

Summer 8-17-2012

Continuity of Conduct and Substance Use Disorders among Adolescents in the One Year and Two Years Following Exposure to Substance Abuse Treatment

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CONTINUITY OF CONDUCT AND SUBSTANCE USE DISORDERS
AMONG ADOLESCENTS IN THE ONE YEAR AND TWO YEARS
FOLLOWING EXPOSURE TO SUBSTANCE ABUSE TREATMENT

A Dissertation
Presented in
Partial Fulfillment of the
Requirements for the Degree of
Doctor of Philosophy

BY
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FEBRUARY, 2012

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ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to my dissertation chairperson, Dr. Sheldon Cotler, for his guidance and patience throughout this project. I am also grateful to Dr. Catherine Pines, Dr. Shelia Ribordy, Dr. Patrick Fowler, Dr. Bryan Sykes, and Dr. Alexandra Novakovic for generously devoting their time to serve on my committee and for providing extremely valuable feedback and encouragement. I would like to thank Dr. Patricia Shane for her mentorship and for allowing me to access the data set utilized for the project. Finally, I would like to thank my wife, Alexandra, for her love and support.

VITA

The author was born in Newburyport, Massachusetts on September 28, 1974. He graduated from Hackettstown High School in 1992 and received his Bachelor of Arts degree from The College of New Jersey in 1996. The author received his Master of Arts degree from DePaul University in 2004.

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CHAPTER I

INTRODUCTION

Loeber, Stouthamer-Loeber, and White (1999) describe the period from late-childhood to late-adolescence as the time in which initiation into substance use becomes virtually complete and regular use of several substances is consolidated. For the general population, substance use increases continually throughout adolescence before eventually declining in the twenties (Johnston, O'Malley, & Bachman 2000). For example, from ages 12- to 20 years-old, the rate of past-month substance use more than triples for alcohol (20% to 75%) and marijuana (8% to 27%) (Anthony & Arria, 1999). For a minority of youth, regular substance use can be a first step in escalation towards substance abuse or dependency. The period from late-childhood to late-adolescence is also the time in which the onset of delinquency takes place, ranging from less serious acts like shoplifting to more serious acts like burglary and aggravated assault. In contrast to substance use which continues to progress into young adulthood, delinquent (i.e., illicit or antisocial) behavior generally peaks in mid- to late-adolescence, and then declines thereafter (Elliott et al., 1989).

Within the research literature, the terminology for adolescent behavioral problems primarily takes the form of either “delinquency” or “conduct disorder.” Delinquency is often broadly defined as antisocial and/or illegal behavior among juveniles. Antisocial and/or illegal behaviors also make up the core of what constitutes conduct disorder. Conduct disorder is broadly defined as the violation of the basic rights of others or the violation of major age- appropriate societal

norms or rules. Conduct disorder behaviors include aggression to people or animals, destruction of property, deceitfulness or theft, and/or serious rule violations (e.g., truancy, curfew violations, running away). Thus, delinquent and conduct disorder behaviors are analogous in that they both connote antisocial and/or illegal activity among youth, but the diagnosis of conduct disorder requires that individuals meet the specific thresholds (i.e., presence of at least 3 symptoms) outlined in the criteria from the Diagnostic and Statistical Manual – Fourth Edition – Text Revision (DSM-IV-TR; American Psychiatric Association, 2000).

Paradise and Cauce (2003) note that the correspondence between adolescent alcohol and other drug use and overt (i.e., externalizing) problem behaviors has received particular research attention in recent years. The authors add that service providers have long realized that substance abuse is often part of a broader constellation of adolescent problem behaviors. This behavioral constellation concept is consistent with the Problem Behavior Theory (Jessor & Jessor, 1977) which has guided much research on adolescent delinquency and substance use over the past three decades. Problem Behavior Theory suggests that adolescent problem behaviors (e.g., substance use, sexual promiscuity, theft, etc.) are interrelated due to characterological predispositions towards deviant or unconventional behavior.

Furthermore, developmental theorists have suggested two pathways for delinquent behavior based on the age of onset and the persistence of behavioral problems. Life-course persistent offenders are characterized by a stable history of deviant behavior from childhood, a wide range of antisocial behavior across

multiple and diverse settings, and failure to alter behavior despite opportunities to desist. In contrast, adolescence-limited offenders demonstrate a later onset of delinquent behavior, less severe offending, and remain involved in offending for a relatively short period of time (i.e., usually desisting by the end of their teenage years).

A review of the relationship between substance abuse and antisocial and/or illegal behavior among adolescents requires the incorporation of a number of related literatures and fields. For example, studies of “high-risk” adolescents include investigations of substance abuse among adolescents in the juvenile justice system. Conversely, other studies seek to examine criminal or delinquent behavior among adolescents receiving substance abuse treatment. Studies using high-school samples from the general population tend to focus on the relationship between less severe forms of both substance use (i.e., initiation or experimentation) and delinquency (i.e., truancy, property damage, etc.) than the investigations of teenage counterparts in clinical or institutional settings who often exhibit more extreme forms of substance use (e.g., regular use interfering with responsibilities) and delinquent behaviors (e.g., aggression towards people or animals).

Comorbidity research examining co-occurring psychiatric disorders among adolescents often highlights the association between substance use disorders (used to encompass both substance abuse and dependence) and conduct disorder and/or mood disturbance. Rates of conduct disorder among clinical samples of adolescents in substance abuse treatment are generally quite high,

especially among the roughly 20% of teens in substance abuse programs who are treated at the inpatient or residential level. In fact, some clinical samples of teens in substance abuse treatment have found rates of conduct disorder as high as 95% (Hovens, Cantwell, & Kiriakos, 1994; Stowell & Estroff, 1992).

Farabee and colleagues (2001) state that the reliable co-occurrence of heavy drug use and crime has led policy makers to advocate drug abuse treatment as a means of reducing the host of adverse behavioral consequences assumed to be directly or indirectly associated with drug use. Conversely, authors such as Glantz (2002) have argued for randomized trials of conduct disorder interventions to examine whether these types of intervention might also function as preventions for substance abuse.

Paradise and Cauce (2003) note that understanding of the processes underlying the comorbidity between substance abuse and delinquency remains incomplete. Furthermore, they argue that clinical intuition, rather than empirical evidence, has shaped the popular belief that alcohol and drug use drive delinquency during adolescence, and that substance abuse should therefore be the primary or initial focus of clinical intervention. Consequently, many substance abuse treatment programs, including the agency used to recruit participants for the current study, have little or no treatment specifically for conduct disorder or behavioral problems.

The current study utilized a sample of adolescents from a short-term (30 to 50 days) inpatient chemical dependency recovery hospital (CDRH). Based on admissions criteria, each participant met diagnostic criteria for substance abuse or

substance dependence and demonstrated a need for a more restrictive treatment environment (e.g., previous unsuccessful outpatient treatment, medical issues, unstable home environment, etc.). Analyses utilized scales from semi-structured interviews administered multiple times over the course of the two years after treatment exposure. The study examined severity of substance abuse, conduct disorder symptomatology, delinquent behavior, and symptoms of mental distress (i.e., anxiety and depression) both prior to treatment entry, as well as how symptoms persist over the two years following treatment. High levels of conduct disorder were evident among adolescents in the sample which was expected given that they were acute enough to warrant an inpatient level of treatment. The study sought to separate those meeting criteria for conduct disorder (i.e., 3 or more DSM-IV-TR symptoms of conduct disorder) into two groups; mild/moderate conduct disorder and severe conduct disorder. Those in the severe conduct disorder group were distinct from their mild/moderate peers in terms of having engaged in behavior that causes considerable harm to others. The two groups were compared over time in terms of persistence of conduct disorder behavior over time. Gender differences were also examined as to whether females differed from their male counterparts with regard to conduct disorder symptomatology, particularly in terms of causing considerable harm to others.

At the year-two follow-up point, participants averaged 18 years of age, allowing the ability to glimpse whether participants seemed to “mature out” of a period of adolescence-limited delinquency or whether they demonstrated more life-course persistent patterns of offending. The study also looked beyond

abstinence, which is often used as the lone indicator of treatment success, to examine the presence of minor use (e.g., less than 10% of days) or non-problem use (i.e., participants reporting no symptoms of abuse or dependence) of alcohol and other drugs following exposure to inpatient substance abuse treatment.

Historical Patterns in Prevalence of Adolescent Substance Use

The two primary sources for estimates of youth substance use in the United States are the annual, school-based Monitoring the Future (MTF) survey sponsored by the National Institute of Drug Abuse (NIDA) and the annual National Survey of Drug Use and Health (NSDUH) sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA). Data for the MTF survey have been collected every year since the survey began in 1975. The most recent MTF survey encompassed approximately 46,500 students from almost 400 secondary schools throughout the nation. This sample was almost equally divided between students in the 8th (34%), 10th (33.5%), and 12th (32.5%) grades (Johnston, O'Malley, Bachman, & Schulenberg, 2011). The NSDUH includes approximately 67,500 persons, aged 12-years or older, from the civilian, non-institutionalized population of the United States (SAMHSA, 2011).

Patterns across annual results from MTF surveys indicate that alcohol use, including binge drinking, has been in a long-term pattern of decline since about 1980. For example, about 41% of 12th graders in the 1980 MTF survey reported binge drinking (i.e., 5 or more drinks in a row) during the previous two weeks. After 1980, rates of recent binge drinking among 12th grade students declined, hitting a low of 28% by 1992. Despite small fluctuations, binge drinking among

high school seniors has not peaked above 32% since 1998. Rates of recent binge drinking among 12th grade students remained at approximately 25% from 2006-2009, before dropping to a historic low of 23% in the most recent survey in 2010 (Johnston, O'Malley, Bachman, & Schulenberg, 2011).

Annual marijuana prevalence rates among 12th graders reached its historic peak of 51% in 1979, following a rise that began during the 1960s. Annual prevalence rates for use of marijuana among high school seniors declined steadily over the ensuing 13 years before reaching a historic low of 22% in 1992. Annual prevalence rates for marijuana use among 12th graders then increased substantially before hitting a peak of 39% in 1997. Rates of annual marijuana use fluctuated between 34% and 38% from 1998 to 2005, before dipping slightly to around 32% from 2006 to 2009. Results from the 2010 MTF survey yielded an annual prevalence rate of 35% for marijuana use among high school seniors suggesting a possible upturn, but these rates remain well below historic highs (Johnston, O'Malley, Bachman, & Schulenberg, 2011).

Johnston and colleagues (2011) note that results from the first MTF survey in 1975 indicated that more than half of young people (55%) had used an illicit drug (most commonly marijuana) by the time they left high school. This figure reached its historic peak of two-thirds (66%) of 12th grade students in 1981, before a long and gradual decline to the historic low of 41% in 1992. Lifetime rates for illicit drug use gradually escalated back to around 54% over the ensuing decade. Rates for lifetime illicit drug use declined slightly over the past ten years, but they still approach nearly half of all students (48%) by the end of high school.

Johnston and colleagues highlight psychotherapeutic prescription drugs (amphetamines, sedatives, tranquilizers, and narcotics) as a type of substance that has played a more important part in the nation's drug problem over the past 10-15 years. For example, rates for lifetime (mis)use of prescription narcotics (e.g., Vicodin and Percocet) among 12th grade students increased from around 6% in the early 1990s to around 13% since 2002. Furthermore, lifetime misuse of any prescription drugs among 12th graders recently increased from around 14% in 2009 to nearly 22% in 2010. The authors state that the prominence of prescription drugs has increased in part because the use of these classes of drugs continued to increase beyond the point at which most illegal (i.e., "street") drugs ended their rise in the late 1990s, and in part because the use of most of these same illegal drugs has decreased in the same time. Johnston and colleagues add that low levels of perceived risk for (unsupervised) use of sedatives and amphetamines among 12th grade students seems to illustrate that young people are less concerned about using these drugs outside medical regimens. The authors speculate that this perception is largely due to the fact that these drugs can be used for legitimate purposes, as well as the fact many prescription drugs are now advertised directly to consumers, implying that they are widely used and safe to consume.

