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## Does Exclusion From Normative Peer Groups in Early Adolescence Predict the Development of Substance Use Problems in Early Adulthood?

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DOES EXCLUSION FROM NORMATIVE PEER GROUPS IN EARLY  
ADOLESCENCE PREDICT THE DEVELOPMENT OF SUBSTANCE USE  
PROBLEMS IN EARLY ADULTHOOD?

by

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A THESIS

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Arts

Major: Sociology

Under the Supervision of Professor Lisa Kort-Butler

Lincoln, Nebraska

April 2013

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ADOLESCENCE PREDICT THE DEVELOPMENT OF SUBSTANCE USE  
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University of Nebraska, 2013

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Much of the previous research pertaining to Problem Substance Use has examined genetic predisposition or personality traits associated with substance abuse or dependence. The current research examines a possible relationship between social exclusion and problem substance use. Using the National Longitudinal Survey of Adolescent Health (waves 1-3), I explore several indicators of social exclusion in adolescence, and examine how they may predict the onset of substance use problems by early adulthood. As discussed herein, there is evidence that suggests that adolescents who are rejected or excluded from normative peer groups are more likely to gravitate towards deviant peer groups, socialize with peers who abuse substances more frequently, and eventually experience more substance use problems in early adulthood. Implications of the current study could contribute to our understanding of environmental influences on adolescent substance use, as well as inform future prevention efforts.



## CHAPTER 1

### Introduction

Substance abuse and dependence represent an enormous social problem in the United States. The physiological effects of illicit drug use can damage brain functioning, destroy vital organs, and place the user at increased risk for life threatening disease. (National Institute on Drug Abuse [NIDA] 2010; Volkow et al. 2001) Driving or operating machinery while impaired poses a threat to the user as well as to bystanders. Substance abuse and dependence can destroy families, and can deplete community resources (National Institute on Drug Abuse [NIDA] 2010). The United States Department of Justice, National Drug Intelligence Center [NDIC] report that the economic costs of illicit drug use reached 193 billion dollars in 2007 (NDIC 2011). Substance abuse can also harm adolescent development. Previous research has linked substance abuse in early adolescence to developmental lag and psychosocial dysfunction (Wetherill and Tapert 2012; Brook, Lettieri, and Brook 1985; Hawkins and Catalano 1992). It is particularly important to increase our understanding of adolescent substance abuse and dependence. Previous research has shown that patterns of problem substance use usually begin during adolescence, and early age of substance initiation is associated with increased probability of developing a substance use disorder (Wetherill and Tapert 2012; Ford 2009; National Institute on Drug Abuse [NIDA] 2010).

Substance abuse is complex social problem. There have been two major approaches to the empirical study of substance abuse (Wright, Beaver, Delisi, and Vaughn 2008). The first approach has focused almost exclusively on genetic or

neurobiological factors to explain substance abuse. This approach has primarily relied on intrapersonal variables such as genetic predisposition (Turkheimer 2000; Kreek, Nielsen, Butelman, and LaForge 2005), neurobiological deficiencies, (Erickson and Wilcox 2001) and personality traits (Smith and Newman 1990; Verheul, Van den Brink, and Hartgers 1995) The second approach has focused on social or environmental factors to explain substance abuse. This approach has largely relied on interpersonal variables such as family structure (Barrett and Turner 2006), family history of use (Ohannessian and Hesselbrock 1999), exposure to violence and abuse (Kilpatrick et al. 2000; White and Widom 2008), and deviant peer association (Fergusson, Swain-Campbell, and Horwood 2002) as contributors to substance abuse and dependence.

One weakness of previous research on the etiology of adolescent substance use problems has been that research has typically been theoretically and methodologically constrained by the discipline of the researcher, focused exclusively on either intrapersonal or interpersonal variables (Lettieri 1985; Newcomb and Felix-Ortiz 1992). Previous research has omitted social exclusion as a possible explanatory factor (for a summary of identified risk and protective factors see Whitesell, Bachand, Peel, and Brown 2013; Hawkins, Arthur, and Catalano 1992). Social exclusion represents a possible middle ground between intrapersonal factors (such as genetic predisposition, neurobiological deficiencies, and personality type) and interpersonal factors (such as deviant peer association). For examples, previous research suggests that intrapersonal factors such as low self-control (Hirschi 1990) neuroticism, and aggression (Coie, Dodge, and Kupersmidt 1990) can strain peer relationships and can result in social exclusion. Dishion, Patterson, and Griesler (1994) argue that excluded adolescents

gravitate towards deviant peer groups, and adopt the deviant peer group's norms. In the present research, I focus on exclusion from normative peer groups during early adolescence, and subsequent peer group influences in groups that largely consist of substance-using peers.

In the present study, I examine data from the National Longitudinal Study of Adolescent Health to explore whether individuals who are rejected from normative peer groups during early adolescence are more likely to be attracted to substance-using peer groups, and in turn develop problem substance use patterns in early adulthood. To begin, I review previous literature on both intrapersonal and interpersonal factors that contribute to substance use problems. Next I derive a series of hypotheses centering on: the influence of peer rejection on association with deviant peers and whether deviant peer relationships during adolescence predicts the prevalence of substance use problems in early adulthood. In chapter 3, I discuss the data and methodology of the present study. In chapter 4, I discuss the results of the analyses used in the present study. In chapter 5, I summarize the findings and discuss future directions for research in this area.

## CHAPTER 2

### Literature Review

The complexity of substance abuse as a social problem has yielded a considerable amount of empirical research. To begin, I review previous literature regarding intrapersonal factors that influence substance abuse, such as genetic predisposition and personality traits. Then I review previous literature, drawing primarily from social control theories and social learning theories, on interpersonal explanations for substance

abuse, such as family structure and delinquent peer association. I then propose a link between the two approaches.

### *Intrapersonal Explanations*

Much of the existing research on substance abuse has focused on biological or individual factors such as a genetic predisposition (Kreek et al. 2005), neurobiological deficiencies (Erickson and Wilcox 2001; Hyman and Malenka 2001) or personality type, (Smith and Newman 1990; Verheul et al. 1995). Relying on family and twin studies, (Kreek et al (2005) estimate that genes contribute 30 to 60 % of the vulnerability to substance use problems. A normal functioning brain produces and regulates levels of various neurotransmitters. Two of these neurotransmitters, dopamine and serotonin, play important roles in addiction (Erickson and Wilcox 2001). Kreek et al. (2005) identified a gene that inhibits the dopamine receptors in the brain. People with this gene present tended to show less impulse control, less ability to delay gratification, greater risk taking and higher rates of substance use problems.

