for the increased likelihood. Overall, this is supportive of Akers' (1998) version of social learning theory.

The results are partially supportive of Gottfredson and Hirschi's (1990) version of self-control theory. The results show that low self-control has a link with cocaine use in the past year, but not in the past 30 days. The link with cocaine use in the past year is consistent with the literature (Malouf et al. 2012). The differences in the results could be because the timing of the measurement. This version of low self-control is an indicator of an individual propensity for criminal activity, and may be activated only for longer-term issues. This is consistent with Gottfredson

and Hirschi's (1990) view individuals with low self-control less likely to foresee the long-term consequences of their actions.

Hirschi's (2004) revised version of self-control theory is supported in these data. The results show that our measurement of self-control as an attitude of health risk for using cocaine allows individuals to express their understanding of consequences for using the drug. This understanding does reduce the likelihood of using the drug. These results are consistent with Hirschi (2004) and previous research (Higgins, Wolfe, and Marcum 2008; Jones et al. 2011; Morris et al. 2011).

While the results are supportive of the theories, they should be kept within their limits. First, cocaine use is a rare event possibly making it difficult to derive proper standard errors. We attempted to use rare events logistic regression to take this into account. The results were exactly the same as the binary logistic regression. We, thus, present the binary logistic regression results because they are simpler solutions.

Second, the study only uses a measure of drug using peer association. The use of this measure does not capture all of the components of Akers' (1998) version of social learning theory. This is problematic because other parts of the theory may provide more information that could increase the likelihood of cocaine use in the past 30 days. Some argue that all is needed is a measure of peer association to capture social learning theory because that is where most of the social learning theory occurs (Akers 1998; Krohn 1999).

Third, the measure of peer association is a projected report from the individual to their friends. This means that the data is not social network data that actually captures the information from the individual's peers. Some suggest that this is the optimal manner to capture peer association (Young and Weerman 2013). However, in the absence of this type of data, Warr (2002) argues that the measures used in the present study are appropriate.

Despite the limits, the present study provides evidence that adds to the self-control and social learning theory literatures. While data that has more cocaine use, additional social learning theory components, and different measures of peer association may provide additional results, the present study makes a contribution to the literature. The present study shows that social learning theory and self-control theories are relevant in understanding cocaine use.

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