Data from the MTF survey also show how perceptions of accessibility have changed for particular drugs over time. Johnston and colleagues note that since the MTF study started in 1975, between 81% and 90% of 12th grade students have indicated that it would be fairly or very easy to get marijuana. Perceived

availability of alcohol has also been very high throughout the study. Despite slight declines, the vast majority (90%) of high school seniors still indicate that it would be fairly or very easy to get alcohol. In the 2010 MTF survey, more than half (54%) of 12th grade students indicate that it would be fairly or very easy to acquire narcotics (besides heroin), while 44% indicate that it would be fairly or very easy to get amphetamines. More than one-third of high school seniors report that it would be fairly or very easy to acquire sedative/barbiturates (37%), cocaine (36%), ecstasy (36%). These rates for perceived availability among 12th graders are significantly lower than historic highs of 60% for sedative/barbiturates in 1975, 59% for cocaine in 1989, and 62% for ecstasy in 2002.

Johnston and colleagues state that results from these annual surveys suggest that while the use of particular drugs (other than marijuana) may fluctuate widely over time, the proportion of people engaging in use of illicit substances remains considerably more stable. Johnston and colleagues state that usage rates for individual drugs reflect rapidly changing determinants specific to that drug, including how widely its psychoactive potential is recognized, how favorable the reports of its supposed benefits are, how risky or acceptable its use is seen to be, and how accessible the drug is, among other factors. In contrast, the authors emphasize that changes in the proportion of young people prone to using illicit drugs and crossing the normative barriers to such use occurs much more gradually and shows much less variation.

Current Prevalence of Adolescent Substance Use

The prevalence rates for the overall 2010 MTF sample (i.e., grades 8, 10, and 12 combined) indicated that more than half (54%) of all high school students reported that they had used alcohol at some point in their life and that more than one-third (34%) of all high school students reported that they had been drunk in their lifetime. Slightly less than one-third (30%) of all high school students reported lifetime use of marijuana. Lifetime rates for alcohol and marijuana use were followed by use of inhalants (e.g., nail polish remover, glue, propellants; 12%). Only about one-sixth (17%) of all high school students endorsed lifetime use of illicit drugs besides marijuana, including amphetamines (9%), tranquilizers (7%), hallucinogens (6%), cocaine (4%), and heroin (1%; Johnston, O'Malley, Bachman, & Schulenberg, 2011).

Past-month (i.e., past-30-days) prevalence rates for the overall MTF sample indicated that a little over one-quarter (27%) of all high school students reported use of alcohol during the previous month. One-sixth (15%) of all high school students reported binge drinking (i.e., 5 or more drinks in a row) during the previous two weeks with a similar amount (15%) reporting that they had been drunk during the past month. Only 1% of the overall MTF sample reported using alcohol on a daily basis. Past-month rates of marijuana use were 15% for the overall sample, with 3% of all high school students endorsing daily marijuana use. A very small minority (6%) of the overall high school sample indicated that they have used illicit drugs besides marijuana during the past month, including

amphetamines (3%), tranquilizers (2%), hallucinogens (2%), cocaine (1%; Johnston, O'Malley, Bachman, & Schulenberg, 2011).

Progression of Substance Use Among Adolescents

MTF results (Johnston, O'Malley, Bachman, & Schulenberg, 2011) indicated that prevalence rates for use of every respective substance increased by grade, with the exception of inhalant use which declined between 8th (15%) and 12th grade (9%). Lifetime rates for any alcohol use increased by age from 36% in 8th grade to 58% in 10th grade and 71% in the 12th grade. Only 16% of 8th grade students reported ever having been drunk, but lifetime rates for intoxication increased to 37% for 10th grade students and 54% for 12th grade students. Rates for any lifetime use of marijuana were similar to those for history of intoxication. Only 17% of 8th grade students reported lifetime use of marijuana, but these rates increased to 33% for 10th grade students and 44% for 12th grade students. Lifetime rates for use of illicit drugs besides marijuana increased from only 11% of 8th grade students to 17% of 10th grade students and 25% of 12th grade students. Rates of lifetime use for amphetamines, tranquilizers, and hallucinogens all increased from roughly 5% for 8th graders to roughly 10% for 12th graders.

Prevalence rates for past-month use of alcohol increased by age from only 14% of students in the 8th grade to 29% of 10th grade students and 41% of 12th grade students. Only 7% of 8th grade students reported binge drinking during the previous 2 weeks, but these rates increased to 16% for 10th grade students and to nearly one-quarter (23%) of 12th grade students.

Prevalence rates for past-month use of marijuana increased from only 8% of 8th grade students to 17% of 10th grade students and 21% of 12th grade students. Rates for daily marijuana use increased from 1% of 8th grade students to 3% of 10th grade students and 6% of 12th grade students. Prevalence rates for past-month use of illicit drugs besides marijuana increased from 4% for 8th grade students to 6% of 10th grade students and 9% of 12th grade students.

Prevalence rates from the NSDUH tend to be lower than those found in the MTF survey, but they suggest very similar trends. The NSDUH also includes respondents from across the life-span (versus only high school students). For the purposes of the current study, results from the NSDUH help to illustrate how prevalence of substance use increases into young adulthood. Findings from the 2010 NSDUH (SAMHSA, 2011) indicated that rates of current (i.e., past-month) alcohol use were 3% among 12- to 13-year olds, 12% among 14- to 15-year olds, and 25% for 16- to 17-year-olds. Rates of past-month alcohol use approached nearly half (49%) of those ages 18 to 20, while the majority (70%) of those in the 21- to 25-year-old age group reported alcohol use in the previous month. Rates of binge drinking (i.e., 5 or more drinks in a row) were 1% among 12- to 13- year-olds, 7% among 14- to 15-year-olds, and 15% among 16- to 17-year-olds. In contrast, one-third (33%) of 18- to 20-year olds, and nearly half (46%) of those aged 21- to 25-years-old, endorsed binge drinking during the past month.

Among all current drinkers ages 12 and older, males showed higher rates of past-month alcohol use than their female counterparts (57% vs. 47%). However, among those in the 12- to 17-year old age group, the percentage of

males who were current drinkers (14%) was similar to the rate for females (14%). Among youths aged 12 to 17, White youths (15%) had the highest rate of current alcohol use among all racial/ethnic groups, followed by 14% of Hispanic youth, 13% of youth reporting more than one race, 11% of American Indian or Alaskan Native youths, and 11% of African-American youth. Overall, Asian youth reported the lowest rates of current alcohol use (5%; SAMHSA, 2011).

NSDUH results (SAMHSA, 2011) indicated that 10% of youth in the 12- to 17-year old age group reported using some illicit drug (including marijuana) during the past month (i.e., past 30 days). More specifically, 7% of 12- to 17-year olds reported past-month use of marijuana, while 3% endorsed non-medical use of psychotherapeutic drugs (most commonly tranquilizers), 1% reported inhalant use, and 1% reported hallucinogen use (most commonly ecstasy) during the previous month. Results indicated that rate of current (i.e., past-month) illicit drug use increased with age from only 4% of 12- to 13-year olds, to 9% of 14- to 15-year olds and 17% of 16- to 17-year olds. Rates of past-month illicit drug use approached one-quarter (23%) of all 18- to 20-year olds, before gradually declining thereafter among adults 21 and older. Among youths ages 12- to 17-years old, types of past-month illicit drug use varied by age. Among 12- to 13-year-olds, only 2% reported use of psychotherapeutic drugs non-medically, 1% reported inhalant use, and 1% reported marijuana use. Rates of past-month marijuana use increased to 7% among 14- to 15-year-olds, followed by 3% reporting non-medical use of psychotherapeutic drugs, 1% reporting inhalant use, and 1% reporting hallucinogen use. Past-month marijuana use increased to 14%

among 16- to 17-year-olds, while 4% of this age group reported current use of psychotherapeutic drugs used non-medically and 1% reported hallucinogen use.

NSDUH results (SAMHSA, 2011) indicated that perceived accessibility of illicit drugs increases by age among 12- to 17-year olds. For example 21% of those aged 12- to 13-years-old reported that it would be fairly or very easy to obtain marijuana, compared to 53% of those aged 14- to 15-years-old and 70% of those aged 16- to 17-years-old. Among 12- to 17-year olds, rates of current illicit drug use were similar between males (10%) and females (10%). However, males in this age group were more likely than their female peers to be current marijuana users (8% vs. 6%), while females aged 12 to 17 were more likely than their male peers to report current non-medical use of psychotherapeutic drugs (4% vs. 2%) and current non-medical use of pain killers (3% vs. 2%).

Rounds-Bryant, Kristiansen, and Hubbard (1999) state that although most adolescents experiment with alcohol and other drugs from time to time with no enduring problems, substance abuse and dependence among adolescents remains a major public health problem. The authors add that substance abuse and dependence are characterized by prolonged and regular use that is associated with a variety of psychological, interpersonal, family, academic, and legal problems (p. 574). Dennis and colleagues (2003) describe a common progression of problematic adolescent substance use as some experimentation followed by opportunistic use (e.g., parties with friends) of tobacco and alcohol (often to intoxication), followed by regular use (weekly or more) of marijuana with continued use of tobacco and alcohol and increasing experimentation with other

substances (Golub & Johnson, 1994; Johnson & Gerstein, 1998; Kandel, Yamaguchi, & Chen, 1992).

White and colleagues (2001) note that researchers have been studying the predictors and correlates of adolescent substance use for several decades. The authors state that this research has generated numerous explanatory theories to adequately explain initiation and experimental use, but the authors argue that most investigators have failed to specify the processes and mechanisms that account for the development of regular and problematic substance use (Glantz, 1992; Petraitis, et al., 1995; White, 1996). White and colleagues add that most research has shown that social and environmental variables (e.g., community norms, friends' use) are more important predictors of initiation or experimental substance use. However, the authors emphasize that psychological variables (e.g., psychopathology, negative affect) and biogenetic variables (e.g., family history of addiction) appear to be more important in predicting the transition from experimentation to regular and frequent use (Glantz, 1992; Stice et al., 1998).

Diagnostic Criteria for Substance Use Disorders

The Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition – Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) provides operational definitions and severity criteria for diagnoses of alcohol and other substance problems, delineating two primary substance use disorders: substance abuse and substance dependence.

DSM-IV-TR Criteria for Substance Abuse

- A. A maladaptive pattern of substance use leading to clinically significant impairment or distress, as manifested by one (or more) of the following, occurring within a 12-month period:
- (1) recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home (e.g., repeated absences or poor work performance related to substance use; substance-related absences, suspensions, or expulsions from school; neglect of children or household)
 - (2) recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use)
 - (3) recurrent substance-related legal problems (e.g., arrests for substance-related disorderly conduct)
 - (4) continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance (e.g., arguments with spouse about consequences of intoxication, physical fights)
- B. The symptoms have never met the criteria for Substance Dependence for this class of substance (p. 199).

DSM-IV-TR Criteria for Substance Dependence

A. A maladaptive pattern of substance use, leading to clinically significant impairment or distress, as manifested by three (or more) of the following, occurring at any time in the same 12-month period:

(1) tolerance, as defined by either of the following:

(a) a need for markedly increased amounts of the substance to achieve intoxication or desired effect

(b) markedly diminished effect with continued use of the same amount of the substance

(2) withdrawal, as manifested by either of the following:

(a) the characteristic withdrawal syndrome for the substance (refer to Criteria A and B of the criteria sets for Withdrawal from the specific substances)

(b) the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms

(3) the substance is often taken in larger amounts or over a longer period than was intended

(4) there is a persistent desire or unsuccessful efforts to cut down or control substance use

(5) a great deal of time is spent in activities necessary to obtain the substances (e.g., visiting multiple doctors or driving long distances), use the substance (e.g., chain-smoking), or recover from its effects

(6) important social, occupational, or recreational activities are given up or reduced because of substance use

(7) the substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance (e.g., current cocaine use despite recognition of cocaine-induced depression, or continued drinking despite recognition that an ulcer was made worse by alcohol consumption) (p. 199-200).