Researchers have also attempted to explain substance abuse and dependence by comparing the correlation between various personality types, and substance use problems (see Tarter 1988). Smith and Newman (1990) and Verheul et al. (1995) found significant correlations between prevalence of substance use problems and antisocial personality disorder; however, both studies focused on adult populations. Neuroticism and disinhibition have also been associated with substance use problems (Sher, Bartholow, and Vieth 1999). Their results have been replicated across clinical (Ball, Tennen, Poling, Kranzler, and Rounsaville 1997), community (McGue, Iacono, and Slutske 1999), and college student (Trull, Waudby, and Sher



2004) studies. Interestingly, many of these same factors have also been found to be related to peer rejection in early adolescence. In particular, neuroticism, aggression, and disruptive behavior are associated with peer rejection. (Coie, Dodge, and Kupersmidt 1990).

Personality and social behaviors are partially shaped by genetics and partially shaped by one's experiences and social circumstances (Wright et al. 2008). Wright et al. (2008) report that it is common for behavioral genetics studies to find that genes account for around 50 percent of delinquency and antisocial behavior among adolescents. However, Arseneault et al. (2003) and Mason and Frick (1994), conclude that more serious or pathological behavioral disorders are more heritable. Wright et al. (2008) report that about 6% of the variance in adolescent delinquency is accounted for by what they referred to as “shared environmental experiences”. Shared environmental experiences refer to environmental “factors that do not vary between children within the same household” (Wright et al. 2008; p.547). Parenting styles, parental attachment, support, and involvement are all examples of shared environmental experiences. The remaining variance of adolescent misconduct is presumed to be accounted for by what Wright et al. (2008) term “Non-shared environmental factors”. Non-shared environmental factors are unique social environments or experiences for adolescents. Exposures to differing peer groups or social events are examples non-shared environmental factors (Wright et al. 2008). Despite growing interest in these issues, few studies have considered how peer environments, such as social exclusion and / or rejection, influence how

personality is formed and its relationship to substance use.

### *Interpersonal Explanations*

If we accept the previous intrapersonal explanations of adolescent substance abuse, we attribute approximately 50 percent of the variance of adolescent delinquent behaviors to heritable traits. We are left with approximately 50 percent then that is attributed to environmental factors (both shared and non-shared). I will review some of the previous research on environmental factors that influence adolescent substance abuse and propose a concept that may serve to fill in a portion of that unexplained variance.

First, examining family environments, Barrett and Turner (2006) found a significant relationship between family structure and substance abuse. Specifically they found that children from single-parent homes are more likely to abuse drugs or alcohol. White and Widom (2008) showed that, specific to women, childhood abuse and neglect are predictors of higher levels of drug use and related problems in adulthood. Kilpatrick et al. (2000) found that victims of physical abuse and those who have witnessed violence are at higher risk of abusing drugs. Ohannessian and Hesselbrock (1999) found that family history of substance abuse is a predictor of substance abuse in offspring. Specifically, children of substance abusers are at increased risk of abusing drugs themselves, compared to children of non-abusers.

Peer relationships have also been linked to drug use. One of the strongest predictors of adolescent delinquency is the delinquency of one's peer group

(Braucht, Brakarsh, Follingstad, and Berry 1973; Ferguson and Horwood 1999; Dishion and Andrews 1995; Chapple 2005). Light and Dishion (2007) argue that delinquent acts by juveniles are rarely done by individuals acting alone. They propose that juvenile delinquency more closely resembles a “team sport.” Much like an athletic team, delinquent groups tend to be made up of individuals who take on specific roles within the group, yet there is an over-arching group or social identity that prescribes behavior of its members.

Studies tend to focus on how participating in a deviant peer group increases risk for substance use. Few studies mention circumstances that contribute to conditions in which adolescents having limited peer relationships or find it difficult to form bonds with peers, and as a result experience rejection from peer groups. Research that examines social causes of substance use disorders among adolescents has yet to look at social exclusion as a factor in problem substance use. There is considerable debate over the functional definition of social exclusion, (Williams and Govan 2005) however, I will rely on DeRosier, Kupersmidt, and Patterson’s (1994) definition: a condition in which children experience “poor peer relationships,” and are “actively disliked or rejected by their peer group” (DeRosier et al. 1994: 1799). Researchers have found several negative outcomes associated with social exclusion. For example: Buhs, Ladd, and Herald (2006) found that social exclusion can lead to poor academic performance and school disengagement. Twenge, Catanese, and Baumeister (2003) found that social exclusion can lead to what they described as a “cognitively deconstructed state” which is a state of increased lethargy, lack of emotion, and lack of self-awareness. Baumeister, Twenge, and Nuss (2002), found that social exclusion decreases performance on IQ tests or other

cognitively challenging tasks. Finally, previous research has found an association between social exclusion and decreased interpersonal empathy (Baumeister and DeWall 2006) as well as increased anger and aggression (Leary, Twenge and Quinlivan 2006).

### *Theoretical Orientation*

The social psychological development of substance use has been a less common focus in research on abuse and dependence. My goal is to examine the relationship between social exclusion or rejection in early adolescence and the development of substance use problems in late adolescence and early adulthood. I argue that rejection from normative peer groups in early adolescence acts as a channeling factor, filtering adolescents into alternative and often deviant social groups. These deviant peer groups then create a group identity that prescribes their social behaviors and re-enforces problem substance use. The theories that this work draws upon stem largely from the fields of criminology and social psychology. First, I discuss the social psychology surrounding the need to belong. Next, I describe criminological theories that may help explain why rejected individuals gravitate towards deviant peer groups. Finally, I discuss how deviant peer group norms can re-enforce problem substance use behaviors.

*The Need to Belong.* The need to belong is a fundamental human motivation. Durkheim (1898) theorized that social integration mitigated antisocial behaviors such as suicide. Maslow (1943) included belongingness in the middle of his hierarchy of needs. Baumeister and Leary (1995) suggest that the need to belong may be an evolutionary adaptation leading to increased protection from threats, increased access to resources (particularly food) and more opportunities to procreate. Other studies (Leary and

Baumeister 2000; Kerr and Levine 2008) suggest that because of the potential consequences, humans have developed subconscious ways to monitor signs of social inclusion or exclusion. They theorized that monitoring one's social environment for signs of inclusion is what creates our self-esteem. Gardner, Knowles, and Pickett (2004) extended this idea and found that individuals who are rejected from a social group can more readily pick up on subtle social cues (such as facial expressions, and vocal tone variations) than those who are accepted into the group. The authors suggest that this finding supports Leary's hypothesis of an evolutionary mechanism that monitors inclusion. In separate studies Maner, DeWall, Baumeister, and Schaller (2007) and Twenge et al. (2007) found evidence that individuals who are rejected from social groups showed a strong desire to restore themselves to be included in a group, although not necessarily the group they were previously rejected from.