The authors of the DSM-IV-TR indicate that neither tolerance nor withdrawal is necessary or sufficient for a diagnosis of Substance Dependence. The authors state that some individuals (e.g., those with Cannabis Dependence) may show a pattern of compulsive use without any signs of tolerance or withdrawal (American Psychiatric Association, 2000).

Gilvarry (2000) stresses that the diagnostic criteria for substance use disorders (i.e., abuse and dependence) have been adopted from adult principles and are not age specific. The author add that, in particular, researchers have questioned the concept of impaired control, the importance of social consequences of use, and the relevance of poly-drug and alcohol use among adolescents.

Prevalence of Substance Use Disorders

Results from the 2010 National Survey on Drug Use and Health (SAMHSA, 2011) indicated that 9% of the entire population, ages 12 or older, met classification for substance abuse or substance dependence. Of those classified with substance abuse or substance dependence, over two-thirds (68%) endorsed abuse/dependency on alcohol, while 19% abused or were dependent on illicit drugs only, and 13% abused or were dependent on both alcohol and illicit drugs. Marijuana abuse or dependence accounted for nearly two-thirds (63%) of illicit drug abuse/dependence, followed by abuse/dependence on pain relievers and cocaine. Survey results indicated that 40% of all current marijuana users reported using marijuana at least two-thirds of all days (20 or more of the past 30 days). Percentages for substance abuse/dependence were the highest among 18-

to 25-year olds, with one-fifth (20%) of this age group endorsing substance abuse or substance dependence. Rates of substance abuse/dependence were 7% for both the 12- to 17-year-old age group, as well as for adults aged 26 or older. Among all persons aged 12 and older, group percentages of substance abuse/dependence were highest among American Indians or Alaskan Natives (16%), followed by Hispanics (10%), people reporting more than one race (10%), Whites (9%), and African-Americans (8%). Rates of substance abuse/dependence were lowest among Asians (4%) and Native Hawaiians or Other Pacific Islanders (6%). Among the entire sample, males aged 12 or older showed rates of abuse/dependence about two times that of females (12% vs. 6%). However, among youth aged 12- to 17-years-old, rates of substance abuse/dependence were similar for both males (7%) and females (8%).

A number of studies of “high-risk” youth have found much higher prevalence rates of substance use disorders than those found in normative samples. For example, Aarons and colleagues (2001) randomly sampled 1,036 adolescents (ages 13 to 18) actively involved in one or more public service sectors. Notably, lifetime rates for a substance use disorder were 62% among youth placed the juvenile justice system, 41% among youth receiving public mental health services, and 19% among youth involved in child welfare services. Owens and Bergman (2010) recently examined a sample of 104 students (60% male, 49% Hispanic) in a GED program in New York and found that nearly one-third (30%) of the sample met diagnostic criteria for a substance use disorder.

Disorders Comorbid with Adolescent Substance Use

Dennis and colleagues (2003) note that the onset and impact of adolescent substance use is intertwined with a wide range of comorbid psychological and behavioral conditions including conduct disorder, attention deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), reactive attachment disorder, depression, anxiety, and a variety of stress disorders (Crowly & Riggs, 1995; Dennis, Scott, et al., 2000; Kaminer, 1994; Risberg, Robbins & McEvoy, 1990). Generally, studies have found that over three-quarters of adolescents entering drug treatment have one or more of these comorbid conditions, with more than half of adolescent patients exhibiting three or more comorbid conditions. Shane, Jasiuskaitis, and Green (2003) note that among youth referred to substance abuse treatment, rates for mood disturbance without accompanying behavioral disorders appear to be particularly low (Armistead, Wierson, Forehand, & Frame, 1992; Rowe et al., 2001).

Greene and colleagues (1999) note that numerous factors (e.g., ADHD, mood disorder) have been shown to be significant predictors of substance use outcomes when considered in isolation. However, the authors stress that when factors are considered simultaneously, the predictive validity of these particular constructs may be greatly reduced, with the notable exception of conduct disorder and social impairment which show power to predict substance use even in the presence of other disorders.

In a review of 22 articles from 15 community studies of adolescent substance use, abuse, and dependence (SU/A/D), Armstrong and Costello (2002)

examined prevalence rates and odds ratios for associated comorbidities. The odds ratio (OR) is the ratio of the odds of a psychiatric disorder in the presence versus the absence of substance use/abuse/dependence. For example, an OR of 2 indicates that a psychiatric diagnosis is twice as likely in the presence of SU/A/D as in its absence, whereas an OR of 1 indicates that a psychiatric disorder is equally likely with or without use of alcohol and other drugs. Results demonstrated that 60% of youth with SU/A/D had a comorbid diagnosis. Conduct disorder and oppositional defiant disorder were the most common psychiatric disorders that were comorbid with use of alcohol or other drugs, followed by depression. With very few exceptions, comorbidity was high between SU/A/D and disruptive behavior disorders. This relationship was especially true of conduct disorder, which demonstrated a comorbid prevalence of 25% to 50% and a median OR of 4, indicating a fourfold increase in the risk for conduct disorder in substance using, abusing, or dependent youth. In the absence of any alcohol or other drug use, reported rates of disruptive behavior disorders were only between 0% and 12%. In terms of internalizing disorders among adolescents with SU/A/D, Armstrong and Costello found that the prevalence rates for depression ranged from 20% to 30% with a median OR above 2. Anxiety disorders and ADHD had median odds ratios close to 1, suggesting insignificant associations between both anxiety disorders and ADHD and the use of alcohol and other drugs.

With one exception, Armstrong and Costello stated that the literature they reviewed did not support a strong argument that particular types of substance use

disorders (i.e., abuse/dependence on specific substances) were distinctly comorbid with particular psychiatric disorders (e.g., depression, conduct disorder, etc.) in children and adolescents. This lone exception was for cannabis for which there was a clear association between marijuana use/abuse/dependence and disruptive behavior disorders (e.g., ODD, conduct disorder), but a lack of association between use of marijuana and presence of mood disorders (i.e., anxiety or depression).

Latimer and colleagues (2002) examined gender differences in comorbidity for clinical sample of 135 adolescents (mean age = 15.74 years; 75% male) with one or more substance use disorders (including both substance abuse and substance dependence). Overall, 91% of the sample met criteria for marijuana abuse or dependence, 73% met criteria for alcohol abuse or dependence, and 20% met criteria for abuse/dependence of other “street” drugs. Males and females within this clinical sample both showed substantial behavioral problems, but significant sex differences were shown in terms of overall comorbidity rates. For example, roughly three-quarters of males (72%) displayed comorbid conduct disorder versus about half (47%) of their female counterparts. Comorbidity rates were also significantly different for comorbid ADHD (46% of males; 24% of females). Rates of comorbid oppositional defiant disorder did not differ significantly between male (19%) and female (27%) adolescents. When disruptive behavior disorders were collapsed (i.e., combining ADHD, ODD, & CD), high comorbidity rates were demonstrated by both female (77%) and male adolescents (94%). However these different rates of disruptive behavior

disorders yielded a gender group difference that was statistically significant. When mood disorders were collapsed (i.e., combining dysthymia, major depression, bipolar disorder, etc.), the comorbidity rates exhibited by female (50%) and male adolescents (37%) did not show a statistically significant difference.

Based on these findings, Latimer and colleagues acknowledge that gender may serve as a useful marker for clinicians by signaling the likely presence of certain psychiatric disorders (e.g., disruptive behavior disorders for males, major depression for females). However, the authors emphasize that the converse association (i.e., gender signaling the absence of a particular comorbidity) is not supported by their data. For example, although substance abusing males show higher rates of comorbid disruptive behaviors than females, this gender difference should not obscure the equally important finding that high rates of conduct disorder, ODD, and ADHD appeared to characterize substance abusing females as well.

Armstrong and Costello (2002) highlight the possible influence of Berkson's bias (1946) among treatment samples. Berkson's bias relates to the probability that people with two illnesses are more likely to seek treatment than people with either one of those illnesses separately. The authors state that this type of bias means that clinic or treatment-based samples are likely to have higher proportions of people with comorbid symptoms in them than the proportions found in the general community. Consequently, one cannot rely on clinical data to estimate the size of comorbid problems in the general population. Armstrong

and Costello add that some combinations of disorders may bring people into treatment setting more frequently than others. For example, youths with both substance use disorder and conduct disorder might be referred to clinics in higher proportions than youths with both substance use disorder and anxiety disorder. Thus, differences in treatment referral trends could erroneously create the impression that substance use disorders are commonly comorbid with problems like conduct disorder, but that comorbidity with anxiety disorders is very rare. Armstrong and Costello also emphasize that what appear to be risk factors for comorbid disorders among clinical samples may in fact be a function of common treatment referral sources (e.g., juvenile justice).

Conduct Disorder

As mentioned, conduct disorder appears to be the most common comorbid psychiatric diagnosis for adolescents who abuse alcohol and other drugs (White et al., 2001), with rates of conduct disorder are as high 95% among clinical samples of adolescents with substance use disorders (Hovens, Cantwell, & Kiriakos, 1994; Stowell & Estroff, 1992). Prevalence rates of conduct disorder in community samples have been found to range from 2% to 16% for boys and 1% to 9% for girls (Loeber, Burke, Lahey, Winters, and Zera, 2000).

DSM-IV-TR Criteria For Conduct Disorder

The Diagnostic and Statistical Manual of Mental Disorders – Fourth Edition – Text Revision (DSM-IV-TR; American Psychiatric Association, 2000) provides operational definitions for the diagnosis of conduct disorder, as well as specifiers for severity and age of onset. The DSM-IV-TR criteria are as follows:

- A. A repetitive and persistent pattern of behavior in which the basic rights of others or major age-appropriate societal norms or rules are violated, as manifested by the presence of three (or more) of the following criteria in the past 12 months, with at least one criterion present in the past 6 months:

Aggression to people and animals

- (1) often bullies, threatens or intimidates others
- (2) often initiates physical fights
- (3) has used a weapon that can cause serious physical harm to others (e.g., a bat, brick, broken bottle, knife, gun)
- (4) has been physically cruel to people
- (5) has been physically cruel to animals
- (6) has stolen while confronting the victim (e.g., mugging, purse snatching, extortion, armed robbery)
- (7) has forced someone into sexual activity

Destruction of property

- (8) has deliberately engaged in fire setting with the intention of causing serious damage
- (9) has deliberately destroyed others' property (other than by fire setting)

Deceitfulness or theft

- (10) has broken into someone else's house, building, or car
- (11) often lies to obtain goods or favors or to avoid obligations (i.e., "cons" others)
- (12) has stolen items of non-trivial value without confronting a victim (e.g., shoplifting, but without breaking and entering; forgery)

Serious violations of rules

- (13) often stays out at night despite parental prohibitions, beginning before age 13 years
- (14) has run away from home overnight at least twice while living in parental or parental surrogate home (or once without returning for a lengthy period)
- (15) is often truant from school, beginning before age 13 years

- B. The disturbance in behavior causes clinically significant impairment in social, academic, and occupational functioning.
- C. If the individual is age 18 years or older, criteria are not met for Antisocial Personality Disorder. (p. 98-99)

The DSM-IV-TR (American Psychiatric Association, 2000) differentiates between Childhood-Onset and Adolescent-Onset Type Conduct Disorder based on the presence (i.e., Childhood-Onset) or absence (Adolescent-Onset) of at least one criterion characteristic prior to age 10 years. The DSM-IV-TR indicates that youth who demonstrate adolescent-onset conduct disorder are less likely to exhibit openly aggressive behaviors and tend to participate in more normative peer relationships than their early-onset counterparts. Loeber, Burke, and Pardini (2009) also emphasize that numerous studies have shown that childhood-onset conduct disorder is particularly associated with a course of conduct disorder that

is more persistent and severe than onset in adolescence (e.g., Lahey et al., 1998; Moffitt, 1993; Robins & Price, 1991). Loeber and colleagues add that childhood-onset conduct disorder has been shown to be predicted by parental antisocial behavior, parental substance abuse, poor supervision, low SES, and low education (e.g., McCabe, Rodgers, Yeh, and Hough, 2004).

The DSM-IV-TR also specifies three severity levels (i.e., mild, moderate, and severe) based on the number of conduct problems and/or the amount of harm caused to others. Mild conduct disorder is ascribed to those cases in which there are few if any problems in excess of those required for diagnosis and for whom conduct problems cause only minor harm to others (e.g., truancy, lying, staying out after dark without permission). Moderate conduct disorder is applied to cases where the number of conduct problems and their effects on others are intermediate between mild and severe (e.g., vandalism, stealing without confronting victim). Severe conduct disorder entails many conduct problems in excess of those required to make a diagnosis and/or conduct problems that cause considerable harm to others (e.g., physical cruelty, forced sex, use of a weapon, stealing while confronting a victim, breaking and entering) (p. 95; American Psychiatric Association, 2000).

Wilson and colleagues (2001) add that although conduct disordered behavior is almost required for adolescents in obtaining illicit substances (e.g., deceitfulness or theft), high comorbidity remains between conduct disorder and substance use disorders even when excluding substance-related conduct problems. For example, Brown and colleagues (1996) examined a sample of 166 adolescents

treated for substance abuse. The authors found that when all conduct disorder behaviors were considered, 95% of their sample met criteria for conduct disorder. However, when the authors excluded from diagnostic consideration any behaviors that occurred exclusively in the context of substance use, roughly half (47%) of adolescents in the sample still met criteria for conduct disorder.

Delinquency

As mentioned earlier, terminology for research on adolescent behavioral problems primarily takes the form of either “conduct disorder” or “delinquency.” Authors such as Stice, Myers, and Brown (1998) have used the term “delinquency” to broadly represent the domain of under-controlled, antisocial behaviors observed among adolescents, including the symptoms used in the criteria for conduct disorder. The National Center on Addiction and Substance Abuse (CASA; 2004) defines “delinquency” simply as conduct in violation of criminal law, and “delinquent acts” as any conduct by a juvenile which, if committed, by an adult would constitute a crime. CASA authors note that juveniles, like adults, can be arrested for offenses against persons, property, and public order, as well as drug-law violations. In addition, youth may be taken into custody for “status offenses” which involves conduct that constitutes an offense only when committed or engaged in by a juvenile (versus an adult). Status offenses can include running away, truancy, curfew violations, and ungovernability (being beyond control of parents or guardians), as well as possession, purchase, or consumption of alcohol.

Past-year results from 2010 National Survey on Drug Use and Health (SAMHSA, 2011) indicated that among youth ages 12- to 17-years-old, one-fifth (20%) reported that they had gotten into a serious fight at school/work, 13% took part in a group-against-group fight, 7% had attacked others with the intent to harm or seriously injure them, 4% had stolen or tried to steal something worth \$50 or more, 3% had sold illegal drugs, and 3% had carried a handgun at least once.

Murray and Farrington (2010) conducted a recent review of studies examining risk factors for conduct disorder and delinquency with an emphasis on studies with large sample sizes and prospective, longitudinal designs spanning at least 5 years. The authors stated that findings tend to indicate that juvenile offenders differ from non-offenders in many respects, including impulsiveness, low IQ, low school achievement, poor parental supervision, punitive or erratic parental discipline, cold parental attitude, child physical abuse, parental conflict, disrupted families, antisocial parents, large family size, low family income, antisocial peers, and high crime neighborhoods. Murray and Farrington add that the probability of adverse outcomes such as conduct disorder or delinquency increase with the number of applicable risk factors.

Progression of Delinquency By Age

Murray and Farrington (2010) state that both official records and self-reports suggest that the “age-crime curve,” obtained cross-sectionally or longitudinally, usually increases to a peak in the late-teenage years and then decreases (Kirk, 2006; Loeber et al., 2008). They highlight, for example, the large scale Denver, Rochester, and Pittsburgh longitudinal studies, which have

shown that the annual prevalence rate for any “street crimes” (e.g., burglary, serious theft, robbery, and aggravated assault) increased from less than 15% at age 11 to almost 50% at age 17 years (Huizinga, Loeber, Thornberry, 1993). Murray and Farrington add, however, that many studies find some groups of offenders who do not follow this trajectory, including low-rate chronic offenders for whom offending does not subside until their mid-20s (Piquero, Farrington, Blumstein, 2007). Murray and Farrington (2010) also note that the average age-of-onset can vary by type of criminal activity. For example, the authors note the Montreal Longitudinal and Experimental Study (LeBlanc & Frechette, 1989) which showed that shoplifting and vandalism tended to first occur before adolescence (average age of onset = 11 years old), while burglary and motor vehicle theft tended to start in adolescence (average age of onset = 14-15 years old), and drug trafficking and sex offenses manifested in the later teenage years (average age of onset = 17-19 years).

Moffitt (1993) notes that the age-crime curve can look different depending on whether or not studies utilize arrest data versus other measures (e.g., self-report) of antisocial behavior. The author highlights findings using official police data which tend to suggest that prevalence rates for new offenders peak around age 16. However, incidence rates for arrests continue to increase into young adulthood. Moffitt suggests that this may be due in part to the persistence and escalation of around 5% of offenders who go on to account for about 50% of all known crimes. The author stresses that the left side of the age-crime curve was historically “censored” by the initial reliance on arrest or conviction records.

Moffitt adds that “early” anti-social behavior was artifactually defined as mid-adolescence based on first police arrests or court convictions. The author states that subsequent developmental research on childhood conduct disorder suggests that antisocial behavior happens long before the age at which it is first encoded in police data banks. Furthermore, Moffitt states that developmental research suggests that there is a steep incline in anti-social behavior from age 7 to age 17, before a steep decline in this behavior between ages 17 and 30.

Monahan, Steinberg, and Cauffman (2009) note that research findings have shown that susceptibility to peer influence clearly declines between middle adolescence and young adulthood (Steinberg & Monahan, 2007). The authors state that this change has been attributed to gains in behavioral autonomy and identity development in late adolescence (e.g., Collins & Steinberg, 2006). Monahan and colleagues state that it is likely that as youth age, the relationship between peer deviance and anti-social behavior may become weaker because individuals become less likely to select antisocial friends. The authors add that even among individuals whose degree of affiliation with anti-social peers remains constant during the transition to young adulthood, it is expected that changes in susceptibility to peer pressure should be associated with diminished antisocial behavior.

Chassin and colleagues (2010) examined a sample of 1,354 juvenile offenders (42% African-American; 86% male; Average age of 16 years old) who were convicted of a felony or similarly serious non-felony offense (e.g., misdemeanor weapons offense or misdemeanor sexual assault). The authors

explained that due to the fact that a large proportion of offenses committed by adolescents are drug offenses, they restricted the proportion of youth recruited into the study with drug charges to 15% for males (i.e., proportion of drug-related offenders was not restricted for female participants). Baseline interviews were conducted an average of 35.9 days after adjudication and follow-up interviews were conducted every 6 months for 3 years. Overall results indicated that the transition into adulthood was marked not only by a decline in antisocial activity, but also drops in both affiliation with deviant friends and declines in susceptibility to peer influence. Based on these findings, Chassin and colleagues suggested that adolescents may decline in antisocial behavior as they mature into adulthood both because their friends, who are going through a similar process of normative maturation, are declining in antisocial activity, as well as because the individuals themselves are becoming increasingly independent of the influence of others (antisocial or otherwise).

Substance Abuse Among Delinquent Adolescents

Results from 2010 National Survey on Drug Use and Health (SAMHSA, 2011) indicated that youths, ages 12- to 17-years-old, who reported fighting or other delinquent behavior during the past year were more likely to also endorse current (i.e., past-month) use of illicit drugs. For example, past-month illicit drug use was reported by 18% of youths who had gotten into a serious fight at school/work in the past year, compared to 8% of youth who had not engaged in fighting. In addition, 39% of those who reported stealing or trying to steal

something worth over \$50 also reported current illicit drug use, compared to 9% of youth who had not engaged in such stealing behavior.

Using data collected by the National Institute Of Justice's Arrestee Drug Monitoring (ADAM) Program and from the Office of Juvenile Justice and Delinquency Prevention (OJJDP) in the Juvenile Court Statistics series, The National Center on Addiction and Substance Abuse (CASA) at Columbia University estimated that the vast majority (78%) of children and teens in juvenile justice systems—1.9 of 2.4 million arrests of 10- to 17-year olds—are under the influence of alcohol or other drugs while committing their crime, test positive for drugs, are arrested for committing an alcohol or drug offense, admit having substance abuse and addiction problems, or share some combination of these characteristics (CASA, 2004).

CASA authors (2004) note that although only 18% of arrested juveniles admitted to being under the influence of alcohol or other drugs at the time of their crime, over half (54%) tested positive for drugs at the time of their arrest. Among those who tested positive for drugs, 92% tested positive for marijuana, 14% for cocaine, 9% for amphetamines, 8% for methamphetamines, and 2% for opiates. Although alcohol is not included in the standard drug tests, 38% of juveniles under the influence of some substance at the time of their crime admitted to being under the influence of alcohol.

CASA authors (2004) indicated that 44% of all 10- to 17-year olds arrested in the previous year met DSM-IV criteria for substance abuse or dependence. The authors added that alcohol and other drug abuse were

implicated across all types of juvenile crimes, including 81% of juveniles arrested for offenses such as assaults, vandalism, and disorderly conduct; 72% of juveniles arrested for property offenses; and 69% of offenders engaging in serious violent crime. CASA authors noted that of the 1.9 million arrests of juvenile offenders exhibiting substance-related problems, only about 68,600 juveniles (4%) reported any history of formal substance abuse treatment.

Delinquency Among Adolescents In Substance Abuse Treatment

Kinlock, Battjes, and Gordon (2004) administered the Global Appraisal of Individual Needs (GAIN) to 178 youth (mean age = 15.9 years, 84% male) entering 5 adolescent outpatient substance abuse treatment facilities. More than half of youth in the sample were on probation (51%) and referred by the justice system (56%), while the majority (79%) of adolescents in the sample reported some lifetime history of arrest. Every single adolescent in this outpatient sample reported that they had used alcohol and/or marijuana, and over half (55%) admitted to use of other illicit substances. Overall, participants reported using substances on an average of slightly over one-third of days in the 90 days before treatment admission. Approximately one-third (34%) of participants reported that they had one or more previous substance abuse treatment experiences.

Based in part on guidelines established by the classic work of Sellin and Wolfgang (1964), Kinlock, Battjes, and Gordon (2004) classified the offenses reported on the GAIN into major and minor offenses. Based on their classification, major offenses included murder, rape, robbery with knife or gun, other robbery, burglary, auto theft, arson, and average drug sales of \$70 or more

per week. Minor offenses included vandalism, forgery/embezzlement, shoplifting, other theft, prostitution, average drug sales of less than \$70 per week, and minor drug distribution activities (e.g., watching for police, holding/delivering drugs). The authors chose to exclude a number of items from classification including “belong to a gang” because it encompassed different levels of perceived seriousness and specific gang-related acts were not gauged. In addition, Kinlock and colleagues excluded “got into a physical fight,” “hurt someone bad enough to need bandages or a doctor,” and “driving under the influence” from classification because the authors argued that the extent of physical harm to the victim was unclear.