Previous studies have shown that failure to fulfill the need to belong decreases prosocial behavior and increases antisocial behavior. For example, Twenge, Baumeister, Tice, and Stucke (2001) and Leary, Quinlivan, and Twenge (2006) found that social exclusion increases propensity for aggression. Twenge et al. (2007) found that individuals who are rejected are less likely to participate in prosocial behavior such as donating money or volunteering to help after a small mishap. Finally, several studies have found that social exclusion can create physiological responses as well. Using an fMRI, Eisenberger, Lieberman, and Williams (2003) found that physiological responses to social exclusion in the anterior cingulate cortex were similar to responses to physical pain, as well as responses to self-reported distress. DeWall and Baumeister (2006) found that social exclusion reduces one's sensitivity to pain (increased pain

threshold and tolerance) as well as reducing one's sensitivity to happiness over future positive events, and sensitivity to someone else's pain.

The need to belong is tied to substance use problems in a very fundamental way. Moshier et al. (2012), examined how a sense of "belongingness to drug subculture" may impede participation in and effectiveness of drug treatment programs. The authors concluded drug subculture fosters a sense of identity and belongingness for people who have been excluded or rejected from mainstream society. For people who have previously experienced rejection and failure, drug subculture offers a sense of accomplishment (finding drugs, selling drugs, avoiding law enforcement, etc). Therefore, drug subculture offers perceived rewards such as prestige and respect, that people who were previously alienated from society never previously experienced (Moshier et al. 2012). Furthermore, as drug use increases, users form stronger ties with other users. Drug users become increasingly isolated from mainstream society (alienation from family, inability to find or keep employment, stigmatization from society), so their social networks become smaller and more concentrated on drug subculture (Moshier et al. 2012). Moshier et al. (2012) focused their attention on how belonging to drug culture may inhibit participation in drug treatment programs. It seems plausible that their theoretical arguments could also explain attraction to, and increased participation in drug-using peer groups, in particular for individuals who have experienced previous social exclusion or rejection.

These findings lead to four important conclusions regarding the need to belong. First, a sense of belonging is important for an individual's physical and social well-being. Second, rejection or exclusion from social groups has negative physical and

social consequences. Third, individuals who are excluded or rejected from social groups seek to restore a sense of belonging by seeking membership in other groups. Fourth, individuals who have experienced social exclusion or rejection may be more susceptible to normative influence of groups, particularly if acceptance from that group provides perceived rewards.

Criminological theories also suggest a relationship between social exclusion and deviant behavior. One theory of criminal offending, Social Control Theory (Hirschi 1969), focuses on the role of social bonds in controlling deviance. Social Control Theory states that individuals with weak bonds to normative agents of socialization (family, school, peers, religion, etc.) are more likely to be involved in criminal activities. Rather than attempting to understand why some people engage in criminal activities, Hirschi examined why people refrain from engaging in criminal activities. He argued that people have a natural tendency to deviate, yet in the course of everyday interactions, people are constrained from engaging in criminal acts by bonds to other people, groups, institutions, and society at large. Therefore, he theorized that strong bonds to agents of socialization act as a mediator against delinquent activities because they offer a “stake in conformity.” (Hirschi 1969) First, conventional society offers excluded individuals little benefit by conforming to conventional societal norms. Second, adolescents who engage in delinquent behavior seek out other deviant peers for companionship (Thornberry et al. 1994). This selection perspective suggests that deviant behavior is the causal mechanism that attracts deviant adolescents into peer groups.

Alternatively, Social Learning Theory (Sutherland and Cressey 1978) suggests that

the causal order is reversed. This socialization perspective suggests that once affiliated with a deviant peer group, an individual may be socialized into conforming to the group's expectations for behavior. For rejected individuals to conform to the norms of the deviant peer group may mean deviating from the norms of conventional society.

Finally, Thornberry et al. (1994) argue that neither one of these unidirectional perspectives adequately accounts for the association between delinquent peers and delinquent behaviors. Thornberry et al. (1994) proposed an alternative explanation called Interactional Theory. Interactional Theory posits that delinquent behaviors and association with delinquent peers have reciprocal relationships to each other. Engaging in either one increases the likelihood of engaging in the other. Theoretically social control processes help explain why adolescents who lack social bonds to normative peer groups and institutions are more likely to engage in delinquent behaviors, however Interactional Theory further describes how delinquent behavioral patterns can serve to both lead adolescents to associate with delinquent peers, and to re-enforce delinquent group norms that further increase delinquent behaviors.

*Social Identity Theory of Intergroup Behavior* provides further perspective on these processes. Social identity theory states that individuals seek "membership" in groups, and those groups in turn define the identity and the behavior of its members (Tajfel and Turner 1986). Individuals can belong to multiple groups simultaneously, and group membership can be based on physical characteristics, demographic or geographic indicators, achieved outcomes, status indicators, or shared interests. Tajfel (1981) also showed that a sense of group membership can be based on completely arbitrary indicators or even based on random assignment to one of two groups. Social



identity theorists also argue that because group memberships “define, prescribe and evaluate who one is and how one should think, feel, and act, people have a strong desire to establish or maintain the evaluative superiority of their own group over relevant other groups” (Hogg 2003 pg. 484.). Sherif et al. (1961) and Tajfel (1981) both showed that individuals tend to show favoritism and allocate greater resources to members of their ingroup, and maximize the difference between ingroup and outgroup resource allocation, termed the ingroup favoritism effect, even if those group assignments were based on arbitrary categories or by random assignment.

Understanding group identity formation and conformity to group norms are important concepts for understanding problem substance use. Groups tend to exert a great amount of social influence on the behavior of their members. Previous research suggests that higher-status groups have greater influence on members of the groups to conform to group norms (Festinger, Schacter, and Back 1950). Greater attractiveness to a group or highly valued membership in a group is also more likely to exert conformity from its members (Dittes and Kelly 1956). For example, Centola, Macy, and Willer (2005) demonstrated that fraternity members showed support for and enforced group norms regarding alcohol consumption for themselves and other group members, even if they were privately opposed to the norm. Because continued group membership required the enforcement of the norm. This suggests that individuals may shift their attitudes towards certain behaviors to fall in line with the perceived attitude of the group they belong to in order to maintain group membership. In this way, Social Identity Theory builds upon Social Control Theory to explain how adolescents who associate with and seek membership in deviant peer groups internalize the group identity. As a result,

problem substance use patterns are re-enforced by group norms.