Based on the most serious level of offense that adolescents had ever committed prior to entering treatment, Kinlock and colleagues found that 47% of clients were classified as “major offenders”, 37% were classified as “minor offenders”, and 16% were classified as “minimal offenders” (a term used rather than “non-offender” because individuals could have committed status offenses not measured). Notably, drug sales and/or distribution comprised 85% of all criminal acts for both major and minor offenders in the 90 days before treatment entry. A small minority (11%) of the sample reported ever committing one or more violent crimes (i.e., murder, rape, using a knife or gun to physically injure someone, and/or robbery). Although the criminality of major offenders was more severe by definition, major offenders also engaged in more varied and more frequent offending than those in the minor offender category. More specifically, major offenders not only committed one or more major offenses for each respective time

period (i.e., lifetime, past year, past 90 days), but they were also more likely than minor offenders to have committed each type of minor offense. For example, during the 90 days prior to treatment admission, major offenders were responsible for 84% of minor crime reported in the overall sample. Major offenders were also significantly younger than minor offenders at age of first illegal activity (10.9 years vs. 12.1 years).

Jainchill, Hawke, and Messina (2005) argue that for adolescents, differentiating between youth in the juvenile justice system and those found in treatment populations may be more an artifact of circumstance than of behavioral realities. The authors add that the multiple problems often experienced by drug-abusing adolescent offenders generally results in their involvement in several systems simultaneously, including juvenile justice, drug treatment, and mental health services.

Relationship Between Learning Disabilities and Substance Abuse/Delinquency

McNamara and Willoughby (2010) note that research findings have generally demonstrated concurrent differences between adolescents with and without learning disorders in areas such as substance abuse, illicit drug use, and engagement in acts of delinquency and aggression. In particular, McNamara and Willoughby (2010) highlight research indicating that adolescents with learning disabilities are 3-4 times more likely to be arrested than their non-learning disabled peers, with the likelihood of arrest increasing 49 times among those with learning disabilities who drop out of school (Doren, Bullis, and Benz, 1996).

McNamara and Willoughby (2010) examined a sample of 614 adolescents (50% male) to compare self-reported risk taking behavior between 307 adolescents with learning disabilities and a matched sample of 307 adolescents without learning disabilities. Results indicated that adolescents with learning disabilities reported greater marijuana use and engaged in more acts of minor delinquency (e.g., shoplifting, sneaking out, joyriding) and direct aggression (e.g., hitting or kicking someone, teasing or ridiculing someone) than their matched, non-learning disabled peers. Despite the group differences, McNamara and Willoughby stressed that the results of the study suggested that among their community sample, adolescents with and without learning disabilities both engaged in risk-taking behaviors at largely a moderate level, and that the overall level of engagement for both groups could be considered typical for this age group.

Relationship Between Substance Use and Precocious Sexual Behavior

Floyd and Latimer (2010) note that numerous research studies have shown positive associations between alcohol and marijuana use and early onset of sexual intercourse, engagement in unprotected sex, and having multiple sexual partners (Corbin & Fromme, 2002; Marlow, Devieux, Jennings, Lucenko, & Kalichman, 2001; Parkes, Wright, Henderson, & Hart, 2007; St. Lawrence, Crosby, Brasfield, & O'Bannon, 2002; Stueve & O'Donnell, 2005). As part of the International Longitudinal Survey of Adolescent Health, Floyd and Latimer (2010) examined a sample of 1,406 youths (49% male; 91% Caucasian; mean age = 14.91 years old) from one middle school and one high school in Minnesota. Among the sample,

lifetime rates of alcohol and marijuana use were 71% and 27% respectively. Only one-quarter (25%) of the sample reported that they were sexually active. Of those adolescents who were sexually active, 53% reported that they had more than one lifetime sexual partner, with 11% reporting six or more sexual partners. Results indicated that youth who had experimented with alcohol (i.e., 1 to 5 times) were nearly 2 times more likely to be sexually active compared to alcohol abstainers. Youth who reported using alcohol frequently (i.e., 20 or more times) were 5 times more likely to be sexually active than those peers who abstained from alcohol use. Similarly, youth who experimented with marijuana (i.e., 1 to 5 times) were 2 times more likely to be sexually active compared to peers with no lifetime marijuana use. More notably, frequent marijuana users (i.e., 20 or more times) were 12 times more likely to be sexually active than youth who abstained from marijuana. No relationship was established between alcohol use and having multiple partners. In contrast, youths who experimented with marijuana were nearly 2 times more likely to have more than one lifetime sexual partner, while frequent marijuana users were over 3 times more likely to have more than one lifetime sexual partner than peers who reported no use of marijuana. Notably, neither alcohol use nor marijuana use frequency was associated with having unprotected intercourse. Using this same sample, Mancha, Rojas-Neese, and Latimer (2010) found that 33% of adolescents endorsed at least one symptom of alcohol abuse or alcohol dependence, with 5% meeting criteria for alcohol dependence. Results indicated that youth who endorsed one or two symptoms of alcohol abuse or dependence were 8 times more likely to engage in sexual

intercourse compared to non-users. Furthermore, youth endorsing three or more symptoms of alcohol abuse or dependence were 24 more times more likely to engage in sexual intercourse than their non-using peers.

Theories of Comorbidity Between Substance Abuse and Conduct Disorder/Delinquency

White and colleagues (2002) note that there are a number of theories that posit explanations for delinquent behaviors among substance abusers. For example, economic motivation models assume that drug users engage in illicit acts to generate income to support their drug habits. White and colleagues (2002) state that self-report data do not provide strong support for an economic motivation model among adolescents. The authors highlight findings that intensive drug users and highly delinquent youth do not report committing illegal acts to raise money for drugs, and instead report committing illegal acts for reasons completely independent of drugs (e.g., for fun, to acquire desired goods, to generate money for commodities besides drugs; Altschuler & Brounstein, 1991; Carpenter et al., 1988; Johnson et al., 1986). White and colleagues go so far as to argue that more recent research findings (e.g., White & Gorman, 2000) dispel the assumption of economically motivated offending among adolescents once drug dealing is excluded. In other words, adolescents do tend to report engaging in drug dealing as a way to support their own drug use, but they do not tend to describe other illegal acts as driven by efforts to acquire money for drugs.

Psychopharmacological models highlight the potential effects of intoxication that include reduced intellectual functioning, reduced self-awareness,

self-disinhibition, and inaccurate assessment of risk. White and Hansell (1998) argue that epidemiological and laboratory studies of adults provide strong support for a direct relationship between alcohol/drug use and aggressive or violent behavior, but the authors stress that data for adolescents appear much weaker (Kingery et al., 1992; White, 1997b). White and Hansell state that for the most part, research on adolescents suggest that neither alcohol nor other drug use has a unique association with aggressive delinquency as compared to non-aggressive acts (Carpenter et al., 1988; White et al., 1985; White, 1997b). White and colleagues (1999) state that, overall, the literature suggests that the relationship between alcohol and violence among adolescents is not specific and, if anything, poly-drug use is more strongly related to violence than alcohol use (White, 1997a).

Chassin and colleagues (2010) highlight perspectives suggesting that adolescent substance abuse may impair social maturity by affecting the development of brain structures thought to regulate behavioral, emotional, and cognitive processes (Clark, Thatcher, & Tapert, 2008; Moss, 2008). Chassin and colleagues highlight recent studies which have documented that over the course of adolescence and early adulthood, both males and females show normative growth in planning (Albert et al., 2009), preference for delayed rather than immediate rewards (Steinberg et al., 2009), attentiveness to the salience of costs versus rewards (Cauffman et al., 2010), resistance to peer influence (Steinberg & Monahan, 2007), and impulse control (Steinberg et al., 2008). Chassin and colleagues stress, however, that many of the brain regions that undergo

developmental changes during adolescence are also affected by alcohol and drug use (Volkow & Li, 2005). The authors note for example, studies using functional magnetic resonance imaging (fMRI) that suggest that the prefrontal cortex and subcortical striatal areas which are actively engaged in decision making also appear to be (negatively) affected by addictive substances (Chambers, Taylor, and Potenza, 2003). Studies using fMRI have also suggested that substance use may affect the brain circuits involved in the experience of reward and self-regulation (Brown & Tapart, 2004). Furthermore, Chassin and colleagues (2010) highlight a recent review by Squeglia, Jacobus, and Tapert (2009) suggesting that adolescent substance use leads to poorer neurocognitive performance, poorer white matter quality, and changes in brain volume. Chassin and colleagues hypothesize that if adolescent substance use affects the neurobiological substrates underlying the processes of decision making, reward sensitivity, and self-regulation, these changes would likely result in slowed development of psychosocial maturity among teenagers. Subsequently, adolescents with relatively low psychosocial maturity would be more prone to engage in impulsive and problematic behavior.

Economic motivation and psychopharmacological models stand in contrast to models that place greater emphasis on characterological differences or variations in specific traits. Paradise and Cauce (2003) state that Problem Behavior Theory (Jessor & Jessor, 1977), and the concept of a general deviance syndrome, has continued to guide much of the research on adolescent delinquency and substance use over the past three decades (e.g., Dembo et al., 1993; Farrel et al., 1992; Neighbors et al., 1992). Problem Behavior Theory posits that substance

use, conduct problems, and a variety of other antisocial or non-normative behaviors (e.g., precocious sexual intercourse) during adolescence are manifestations of a unitary underlying predisposition towards unconventional or deviant behavior (Elliot et al., 1989; Farrel et al, 1992; McGee & Newcomb, 1992).

Chassin and colleagues (2010) state that various studies have shown that substance use is associated with a number of specific traits. These traits include heightened impulsivity (Colder & Chassin, 1997), impaired affect regulation (Cooper, Agocha, & Sheldon, 2000), poor judgment (Giancola, Martin, & Tartar, 1996), and less successful decision-making (White, 1990). Burt and Neiderhiser (2009) have highlighted research that has supported the conceptual distinction between aggressive and (non-aggressive) delinquent behavior. In particular, the authors note findings that suggest that deficits in affective regulation appear to be largely exclusive to aggression, whereas impulsivity seems to be specific to (nonaggressive) delinquency (Burt & Donnellan, 2008; Burt & Larson, 2007; Pardini, Lochman, & Frick, 2003).

Pardini, Frick, and Moffit (2010) note that in recent years, studies of callous-unemotional (CU) traits (e.g., lack of guilt and empathy) have shown promise as a means of delineating a subtype of conduct disordered youth who demonstrate a particularly severe and “recalcitrant” form of antisocial behavior (e.g., Frick & White, 2008). The authors note a recent study by McMahon, Witkiewitz, Kotler, and the Conduct Problems Prevention Research Group (2010) who examined a sample of 754 males and females from early adolescence to early

adulthood. McMahon and colleagues found that continuous measures of callous-unemotional symptoms predicted self-reported delinquency, arrests, and Antisocial Personality Disorder in early adulthood even after controlling for symptom of oppositional defiant disorder (ODD) and conduct disorder. Pardini, Frick, and Moffit also note a recent study by Kolko and Pardini (2010) who followed a clinical sample of 177 children (ages 6-11) diagnosed with either ODD or conduct disorder over a three year period. The authors found that clients who fit the callous-unemotional subtype did not have poorer treatment outcomes than their peers. However, Kolko and Pardini found that symptoms of vindictiveness were uniquely predictive of externalizing, delinquent behavior, whereas symptoms of irritability were uniquely associated with post-treatment internalizing problems.