*The Influence of Deviant Peers.* Early adolescence is a critical time period for both physical and social development. Peer relations, and peer group selection have tremendous influence on one's life trajectory and transition into adulthood. Empirically studying the influence of friends and peer groups is a complex task (Haynie and Osgood 2005). Haynie and Osgood (2005) point out that there are several competing theories that attempt to explain the relationship between friends' delinquency and the respondent's delinquency.

The most common explanation of the link between peer relationships and delinquency is one of normative social influence. That is, an individual adapts to the norms that are established by an existing social group (Haynie and Osgood 2005).

Social Learning Theory (Akers 1985), and Differential Association Theory (Sutherland and Cressey 1975) are both consistent with this explanation. An alternative explanation is that the relationship between peer relations and delinquency is largely a self-selection effect (Haynie and Osgood 2005). Individuals generally choose to be friends with people who are very similar to themselves. For example, Gottfredson and Hirschi (1990) argue that adolescents with low self-control are more likely to experience difficult peer relations, more likely to engage in risky behavior, and more likely to associate with similar peers. Haynie and Osgood (2005) also described a third explanation that they refer to as the "Opportunity Perspective." That is, adolescents are more likely to engage in delinquent behavior during unstructured times in the absence of authority figures. The important distinction here is that delinquency is not related to who the friends

are, or the type of friends one chooses, but situational factors that are conducive to delinquency (Haynie and Osgood 2005). Despite the complexities of exploring the relationship between peer relationships and adolescent delinquency, Haynie and Osgood's (2005) general conclusion is that no single approach adequately explains the relationship, and future research should consider the viability of an integration of all three approaches.

Such an approach may help explain an interesting paradox. That is, if juvenile delinquency is largely a group activity, then theoretically individuals who are rejected from groups should be less likely to be involved in such activity. Similarly, previous studies (Farmer and Hollowell 1994; Farmer, Van Acker, Pearl and Rodkin 1999) have shown that individuals who experience peer rejection still report belonging to average sized groups. Dishion et al (1994) accounted for these paradoxical findings with the Confluence Effect, which is the tendency for "deviant peer groups [to] form among mutually rejected youth, who adapt by forming a unique group with a deviant set of mutually influential norms" (Dishion et al. 1994, pg.64). That is, rather than remaining isolated, rejected individuals are motivated to restore a sense of belonging to a group, even if that group consists of others who have also been rejected.

Consistent with the Confluence Effect, DeMuth (2004) found that adolescents with few friends were more likely to associate with delinquent peers than adolescents with a lot of friends.

Research from Kaplan (2003) may identify how and why the confluence effect occurs. Kaplan argues that not only normative peer groups, but also deviant peer groups offer their members a "stake in conformity." Specifically Kaplan (2003)

argues that individuals affiliate with chosen groups because they offer benefits to their members. During the course of the socialization process, individuals learn to value positive evaluation and approval of others. To achieve positive evaluation and approval of others, individuals learn to conform to the expectations associated with valued social identities (Kaplan 2003). However, some individuals experience chronic failure to conform to the expectations established by valued social groups and so experience distress and rejection from normative peer groups. Kaplan suggests that deviant peer groups form from those individuals who have been rejected from normative groups. The shared experience of distress and rejection, and the shared contempt for normative groups and mainstream societal norms creates a cohesive group identity.

Furthermore, Kaplan (2003) indicates that individuals who are chronically rejected from normative peer groups are likely to be attracted to alternative (deviant) peer groups if certain conditions are met. First, attraction to alternative peer groups is likely if the individual expects to be able to approximate the (deviant) group's norms and values. Second, attraction to alternative peer groups is likely to occur if it is expected to meet strongly felt needs (i.e. the need to belong, see Baumeister and Leary 1995). Lastly, chronically rejected individuals are likely to be attracted to deviant peer groups whose norms and values demonstrate contempt for and rejection of the normative group's values (Kaplan 2003). Because of the perceived benefits of association with drug-using groups (Moshier et al. 2012), such groups are likely alternatives for adolescents who have experienced chronic social exclusion.

### *Hypotheses*

Few studies on substance abuse have attempted to integrate intrapersonal and interpersonal factors. Yet, both intrapersonal and interpersonal factors contribute to the development of substance use problems. For example, intrapersonal factors such as inherited traits, personality type, or low self-control may contribute to conditions in which adolescents find it difficult to form bonds with peers, and as a result experience rejection from peer groups. The need to establish or restore a sense of belonging (Baumeister, 1994; Maner et al. 2007; Twenge et al. 2007) leads rejected adolescents to gravitate towards peer groups that consist of other mutually rejected individuals (Dishion et al. 1994). Adolescents who experience rejection, and seek to restore a sense of belonging may then be more susceptible to interpersonal influence such as conformity to perceived group norms surrounding substance use (Moshier et al. 2012).

Previous research has demonstrated the negative effects of social exclusion. This is particularly true during adolescence when the influence of peers is stronger than at any other stage of the life course (Brown 1990). In the current project, I focus on association with substance using peers as a potential mediator between social exclusion and later substance use. I argue that individuals who are excluded from normative peer groups in early adolescence (at Wave 1) are more likely to experience serious substance use problems in early adulthood (at Wave 3). Furthermore, I argue that this relationship is mediated by association with substance-using friends during adolescence (at Wave

2). Figure 1 illustrates the conceptual model. The following hypotheses were developed from social control theory and social identity theory:

(Figure 1 Here:)

**Hypothesis 1:** Individuals who feel rejected from normative peer groups during early adolescence are more likely to associate with alcohol (Hypothesis 1a) or drug (Hypothesis 1b) using peers by middle adolescence (Path a in Fig. 1).

**Hypothesis 2:** Individuals who feel rejected from normative peer groups during early adolescence are more likely to experience a higher prevalence of serious problems associated with alcohol (Hypothesis 2a) or drug (Hypothesis 2b) use during early adulthood (Path c in Fig. 1 above).

**Hypothesis 3:** Association with alcohol (Hypothesis 3a) or drug (Hypothesis 3b) using peers will mediate the relationship between social exclusion and problem substance use. Therefore, individuals who associate with substance-using peers are more likely to experience a higher prevalence of serious problems associated with substance use during early adulthood while controlling for social exclusion at Wave 1 (Path b in Fig. 1). Additionally, including association with substance-using peers in the model will reduce the effect of social exclusion on substance use problems, demonstrating the posited mediating effect.

## CHAPTER 3

### DATA AND METHODS

#### *Data*

The data for this study are from the National Longitudinal Study of Adolescent

Health, waves 1-3 (1994-2002). Add Health is a nationally representative longitudinal survey of adolescents in grades 7-12 beginning in the 1994-1995 school year. Subsequent waves have tracked the original cohort of students as they progressed through adolescence and into early adulthood. For the present study I use data from waves 1-3. The Public Use file used in the current study contains data from 6,504 respondents. Due to the scope of the study, only respondents who were 16 years of age or younger at Wave 1 are included in the analysis. As a result, Wave 1 contains data from 4,288 respondents. From Wave 1 to Wave 2; 550 participants dropped out of the study, or were otherwise unavailable. The total number of participants at wave 2 was 3,738. In the original sample at Wave 1, 47.3% of respondents were male, and 52.7 % were female. However of those respondents who dropped out of the study between Wave 1 and Wave 2, 52.7% were male and 47.3% were female ( $p=.0104$ ).

From Wave 2 to Wave 3, 742 participants dropped out of the study or were otherwise unavailable. The total number of participants in the analysis sample was 2996. Of those respondents who were lost to attrition, 55.1% were male and 44.9 % were female ( $p< .001$ ). This suggests that there was a disproportionately high number of male respondents who dropped out of this study.

Social Rejection also appears to be a highly significant predictor of attrition. The mean score on the rejection index for participants who were lost to attrition from Wave 1 to Wave 2 was 2.93 ( $n=550$ ;  $sd= .6191$ ). The mean score for those respondents who completed the survey at both Wave 1 and Wave 2 was 1.88 ( $n=3736$ ;  $sd=.6221$ ). This suggests that respondents who experience greater levels of

social rejection (at Wave 1) were less likely to participate in subsequent waves of this study. However, the rejection index scores of those participants who were lost between waves 2 and 3 were not significantly different than those who participated in all 3 waves.

### *Measures*

#### ***Dependent Variables***

The study focused on two indicators of problem substance use. The first, *Alcohol Problems*, is a 7-item additive scale assessing the frequency of serious problems due to alcohol use, measured at Wave 3. Six items asked about problems in the previous twelve months, based on response categories where 0 = never to 4 = 5 or more times. The items were: problems at work or school due to drinking, problems with friends due to drinking, problems with romantic partner due to drinking, had a sexual encounter that they regretted due to drinking, had a physical fight due to drinking, and had been drunk at school or work. The seventh item was a yes/no item that asked if the respondent had ever driven drunk. Higher scores indicate increased problems associated with alcohol use. ( $\alpha = .749$ ; range = 0 - 19).

The second dependent variable, *Drug Problems*, is a 6-item additive scale, measured at Wave 3, to assess the frequency of serious problems due to illicit drug use. Six items asked about problem in the previous twelve months, based on response categories where 0 = never to 4 = 5 or more times. The items were: problems at work or school due to drug use, problems with friends due to drug use, problems with romantic partner due to drug use, had a sexual encounter that they regretted due to drug use, had a physical fight due to drug use, and had been high on drugs at school or work. Higher scores indicate



increased problems associated with illicit drug use ( $\alpha = .74$ ; range = 0 - 16).

### ***Focal Independent Variables***

The independent variable centers on perceptions of *social exclusion*. The focal independent variable is an 8-item mean scale assessing the respondent's level of attachment to peers and school at Wave 1. Respondents were given a series of statements and asked on a 5-point Likert scale whether they strongly agreed, agreed, neither agreed nor disagreed, disagreed, or strongly disagreed. The scale consisted of the following items: "I have trouble getting along with teachers; I have trouble getting along with other students; I feel close to people at school; I feel part of my school; I am happy at my school; Teachers treat students fairly; I feel safe in my school; I feel socially accepted" ( $\alpha = .775$ ; range = 1.0 – 4.75). All items were reverse coded, so higher values indicate greater feelings of exclusion.

### ***Mediating Variables***

The two mediating variables center on peer substance use, measured at Wave 2. One focuses on alcohol use and the other on marijuana use. *Peer alcohol use* refers to reported number, out of the respondent's 3 best friends, of friends who drink at least once a month. *Peer marijuana use* refers to the reported number, out of the respondent's 3 best friends, of friends who use marijuana at least once a month. Both variables are intended to be proxies to assess each respondent's association with peers who regularly use alcohol and marijuana.

### ***Control Variables***

*Race / Ethnicity* is a dummy variable where White was the reference group and

Black, Native American, Asian, and other races are the categories. *Biological sex* was measured using a dummy variable, with male as the reference. *Family Income* (measured in thousands of dollars; assessed at Wave 1) was included to control for family economic status. *Number of 3 best friends who drink alcohol / use marijuana at least once per month* (assessed at Wave 1) was included to control for the baseline level of association with peer groups who regularly use alcohol and/ or marijuana.

#### *Analytic Strategy*

I relied on a series of negative binomial regression models to test the hypothesized relationships. Negative binomial models are ideal for analyzing dependent variables that are counts, and have a large proportion of zero values (Haynie, Giordano, Manning, and Longmore 2005). In addition, Haynie et al (2005) report that negative binomial models are ideally suited to handle positively skewed distributions (few respondents experiencing an extremely high number of problems related to alcohol or drug use). As a test of Hypotheses 1a and 1b, Wave 3 prevalence of substance-use problems was regressed on Wave 1 social rejection and the control variables. As a test of Hypotheses 2a and 2b, Wave 3 substance use problems were regressed on affiliation with substance-using friends and the control variables. Because Hypotheses 2a and 2b posed mediation processes between social exclusion and substance use problems, association with substance-using peers was then entered into the previous models. If the relationship between social acceptance and prevalence of problem substance use was reduced, it was considered evidence for mediation. As a further test of mediation, I also used the “Causal steps” method outlined by Baron and Kenney (1985). Included in the causal steps method is the Sobel post hoc mediation test. The Sobel test

measures the statistical significance of a hypothesized mediating variable, and calculates the proportion of the total effect that is mediated.<sup>1</sup>

## CHAPTER 4

### RESULTS

(Table 1 Here)

Table 1 presents the descriptive statistics for the sample. Overall, relatively few people report experiencing any serious problems related to alcohol or substance use by Wave 3. About 69% report no alcohol-related problems and about 92% report no drug-related problems. The average value for the social exclusion index is 2.1. The average value for Peer alcohol use (at Wave 2) is 0.99, and the average value for Peer marijuana use is .66. Interestingly, a fairly large proportion of respondents report that none of their best friends use alcohol (47.82%) or marijuana (61.74%).