In terms of the temporal relationship between onset of behavioral problems and onset of substance use, Dodge and colleagues (2009) state that both community studies (e.g., Armstrong & Costello, 2002) and clinical studies (e.g., Clark, Parker, & Lynch, 1999; Disney, Elkins, McGue, & Iacono, 1999) tend to show that early disruptive behavior disorders temporally precede eventual early-onset substance use, with conduct disorder standing out as the most consistent and strongest marker of risk (Glantz & Leshner, 2000). The authors add that while internalizing behaviors have been correlated with substance-use problems in adolescence (e.g., Kandel et al., 1999) and may immediately precede substance use in the short-term (e.g., Deykin, Buka, & Zeene, 1992), little evidence exists that internalizing problems during early childhood mark later risk for substance

abuse. Dodge and colleagues suggest that children who display early anxiety and other internalizing symptoms, in the absence of concurrent disruptive behaviors, may actually be buffered from later substance use (e.g., Kaplow, Curran, Angold, & Costello, 2001; Kaplan, Curran, Dodge, & the Conduct Problems Prevention Research Group, 2002) because internalizing problems can prevent a child from interactions with peer groups who engage in a culture of risk-taking like substance use.

Dennis and colleagues (2003) note that the psychological and behavioral conditions that are comorbid with substance use could be both cause or consequence of alcohol and other drug consumption. The authors acknowledge that general findings of research on the chronology of delinquency and substance use support the idea that delinquent or conduct disordered behaviors tend to predate the onset of substance use (i.e., substance use doesn't precipitate delinquency). However, Dennis and colleagues also note findings that substance use can exacerbate delinquent activity once both types of behaviors become persistent (Elliott et al., 1989; Loeber, 1988). Consequently, a number of researchers (e.g., Mason & Windle, 2002) have proposed that adolescent substance use and delinquency may be reciprocally related with causal processes involving feedback mechanisms or circular processes over time. For example, early conduct problems might increase the likelihood of involvement with substance use, which would, in turn, contribute to the maintenance and escalation of delinquent activity.

Wiesner, Kim, and Capaldi (2005) state that recent research has sought to examine whether delinquent behaviors can be explained most parsimoniously in terms of characterological differences (i.e., deviant or antisocial propensity) or whether patterns of behavior are more consistent with models positing the developmental influences of offending behavior on subsequent adjustment. Wiesner and colleagues note that propensity theorists (e.g., Gottfredson & Hirschi, 1990) claim that individual differences in offending behavior (and trajectories of offending) are mainly of degree, and that trajectories reflect stable individual differences in lack of self-control. Propensity theorists further argue that negative consequences of criminal offending and “analogous” problem behaviors, including school failure, relationship problems, and alcohol and other drug use, are caused by the same underlying propensity factors throughout the life course, rendering associations between crime and behaviors like drug use largely spurious.

In contrast, predominant developmental theories posit two offending pathways originally proposed by Moffitt (1993). Early propensity is considered predictive of the first offending path, namely early-onset and life-course persistent offending. This pathway of early onset and life-course persistence is contrasted by a second pathway, namely late-onset or adolescence-limited offending. Developmental theories do overlap with propensity theories in their emphasis on the potential importance of characterological differences. More specifically, developmental theories posit that early-onset offenders tend to be characterized by stable individual characteristics, such as impulsivity, poor self-control, and

inability to delay gratification (e.g., Moffitt, 1993). Early-starters are also characterized by a tendency to be less concerned about the morality of their behavior, to be more attracted to novel and exciting activities, to be more emotionally labile, and to be less optimistic about how the world treats them (Taylor, et al., 2002).

Developmental theories posit that the antisocial behaviors manifesting in early childhood are likely to lead to a cascade of secondary problems, including involvement with deviant peers, substance abuse, school failure, risky sexual behavior, depressive symptoms, and failure in the workplace (e.g., Capaldi & Stoolmiller, 1999; Capaldi et al., 2002; Patterson & Stoolmiller, 1991; Patterson & Yoerger, 1993). In particular, youth who show high levels of antisocial behavior in childhood are much more likely to be rejected by normative peers because of their poor social skills. Normative peer rejection can result in involvement with deviant peers at earlier ages which, in turn, fosters early initiation into alcohol and drug use. Consequently, each secondary problem has the potential to lead to subsequent developmental consequences or developmental failures in later periods of life. These developmental failures have the potential to act as “snares” (Moffitt et al., 1996) that diminish the chances for later success in more conventional life arenas, leading life-course offenders to become entrapped in a deviant lifestyle.

Dodge and colleagues (2009) highlight work by Patterson, Reid, and Dishion (1992) who have emphasized the potential role of alienation between youth and caregivers. Patterson and colleagues posited that childhood conduct

problems are likely to ultimately exacerbate conflict with parents during early adolescent years. Patterson and colleagues suggested that early conduct problems can cause social rejection and peer conflict that leads to trouble both at school and in the larger community. These repeated peer fights and trouble can then result in school suspensions, disruptions in extracurricular activities, and parent's unwanted trips to school for disciplinary actions. Patterson and colleagues further hypothesize that chronic problems can gradually wear on parents, making them increasingly likely to give up their attempts to socialize their young teen, as well as making parents more likely to withdraw from monitoring and supervising their child. Murray and Farrington (2010) emphasize that among all child-rearing factors, poor parental supervision is the strongest and most replicable predictor of delinquency (Smith & Stern, 1997), with harsh or punitive discipline (including physical punishment) also serving as important predictors of delinquent activity (Haapasalo & Pokela, 1999).

In contrast to early-onset and life-course persistent offenders, developmental theorists posit that late-onset or adolescence-limited offenders initiate offending later in life, engage in less severe offending, and remain involved in offending for a relatively short period of time. Consequently, late-onset offenders have less time to accumulate the negative consequences and associated developmental failures experienced by their early-onset peers. Myers, Stewart, and Brown (1998) suggest that from this developmental perspective, delinquent or antisocial behavior is likely to persist among adolescents who demonstrate a stable history of deviant behavior since childhood, show a wide

range of antisocial behaviors across multiple and diverse settings, and fail to alter their behavior despite opportunities to desist (Loeber et al., 1993; Moffitt, 1993; Moffitt et al., 1996).

In one notable study, Myers, Stewart, and Brown (1998) examined a sample of 137 patients (average age = 15.9 years; 61% male) from two adolescent inpatient drug treatment facilities who met DSM-III-R criteria for conduct disorder. Overall, 61% of the initial sample of adolescent substance abusers with co-occurring conduct disorder subsequently met criteria for antisocial personality disorder four-years after treatment. Male subjects were disproportionately represented in the antisocial personality group (71%) compared to female subjects (29%). Results of a logistic regression analysis indicated that onset of deviant behavior at or before the age of 10, a greater diversity of deviant behavior, and more extensive pre-treatment drug use predicted the progression into the antisocial personality disorder category. The authors described their findings as largely consistent with theoretical models for the persistence of antisocial behavior that stress the importance of early, severe, and diverse deviant behavior in predicting lifelong antisocial behavior.

Myers, Stewart, and Brown (1998) suggest that, over time, antisocial behavior is more likely to desist for adolescents who display conduct disordered behavior that occurs primarily in the context of substance use or who show behavioral problems only after the onset of substance abuse, as well as for those adolescents who demonstrate behavior problems across few settings. Consequently, the authors state that adolescents with this limited type of profile

may not require much intervention beyond treatment for substance abuse. In contrast, the authors suggest that those who appear to be on a lifetime course for antisocial behavior may require and benefit from more intensive targeted interventions.

It is worth noting that Burt and Neiderhiser (2009) have argued that recent research has suggested that adolescence-limited antisocial behavior may have been “underpathologized” in Moffitt’s (1993) original taxonomy of adolescence-limited versus life-course persistent offenders. Burt and Neiderhiser note that follow-up studies from early adulthood show that adolescent-onset delinquents do not fully desist from antisocial behavior, nor do they demonstrate full psychological health, as initially proposed. Although overt, aggressive behaviors tend to be largely absent among young adults with a history of adolescent-onset delinquency, this group has been shown to continue engagement in low level crimes like property offenses, as well as to demonstrate problems with mental health and substance abuse/dependence (Moffitt, Caspi, Harrington, & Milne, 2002).

Adolescent Substance Abuse Treatment

Only a small minority of adolescents who display problems with substance abuse or substance dependence receive formal substance abuse treatment. Findings from the 2010 National Survey on Drug Use and Health (SAMHSA, 2011) indicated that 7% of youths, aged 12- to 17-years-old, appeared to show a need for substance abuse treatment as demonstrated by their endorsement of

substance abuse/dependence. However, among those youth in need of treatment, only 8% reported that they had ever received services at a specialty facility.

Furthermore, Chan, Godley, Godley, and Dennis (2009) note that a substantial portion of individuals with co-occurring substance use and mental health disorders do not receive mental health services during the course of their treatment for their substance use disorder. The authors stress that despite the fact that integrated (substance abuse and mental health) care has been found most effective in treating substance abusers with co-occurring disorders, only about half of treatment settings provide integrated substance abuse and mental health services. Chan and colleagues add that mental health and substance abuse services agencies frequently operate in two separate systems, with variations across states in terms of funding streams and services delivered. The authors note that many individuals with dual diagnoses are therefore required to seek services in two distinct treatment systems, creating challenges in terms of getting treatment that fully meets individual client needs.

Substance abuse treatment in the United States generally takes place largely in four settings: outpatient programs, day programs, inpatient hospital programs, and residential units. Placement is generally related to criteria such as severity of substance use problem, presence of psychiatric disorders, level of family and social supports, and history of treatment response. Therapeutic community (TC) models, traditionally designed for adults, have been modified to try to accommodate the developmental and maturational issues of adolescents,

including shorter lengths of stay and greater emphasis on family involvement and education (Gilvarry, 2000).

From a historical perspective, Dennis and colleagues (2003) state that the lack of community resources available for a growing numbers of young narcotic addicts triggered new initiatives in the 1950s, particularly within cities being hit hard by heroin addiction. These early initiatives served as the basis for the modern community-based treatment system. These initiatives included the creation of addiction wards in local hospitals, as well as church-based efforts and other religiously affiliated programs that became more widespread throughout the 1950s and early 1960s. Dennis and colleagues state that there is little evidence of large numbers of adolescents or adults seeking treatment for marijuana until the late 1960s when use of marijuana became more common. The transition from adolescents being admitted to drug treatment programs for narcotics to admissions for alcohol and marijuana did not appear until the late 1960s and early 1970s.

Kamon, Budney, and Stanger (2005) note that the number of adolescents receiving social and mental health services for marijuana abuse/dependence from publicly-funded treatment centers doubled from 1992 to 2000. The authors add that the majority of all adolescents now presenting for admission to substance abuse treatment report marijuana as their primary drug of use (Substance Abuse Mental Health Services Administration, 2000). Dennis and colleagues (2003) also emphasize that while alcohol use continues to be a problem for the current generation of adolescents, marijuana has now become the leading substance mentioned in adolescent emergency room admissions and autopsy reports (Office

of Applied Studies, 1995). This pattern is believed to be due, in part, to the fact that marijuana has become significantly more potent over the past few decades. More specifically, concentrations of Delta-9-tetrahydrocannabinol (also known as THC or delta-9-THC), the cannabinoid that is primarily responsible for the psychoactive effects of marijuana, have increased considerably since the late 1960s. For example, authors of the DSM-IV note that the THC content of illicit marijuana has increased from an average of approximately 1%-5% to as much as 10%-15% (p. 215, American Psychiatric Association, 1994).

Between 1995 and 1998, the number of substance abuse treatment admissions for youths in the United States increased by 46%. This continuing trend has been almost exclusively attributable to a steady rise in treatment referrals from the criminal justice system (Substance Abuse and Mental Health Services Administration, 2001). In fact, the criminal justice system has been responsible for more than half of all adolescent substance abuse treatment admissions since 2000 (U.S. Department of Health and Human Services, Substance Abuse and Mental Health Service Administration, Office of Applied Studies, 2003).

Estimates suggest that about 80% of adolescents in substance abuse treatment are seen in outpatient settings, 50% are in treatment for 6 weeks or less, and 80% are in treatment for 90 days or less (Dennis et al., 2003; Hser et al., 2001). High dropout rates are a particular problem for young people demonstrating antisocial behavior and substance abuse. In particular, completion rates for therapeutic communities have been shown to be as low as 10% to 18%,

with up to 33% of adolescents in therapeutic communities leaving these settings within one month and up to 50% of families failing to complete family therapy treatment components (Gilvarry, 2000).