(Table 2 Here)

Hypothesis 1 proposed that adolescents who are rejected or excluded from normative peer groups during early adolescence will be more likely to experience increased problems associated with substance use. Table 2 presents the regression models for association with substance-using peers at Wave 2. As predicted, a significant relationship was found for social rejection and engaging in friendships with substance-using peers, while accounting for the control variables. For each unit increase in feeling excluded, the risk of acquiring alcohol using peers increases by 8% and of acquiring drug using peers by 15%. These results support hypotheses 1a and 1b and suggest that individuals who feel excluded from normative peer groups during early adolescence may become involved with deviant peer

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<sup>1</sup> Previous published studies (Buber & Engelhardt 2011; Wetherill & Fromme 2007) have used the causal steps method with negative binomial regression models.

groups.

(Table 3 Here)

Hypotheses 2a and 2b proposed that individuals who feel excluded from normative peer groups are more likely to experience greater prevalence of alcohol or drug related problems during early adulthood. Table 3 presents the regression models for experiencing serious substance-related problems during early adulthood (at Wave 3). As predicted, a significant relationship was found for social exclusion and the frequency of serious problems due to substance use. For each unit increase in feeling excluded, the risk of experiencing greater alcohol-related problems in early adulthood increases by 18%. Similarly, similarly, for each unit increase in feeling excluded, the risk of experiencing greater drug-related problems in early adulthood increases by 49%. These results support hypothesis 2 and suggest that social exclusion during early adolescence is a significant predictor of experiencing serious substance use related problems during early adulthood.

(Table 4 Here)

Hypotheses 3a and 3b proposed that greater association with substance-using peers during middle adolescence mediates the relationship between social exclusion and experiencing serious problems due to alcohol use in early adulthood. Table 4 presents the regression models for experiencing substance-related problems during early adulthood (at Wave 3), with the hypothesized mediating variable included in the model. According to MacKinnon, Fairchild, and Fritz (2007) the most common method to test for mediation is the “Causal steps” method outlined by Baron and Kenney (1985). This method requires the following four conditions to be met: (1) A significant relationship between the independent variable and the dependent variable; (2) A significant relationship between the independent

variable and the hypothesized mediating variable; (3) A significant relationship between the mediating variable and the dependent variable while controlling for the independent variable; (4) The relationship between the independent variable and the dependent variable should be reduced when accounting for the mediating variable. The results support Hypothesis 3 and suggest that greater association with substance-using peers mediates the relationship between social exclusion and problem substance use, the present models meet all four conditions outlined by Baron and Kenney (1985). The independent variable (social acceptance in early adolescence) is related to the dependent variable (frequency of serious problems due to using alcohol in early adulthood). The independent variable is significantly related to the hypothesized mediating variable, as tested previously (hypothesis 1). The mediating variable (association with peer groups that regularly use alcohol) has a significant relationship with the dependent variable (frequency of serious problems due to drinking in early adulthood), while accounting for the independent variable.

Specific to alcohol use, the relationship between rejection from normative peer groups and problem alcohol use is slightly reduced while accounting for association with peer groups who regularly use alcohol. The IRR was reduced from 1.185 to 1.182. The Sobel post-hoc test assesses whether the drop in the total effect is significant when the mediating variable is included in the model (for details see Holmbeck 2002). Using the Sobel test reveals that association with peer groups that regularly use alcohol only partially mediates the relationship between rejection from normative peer groups, and frequency of serious problems due to alcohol use. The proportion of the total effect that is mediated equals 0.02, but the Sobel test was not-significant ( $p=.12$ ). (see figure 2 below).

Specific to drug use, the relationship between rejection from normative peer groups

and problem drug use is reduced while accounting for association with peer groups who regularly use illicit drugs. The IRR was reduced from 1.485 to 1.471. Using the Sobel post hoc mediation test reveals that association with peer groups that regularly use marijuana does significantly mediate the relationship between rejection or exclusion from normative peer groups and frequency of serious drug-related problems ( $z = 2.11$ ;  $p = .035$ ). Furthermore, the proportion of the total effect that is mediated equals 0.04. These results support hypothesis 3b, and suggest that association with drug-using peers partially mediates the relationship between social exclusion and drug use problems.

(figure 3 here)

## CHAPTER 5 DISCUSSION AND CONCLUSION

The current study seeks to provide a middle ground between intrapersonal and interpersonal explanations for problem substance use. Previous research suggests that intrapersonal variables such as low self-control, (Gottfredson and Hirschi 1990) neuroticism, and aggression (Coie et al. 1990) may lead to conditions in which adolescents find it difficult to form bonds with peers and are excluded from normative peer groups. Several studies suggest that there are negative consequences associated with social exclusion (Baumeister et al. 2001; Baumeister et al. 2007; Leary, Quinlivan, and Twenge 2006; Eisenberg, Lieberman, and Williams 2003), and those who are excluded from social groups seek to establish acceptance into alternative groups (Maner et al. 2007; Twenge et al. 2007). Dishion et al. (1994) found evidence that socially excluded adolescents tend to gravitate towards deviant peer groups. Finally, Moshier et al.'s (2012) work on drug subculture suggests that drug subculture offers many perceived

benefits to individuals who have experienced chronic social exclusion, and that those individuals are likely to be more susceptible to the influence of group norms.

The current study focuses on exploring the relationship between social exclusion in early adolescence, and the development of substance use problems in early adulthood. I propose 3 hypotheses that are consistent with established theories and previous research. In the present study, I found evidence that supports Hypothesis 1 and concluded that individuals who feel socially excluded are more likely to associate with substance-using peers by middle adolescence. These results are consistent with Social Control Theory (Hirschi 1969), and lend support to the Confluence Effect (Dishion et al. 1994).

I also found evidence to support Hypothesis 2 and concluded that individuals who feel socially excluded during early adolescence are more likely to experience a greater prevalence of serious substance use related problems during early adulthood. These results lend support to previous research that identifies serious negative consequences associated with social exclusion (Baumeister et al. 2001; Leary, Quinlivan, and Twenge 2006).

In regards to Hypothesis 3, which proposed that greater association with substance-using peers will mediate the relationship between social exclusion and problem substance use, the results are mixed. The results satisfy all four conditions necessary to show mediation (Baron and Kenney, 1985), however for both alcohol and drug use, the proportion of total variance that is mediated is small. Specific to alcohol use, including association with peers who regularly use alcohol, in the regression model slightly decreases the relationship, but the mediating effect is non-significant. These results

suggest that greater association with substance-using peers partially mediates the relationship between social exclusion and problem substance use.

The lack of evidence to support mediation may suggest that the theoretical approach needs re-evaluated. There is a significant direct effect between social exclusion and problem substance use, however that relationship is likely different than the present research hypothesizes. These results lend support to both Thornberry et al. (1994) and Haynie and Osgood (2005), who both concluded that the relationship between peer association and delinquent behavior is too complex to be summarized by unidirectional models. This suggests that future research should utilize more sophisticated analyses. Another explanation for the lack of mediation could be the variables used for group affiliation. The theories that guide the current research suggest that acceptance into a peer group will govern the group member's attitudes and behaviors. The data utilized in the current study do not account for alcohol or drug using group membership. The available proxies (number of best friends who use alcohol / drugs) may not adequately capture the dynamics of alcohol or drug using group membership.

One particular note of interest is that for all hypotheses, the hypothesized relationships are stronger for drug use than for alcohol. While not the intent of the current study, this distinction may need to be explored in future research. Theoretically, these results are consistent with Social Identity Theory. According to the National Survey of Drug Use and Health (NSDUH 2011) a larger proportion of people aged 12-20 have reported lifetime use of alcohol compared to illicit drugs. It seems plausible that individuals who associate with drug-using groups see their group as more distinctive and group norms



may be more influential. In respect to alcohol use, it is likely difficult to view one's group as distinctive if the majority of one's peers are also engaging in the same activity.

The current study is not without its limitations. First, I relied on the public use Add Health data set for my analysis. Analysis of the restricted-use data set may have yielded richer or alternative results. A second limitation to the current study is the lack of intrapersonal variables available (such as inherited traits, neurobiological functioning, etc.). Previous research has identified potential intrapersonal risk factors involved with the development of substance abuse. The current study would have benefitted from including such factors in the analysis. Advancements in the field of behavioral genetics suggest rich opportunities to integrate research across disciplines. Future research will likely benefit from integrating intrapersonal and interpersonal variables to increase our understanding of the dynamics of problem substance use.

An additional limitation is the relatively high proportion of people who were lost due to attrition between waves. Additionally due to the methodological design of Add Health, it was possible for respondents to be missing for Wave 2 and brought back in to the study by Wave 3. Due to the nature of the present research however, only data from respondents who were available for all 3 waves could be analyzed. Of the people who were lost to attrition, a significantly high proportion were males. Additionally, the average score on the rejection index for people who were lost to attrition was significantly higher than those who were available for all 3 waves. A final limitation is that the measures used in the present study to assess association with substance-using peers and problem substance use are intended to be proxies for larger indicators. The social rejection scale is a self-reported measure of how bonded the respondent feels to

peers and his or her school. There may be other ways of measuring social exclusion, such as a social network approach, that may yield richer results. Association with substance-using peers is intended to be a proxy for drug subculture “belongingness.” Moshier et al. (2012) have recently developed and implemented the “Belongingness to Drug Culture Questionnaire” into their research. Future research should rely on this or similar measures to provide a more accurate assessment of drug culture “belongingness.” The problem substance use scales used in the current research are intended to be proxies for substance abuse or dependence as defined by the Diagnostic and Statistical Manual (DSM-IV). Future research should include diagnostic criteria to identify respondents with substance use disorders.

The current study builds upon our existing knowledge of the development of substance use problems. Previous research on the development of substance use problems has omitted social exclusion as an explanatory factor. The current research suggests that there is a significant relationship between feeling socially excluded in early adolescence, and the development of substance use problems by early adulthood. It will be beneficial to further explore the complexities of that relationship. Finally, the current research, along with other documented risk and protective factors may assist in future prevention, intervention, and treatment efforts.

Figure 1: Conceptual Model

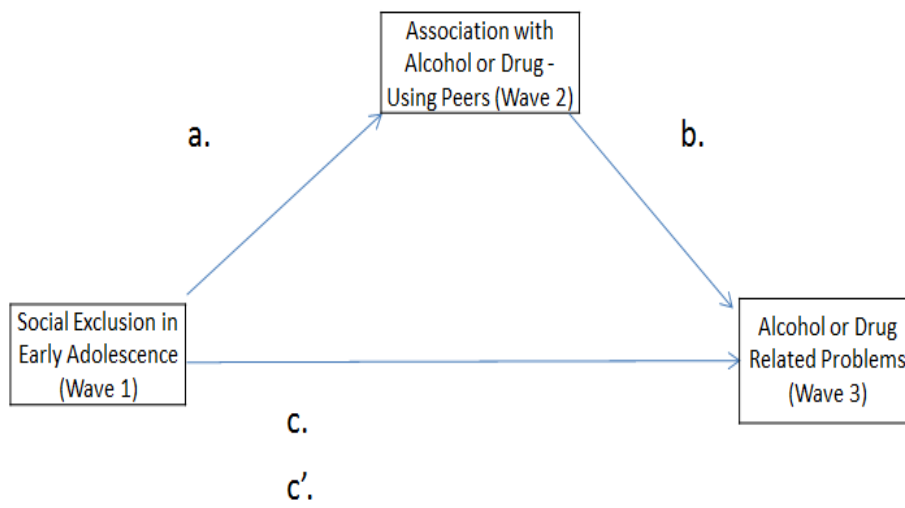
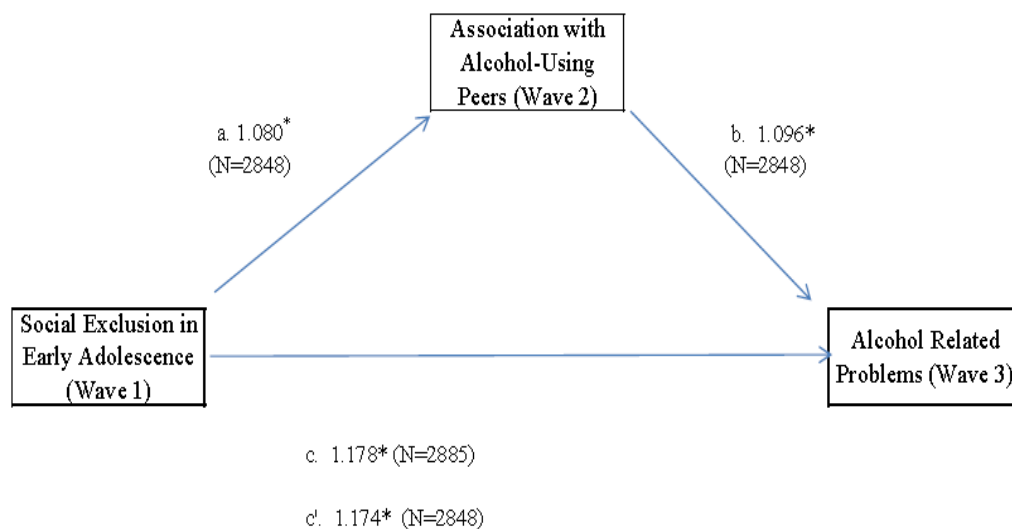