Influence of 12-Step Recovery Model

The 12-step approach, also known as the Minnesota Model or the Alcoholics Anonymous (A.A.)/Narcotics Anonymous (N.A.) approach, is the most widely used model in the treatment of adolescent substance abuse. Findings from a national study utilizing a representative sample of 450 private substance abuse treatment centers indicate that 90% of facilities based their treatment on the 12-step principles of Alcoholics Anonymous or variations of this model, with nearly one half of the remaining 10% incorporating 12-step principles in combination with other approaches (Roman & Blum, 1998).

The 12-step model is based on the tenets of A.A. and basic psychotherapy and the model views “chemical dependency” as a disease that must be managed throughout one’s life with a goal of abstinence. The foundation of 12-step treatment is step work, a series of treatment and lifestyle goals that are worked on individually and in groups. The first 3 steps are intended to help adolescents to be more honest, decide to stop using alcohol and other drugs, and chose a new lifestyle. Steps 4 through 9 are action-oriented steps intended to help adolescents continue being honest, develop and implement a plan for lifestyle change, and amend past wrongs when possible. Steps 10 through 12 are growth-oriented steps which encourage adolescents to continue to work a recovery program throughout their lives. Typically, the initial treatment phase covers steps 1 through 5, while

the remaining seven steps are addressed in aftercare and ongoing involvement in community self-help groups (Muck et al, 2001).

Kelly, Myers, and Brown (2000) state that a common criticism of using the 12-step disease-model approach with adolescent substance abusers has been the emphasis on or assumption of the primary causative role of the substances of abuse in the clinical presentation. Kelly and colleagues argue that more typically, substance abuse constitutes only one part of a more complicated pattern of problem behavior among adolescents in treatment.

It is also worth noting that despite the strong emphasis on A.A. participation for adolescents during and following substance abuse treatment, youth often have limited affiliation with same-aged peers within the A.A. membership. The most recent published results of the Alcoholics Anonymous (A.A.) Membership Survey (A.A. World Services, Inc., 2008), which includes responses from over 8,000 members from the United States and Canada, indicated that only 2% of A.A. members are under the age of 21. Furthermore, results of the survey indicated that the average A.A. member is 47-years-old, and that the membership is two-thirds (67%) male and predominantly Caucasian (85%).

While some research (e.g., Kelly, Myers, & Brown, 2000) has shown that attendance at teen-focused, 12-step (i.e., A.A) meetings predicts better outcome among adolescents, these outcomes appear to be mediated by motivation rather than coping. In other words, attendance predicted better outcomes through enhanced motivation to recover, but not through acquisition of coping strategies.

Adolescents vs. Adults in Substance Abuse Treatment

Kelly, Myers, and Brown (2000) note that adolescents entering treatment have been found to differ from adults in treatment, particularly in terms of their expressed motivation to cease substance use. Adolescents often indicate that they are coerced into treatment because of a variety of school, legal, or familial-interpersonal problems as opposed to seeking out treatment due to an intrinsic desire to stop using substances. Kelly, Myers, and Brown note that drug treatment studies reveal that when compared to their adult counterparts, teenagers in treatment have used substances less frequently, display fewer symptoms of dependence, use multiple substances concurrently, and have fewer withdrawal symptoms and medical complications.

The Drug Outcome Monitoring Study (DOMS) (Dennis, Scott, et al., 2000; Godley, Godley, & Dennis, 2001) provided an extensive comparison of substance abuse treatment populations across ages and levels of care. Results of the study indicated that relative to adults, adolescents were more likely to have externalizing problems, such as conduct disorder or ADHD, and tended to engage in more violent/aggressive behaviors. Conversely, adolescents in treatment were less likely than adults to report internalizing or mood disorders such as anxiety, depression, or stress disorders.

Chan, Dennis, and Funk (2008) recently pooled data from 77 substance abuse treatment studies conducted in a variety of institutional settings across adolescent and adult levels of care, including student assistance programs, criminal and juvenile justice agencies, mental health agencies, and family and

child protective services. The pooled multi-site data yielded information from 6,886 clients (67% male, 45% White) admitted to substance abuse treatment, including 4,930 adolescents and 1,956 adults. Results indicated that the most prevalent substance-specific use problem (i.e., substance abuse or substance dependence) among adolescents under age 15 was marijuana (42%), followed by alcohol (22%) and polysubstance dependence (16%). A similar substance use pattern was observed for adolescents ages 15- to 17-years-old, including problems with marijuana (45%), alcohol (28%), and polysubstance dependence (21%). For young adults ages 18- to 25-years old, the most prevalent substance use problems remained marijuana (41%) and alcohol (39%), but this age group also shows much higher rates of problems with cocaine (23%) and opioids (10%). For adults ages 26 to 39, the prevalence of cocaine use problems (63%) far outnumbered the prevalence of other substance use problems, followed by problems with alcohol (37%), opioids (20%), and marijuana (13%). For adults at age 40 or older, the most prevalent substance use problems were for cocaine (59%), followed by alcohol (44%) and opioids (22%). For both adolescents and adults, amphetamines, hallucinogens, inhalants, and sedative use problems were much less prevalent. Only about 30% of all adolescents in the sample received treatment at an inpatient/residential level (vs. outpatient) of care, compared to about half (45%) of young adults aged 18-25, and almost two-thirds (63%) of adults aged 26 or older who received inpatient or residential treatment.

Chan and colleagues found that two-thirds or more of clients from each age group had at least one co-occurring mental health problem. The rates for

internalizing problems generally increased across the age groups. About one-third or more of adolescents (33% of those under age 15 and 36% of those ages 15 to 17) endorsed depressive symptoms in the year before treatment, compared to about half of adults (41% of those ages 18 to 25 and 56% of those aged 26 or older). Anxiety symptoms were also much more common among adults age 26 or older (46%), as compared to young adults (i.e., age 18-25; 32%), and adolescents (14% of those under age 15 and 17% of those age 15-17). In contrast to internalizing problems, externalizing problems generally decreased with age going from around two-thirds of adolescents (68% of those under age 15 and 63% of those age 15-17) to around half of young adults (49% of those age 18-25) and 40% or less of adults 26 and older.

Gender Differences In Adolescent Substance Abuse Treatment

Opland, Winters, and Stinchfield (1995) examined a sample of 2,281 drug abusing adolescents (ages 12 to 18 years) from 26 public and private adolescent drug treatment programs, including hospital-based and free-standing inpatient and outpatient facilities across 8 states. Overall, the authors found that male adolescents in drug treatment did report higher levels of substance use (both past year and lifetime) than their female peers. The authors caution, however, that the significance of these results is diminished by the fact that the statistically significant findings represented fairly small group mean differences, the groups did not differ in alcohol use, and females reported greater amphetamine use. Opland and colleagues concluded that the tendency of males in their sample to use more of various illicit drugs as compared to their female counterparts was not

large enough to represent a clinically significant difference. Opland and colleagues suggest that potential gender differences in substance use among adolescents in drug treatment may be attenuated as compared to the widespread and consistent findings of gender differences in frequency of drug use from high school samples (e.g., Monitoring the Future). The authors suggest that results from clinical samples may be due in part to a restriction in range resulting from admission criteria to drug treatment settings. They add that drug use levels reported by adolescents receiving drug treatment are expected to be skewed to the high end of the frequency continuum, rendering drug use levels that are not gender specific.

Notably, overall results from the Drug Outcome Monitoring Study (DOMS) (Dennis, Scott, et al., 2000; Godley, Godley, & Dennis, 2001) indicated that the severity of both substance use and clinical problems actually appeared higher among both females and younger clients across the various clinical samples studied. These results are in contrast to consistent finding in the general community indicating that behavioral problems tend to increase with age, and that males tend to display more overt behavioral problems than their female peers. Dennis and colleagues attributed these findings from clinical samples to a potential threshold effect in which problems need to be more extreme for families or systems to refer younger clients or females to treatment.

Differences Across Levels of Care

Dennis and colleagues (2003) note that while researchers and policymakers have often attempted to compare outpatient and inpatient treatment, these programs have historically served different subgroups of adolescents (Gerstein & Johnson, 1999; Hubbard et al., 1985). Males, African Americans, and adolescents who are involved in the criminal justice system are more likely to go to intensive outpatient programs and long-term residential programs. Females, Caucasians, and those referred by other treatment programs or health care providers are more likely to go into detoxification services, hospital programs, or short-term residential programs. Clients involved in outpatient or intensive outpatient services are likely to be younger and entering treatment for the first time. Clients involved in residential levels of care are more likely to have been in treatment before, use substances weekly or more, and meet criteria for substance dependence. While the predominant pattern of adolescent substance use across all levels of care consists of marijuana and alcohol use, adolescents in residential levels of treatment are more likely to have problems with marijuana. Adolescents in residential treatment are also much more likely to have problems with cocaine, stimulants, hallucinogens, or other drugs, although prevalence rates are fairly low for these substances in general.

Morral and colleagues (2004) also stress that the assumption of similarity between youth entering different levels of substance abuse treatment has been contradicted by the available data. Observational studies of adolescent drug treatment modalities have demonstrated important differences among treatment

groups on pretreatment characteristics, including factors such as problem severity, treatment motivation, social environment, school problems, and criminal history, all of which have been found to reliably predict poorer treatment outcomes. The authors add that differences in treatment outcome could result from true differences in treatment effectiveness, but may also be accounted for by differences in expected rates of relapse, recidivism, and other psychosocial outcomes for cohorts with substantially different risk profiles.

As part of the Drug Abuse Treatment Outcome Studies of Adolescence (DATOS-A), Rounds-Bryant, Kristiansen, and Hubbard (1999) examined a sample of 3,382 youth presenting at 37 adolescent treatment programs from 1993 to 1995. Treatment was delivered in three modalities, including short-term inpatient (28%), long-term residential (48%), and outpatient drug-free (24%) programs.

Rounds-Bryant and colleagues compared client characteristics and pretreatment behaviors across all three treatment modalities. Compared to other modalities in DATOS-A, short-term inpatient programs had the highest percentage of females (36%) and whites (72%). Less than one-third (32%) of inpatient clients had a prior drug treatment experience and less than one half (41%) were living with both parents at the time of admission to treatment. Although inpatient rates for self-referral were the highest among the modalities, very few inpatient clients reported entering treatment of their own volition (8%). The substances that inpatient clients reported using the most in the 12-months before treatment admission were marijuana and alcohol. Approximately 82% of

short-term inpatient clients reported that they used marijuana on a daily or weekly basis, whereas 47% said they used alcohol on a daily or weekly basis. Over two-thirds (67%) of inpatient clients met criteria for marijuana dependence and over one-third (37%) met criteria for alcohol dependence. Nearly three-quarters (72%) of inpatient clients were in school at the time of admission to treatment. Inpatient programs had the highest percentage of clients who met criteria for conduct disorder (61%) and ADHD (14%). Overall, 47% of short-term inpatient clients had a juvenile or criminal justice status at admission, 52% had a history of past arrest, and 65% reported committing a serious predatory crime (i.e., aggravated assault, burglary, theft, robbery, forgery or embezzlement) during the year before coming to treatment.