Figure 2:



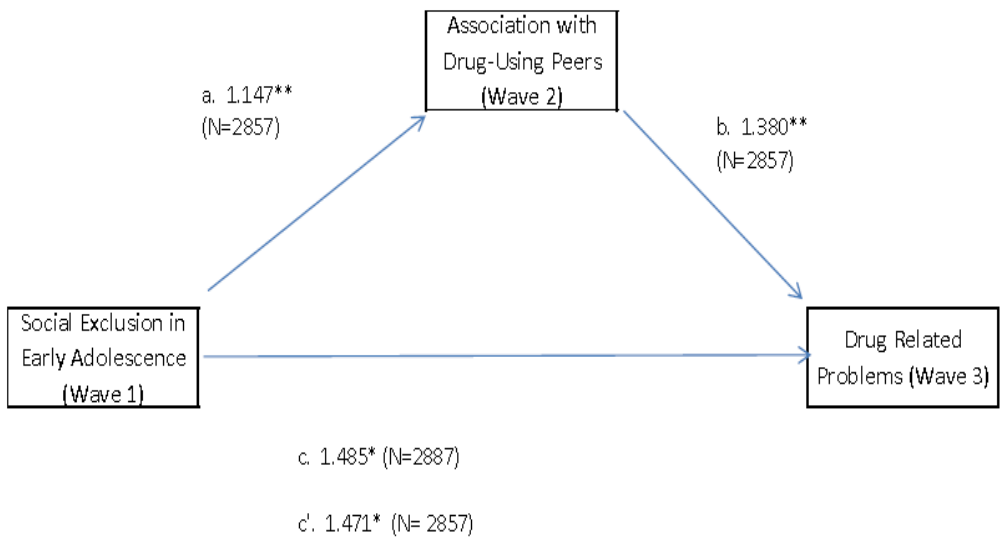
Exponentiated coefficients; N observations in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Sobel post hoc mediation test ( $z = -1.5458$ ;  $p = .12$ )

Proportion of total effect that is mediated = .02

Figure 3:



Exponentiated coefficients; N observations in parentheses  
\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Sobel post hoc mediation test ( $z = 2.11$ ;  $p = .035$ )  
Proportion of the total effect that is mediated = .04.

**Table 1: Descriptive Statistics**

	Mean or %	Std. Dev.	Min.	Max.
<b>Dependent Variables</b>				
Alcohol Problems (at Wave 3)	0.99	2.27	0	19
Drug Problems (at Wave 3)	0.29	1.32	0	16
<b>Focal Independent Variable</b>				
Social Rejection scale (at Wave 1)	2.11	0.61	1	4.75
<b>Mediating Variables</b>				
Of your 3 best friends, how many use alcohol regularly? (at Wave 2)	0.99	1.13	0	3
Of your 3 best friends, how many use marijuana regularly? (at Wave 2)	0.66	0.98	0	3
<b>Control Variables</b>				
Of your 3 best friends, how many use alcohol regularly? (at Wave 1)	0.85	1.08	0	3
Of your 3 best friends, how many use marijuana regularly? (at Wave 1)	0.47	0.89	0	3
Family Income	47.92	50.79	0	900
Race - Black	0.20	0.40	0	1
Race - Native American	0.03	0.17	0	1
Race - Asian	0.03	0.17	0	1
Race - Other	0.04	0.19	0	1
Biological Sex (Male)	0.47	0.50	0	1

Table 2: Negative Binomial Regression Results on association with Substance-using Peers

	(1) W2 Alc Using Peers	(2) W2 Drug Using Peers
W1 Alc Using Peers	1.476 <sup>***</sup> (22.08)	
W1 Drug Using Peers		1.715 <sup>***</sup> (21.17)
Family Income	1.000 (-0.13)	1.000 (0.24)
Race Black	0.781 <sup>***</sup> (-4.23)	1.098 (1.33)
Race Native	0.999 (-0.01)	1.190 (1.19)
Race Asian	0.736 <sup>*</sup> (-2.20)	0.976 (-0.14)
Race Other	1.068 (0.62)	1.355 <sup>*</sup> (2.23)
Gender	1.003 (0.06)	1.006 (0.10)
Rejection Index	1.080 <sup>*</sup> (2.29)	1.147 <sup>**</sup> (3.03)
N	2848	2857

Exponentiated coefficients; *t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Table 3:

	(1) W3 Alcohol Problems	(2) W3 Drug Problems
W1 Alc Using Peers	1.165 <sup>***</sup> (3.45)	
W1 Drug Using Peers		1.166 (1.28)
Family Income	1.004 <sup>**</sup> (3.24)	1.003 (1.02)
Race Black	0.412 <sup>***</sup> (-7.02)	0.605 (-1.86)
Race Native	1.060 (0.21)	2.943 (1.83)
Race Asian	0.374 <sup>***</sup> (-3.34)	0.643 (-0.71)
Race Other	0.852 (-0.64)	0.632 (-0.78)
Gender	2.084 <sup>***</sup> (7.86)	1.552 <sup>*</sup> (2.10)
Rejection Index	1.178 <sup>*</sup> (2.00)	1.485 <sup>*</sup> (2.08)
N	2885	2887

Exponentiated coefficients; *t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



Table 4:

	(1) W3 Alcohol Problems	(2) W3 Drug Problems
W1 Alc Using Peers	1.125* (2.48)	
W1 Drug Using Peers		0.964 (-0.27)
Family Income	1.004** (3.26)	1.003 (1.01)
Race Black	0.422*** (-6.81)	0.644 (-1.65)
Race Native	1.068 (0.24)	2.508 (1.58)
Race Asian	0.385** (-3.24)	0.673 (-0.64)
Race Other	0.854 (-0.63)	0.593 (-0.90)
Gender	2.061*** (7.75)	1.543* (2.10)
W2 Alc Using Peers	1.096* (2.05)	
W2 Drug Using Peers		1.380** (2.66)
Rejection Index	1.174* (1.97)	1.471* (2.04)
N	2848	2857

Exponentiated coefficients; *t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

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