Long-term residential programs had the lowest proportion of females (17%) and white clients (40%). The residential modality also had the lowest percentage of clients attending school (55%) and the lowest percentage of clients who lived with both parents (27%) at the time of admission. Although clients in the residential modality were the most likely to have had a prior drug treatment episode, this was true of a minority (38%) of clients. In the year before admission to treatment, the most frequently used drugs reported by residential clients were marijuana (85%) and alcohol (44%). The two dominant patterns of substance use among residential clients were daily or weekly use of marijuana (36%) or daily or weekly use of marijuana with alcohol (27%). Although rates were slightly lower than inpatient clients, residential clients displayed similar percentages for conduct disorder (57%) and ADHD (10%). The residential modality had the highest

proportion of clients with a criminal justice status at admission (69%), as well as history of past arrest (83%). Furthermore, 15% of residential clients reported that they were in juvenile detention prior to treatment admission. Notably, residential clients were no more likely than inpatient clients to report committing a serious crime in the year before treatment (64% and 65% respectively). Rounds-Bryant and colleagues note that these data suggest a highly significant difference between the two groups in the likelihood of adjudication, despite similar rates of delinquent activity. The authors add that these findings may be explained, in part, by the fact that residential clients were mostly African-American and Hispanic males, while inpatient programs served primarily white males and females.

Among outpatient clients, nearly one-third (32%) were female, a percentage similar to inpatient programs, but much greater than the proportion served in residential programs. Over half (52%) of outpatient clients were white. The outpatient modality had the highest proportion of clients who were attending school (84%) at the time of admission, and the lowest percentage of clients with previous treatment experience (13%). Although outpatient clients had the highest proportion of “intact” families, less than half (43%) reported living with both parents at admission. Compared to clients in the other modalities, outpatient clients displayed the lowest rates of conduct disorder (43%) and comparable rates of ADHD (11%). Although outpatient clients reported the lowest drug use prior to admission, 73% reported weekly or more frequent use of marijuana and 31% reported weekly or more use of alcohol. Although outpatient clients reported the lowest criminal involvement, 39% were involved with the juvenile or criminal

justice system, 46% reported being arrested in their lifetime, and 50% reported committing a serious crime in the year before treatment.

Based on their findings, Rounds-Bryant, Kristiansen, and Hubbard concluded that although there were significant differences among the modalities in terms of the types of clients treated (e.g., gender, race, referral source), adolescents in all modalities reported clinically relevant levels of problems, such that even the comparatively least impaired clients from the outpatient modality reported notable rates of drug use, criminal activity, and psychological symptomatology.

Continuity of Care for Co-occurring Mental Health Problems

Chan and colleagues (2009) pooled data from 32 studies of adolescent community-based outpatient substance abuse treatment to yield a sample of 2,789 youth ages 12- to 19-years old. The authors utilized a subsample of 1,190 adolescents (61% male, 59% White) who were identified as having co-occurring mental health problems to examine subsequent utilization of mental health services. Among these youth with at least one mental health problem at intake, almost nine in ten (89%) reported an externalizing problem. Nearly half (46%) of the sample had both an internalizing and externalizing problem, while only a small minority (11%) reported an internalizing problem in the absence of any externalizing problems. Overall, 40% of the sample reported that they had received treatment for mental disorders in the year prior to admission into substance abuse treatment. The authors found that three-months after intake to substance abuse treatment, only about one-third (35%) of these adolescents with

co-occurring mental health problems received any follow-up mental health services, which was broadly defined to include psychotropic medication. Among the overall sample, 24% were treated in an outpatient mental health setting, 27% were treated with psychotropic medication, and 2% received inpatient services. Chan and colleagues found that the characteristic most strongly associated with participation in mental health services within the first three-months after admission to substance abuse treatment, was a history of mental health treatment in the year before intake (65% vs. 15%). The authors suggest that this finding may be due to associations between participation in mental health treatment among those with persistent mental health problems, as well as the likelihood that greater services reflect more adequate health insurance coverage. Chan and colleagues added that suicidal behavior, family history of mental disorders, and having mental health insurance coverage remained strongly associated with receipt of mental health services even after controlling for other correlates.

Chan and colleagues added that their results were similar to those of Jaycox, Morral, and Juvonen (2003) who examined a large clinical sample of youth admitted to seven residential and outpatient substance abuse treatment centers. Jaycox and colleagues found that only one-third of all youth diagnosed with co-occurring disorders received mental health care in the first 3-months after substance abuse treatment entry, including nearly half (45%) of those who received residential substance abuse treatment and only 16% of those who received outpatient substance abuse treatment.

Adolescent Substance Abuse Treatment Outcome Research

Cornelius and colleagues (2003) note that there has been a dramatic increase in adolescent substance abuse treatment programs in recent years. The authors add that these programs generally operate in the absence of data supporting their effectiveness. Dasinger and colleagues (2004) note that prior to 1990, few scientifically rigorous studies had been conducted on the effectiveness of substance abuse treatment for adolescents. For example, a comprehensive review of the literature by Catalano and colleagues (1990-1991) located only 14 controlled studies reporting results for frequency of adolescent substance use during or after treatment. Based on this review of the effectiveness of adolescent drug abuse treatment programs, Catalano and colleagues concluded that some treatment appeared preferable to no treatment, that few comparisons had demonstrated the superiority of one approach or modality over another, and that brief periods of abstinence were achievable, but that post-treatment relapse was high (35%-85%). In general, Catalano and colleagues found that studies for most treatment modalities showed reductions in narcotic use post-treatment, but fewer studies reported reduction in alcohol or marijuana use. Pre-treatment characteristics indicative of a poorer prognosis included severe substance use problems, high frequency of use, psychiatric problems, and school and legal difficulties.

Dennis and colleagues (2003) argue that it is important to realize that most of the treatment programs in earlier evaluations were using adult treatment models with only minimal modifications made for adolescent clients. The authors

add that early evaluations of adolescent treatment services were also methodologically limited by small samples spread over many different programs, undefined approaches, low treatment duration (generally around 2 months), and marginal follow-up rates (50% to 70%).

National Studies of Community-Based Treatment

Three of the earliest national studies of community-based adolescent substance abuse treatment illustrate shifts over time in terms of treatment populations and services. These early studies include the Treatment Outcome Prospective Study from the late 1970s and early 1980s, the National Treatment Improvement Evaluation Study from the early 1990s, and the Drug Abuse Treatment Outcome Studies of Adolescence from the mid-1990s.

The Treatment Outcome Prospective Study

The Treatment Outcome Prospective Study (TOPS) (Craddock, Bray, & Hubbard, 1985; Hubbard et al., 1985) was conducted in the late 1970s and early 1980s using a stratified and purposive national sample of existing community-based treatment for any kind of drug use. The study included intake and 12-month post-intake data for 256 adolescents (under 20 years old) who had been admitted to therapeutic communities (n = 106) or outpatient treatment (n = 150). At this time, 31% of adolescents were being treated primarily for marijuana-related problems, followed by admission primarily related to amphetamines (7%), alcohol (5%), and opioids (4%). TOPS results indicated a 25% to 50% reduction across rates for daily marijuana use, alcohol and other drug use, and drug-related problems following residential treatment. Results were more mixed for

adolescents in outpatient treatment, with overall reductions of 25% or less, and several subgroups (e.g., 18- to 19-year-olds in treatment less than 3 months) actually increasing in their reported rates of substance use or other problems. Findings from the TOPS indicated that 25% to 30% of youths still reported daily use of marijuana and heavy use of alcohol one-year post-treatment.

The National Treatment Improvement Evaluation Study

The National Treatment Improvement Evaluation Study (NTIES) (Center For Substance Abuse Treatment [CSAT], 2000; Gerstein & Johnson, 1999) was conducted in the early 1990s using a stratified and purposive national sample of community-based programs. The data included interviews at intake and 12-months post-discharge for 236 adolescents (ages 13-17) who received any type of treatment. Most adolescents were being treated for marijuana (46%) or alcohol (10%), with heroin, crack, and cocaine accounting for only 14% more of admissions. NTIES findings indicated that residential treatment was associated with reductions in using (5 or more times in the past year) for marijuana (97% to 72%), alcohol intoxication (52% to 45%), and cocaine (52% to 30%). Adolescent outpatient treatment was associated with a slight reduction in use (5 or more times in past year) of marijuana (77% to 69%), a slight increase in alcohol intoxication (32% to 37%), with no reported change in cocaine use (13% to 13%).

The Drug Abuse Treatment Outcome Studies of Adolescence

The Drug Abuse Treatment Outcome Studies of Adolescence (DATOS-A) was conducted in the mid-1990s using a third stratified and purposive national sample of existing community-based treatment for any kind of substance use. The overall DATOS-A sample included 3,382 youth presenting at 37 adolescent treatment programs from 1993 to 1995. As part of the DATOS-A, Hser and colleagues (2001) examined a sample of 1167 adolescents (mean age = 15.7; 69% male) from three modalities, including short-term inpatient (39%), residential (36%), and outpatient drug free (25%) treatment, for whom intake and 12-month post-discharge data were available. Many of the adolescent patients endorsed poly-drug use with one-quarter (25%) reporting use of 3 or more drugs. Overall, nearly two-thirds (64%) of the sample met DSM-III-R criteria for marijuana dependency, followed by 36% for alcohol dependency and 10% for cocaine dependency. Prior to intake, more than two-thirds (67%) of the sample were criminally active and 57% met criteria for conduct disorder. The biggest post-treatment improvement was in terms of weekly or more marijuana use which dropped from 80% in the year before admission to 44% in the year following treatment. Despite relative improvements following treatment, many adolescents were still engaging in negative behaviors, with over half (53%) committing crimes, 42% using illicit drugs other than marijuana, 20% drinking heavily (five or more drinks in a single sitting at least once per week), and 19% using cocaine during the year after treatment.

Influence of Criminal Justice Supervision

Farabee and colleagues (2001) also examined the DATOS-A sample of 1,167 adolescents (mean age = 15.7; 69% male) from three modalities, including short-term inpatient (39%), residential (36%), and outpatient drug-free (25%) programs, for whom intake and 12-month post-discharge data were available. Findings indicated that approximately 58% of the sample were under some form of criminal justice supervision (i.e., on probation, parole, or case pending) at admission. Contrary to expectations, frequency of illegal activity and pre-treatment drug and alcohol use did not differ between criminal justice system (CJS) supervised and non-CJS supervised adolescents. Pre/post comparisons of self-reported criminal activity and arrests showed significant decreases in self-reported drug-related criminal activity (i.e., crimes committed to obtain drugs or to obtain money for drugs) for both CJS- and non-CJS-supervised adolescents one-year post-treatment. The percentage of CJS-supervised participants reporting that they had engaged in drug-related crime during the one-year follow-up period fell from 68% to 27%, whereas the percentage fell from 49% to 22% among non-CJS-supervised participants. The percentage of CJS-supervised participants reporting any arrest during the previous year fell from 54% to 24%. Rates of any arrests for non-CJS-supervised participants remained at 13% from baseline to follow-up. Both groups of participants showed parallel changes across measures of substance use. Rates of substance use for CJS-supervised participants dropped from 88% to 69% for alcohol use and 94% to 66% for marijuana use, while cocaine use went up slightly from 17% to 18% one-year post-treatment. Rates for

non-CJS-supervised participants dropped from 89% to 74% for alcohol use, 89% to 70% for marijuana use, while cocaine use went up from 16% to 21% in the year following treatment.

Gender Differences In Criminal Activity

Using the overall DATOS-A sample of 3,382 youth, Rounds-Bryant, Kristiansen, Fairbank, and Hubbard (1998) found that male clients (mean age = 16 years) were more likely to commit illegal acts and to have been sanctioned by the juvenile justice system than female clients (mean age = 15). In the year before treatment, 64% of males and 32% of females were involved in the juvenile justice system (incarceration, probation, parole, pending case). Compared to females, males were more likely to report having a lifetime history of arrest (75% vs. 40%), as well as more likely to report having committed aggravated assault or robbery (63% vs. 57%) or having engaged in illegal activity for the purposes of purchasing drugs (62% vs. 41%) in the year before treatment. Despite the gender differences, it is important to stress that a substantial amount of females in the sample reported engaging in illegal activity.

Treatment Outcome Research Using Regional Samples

Jainchill, Hawke, and Messina (2005) examined a sample of 282 adolescents (71% male) from two modified therapeutic community (TC) programs as part of a 5-year post-treatment outcome study. At intake, the majority of the sample (58%) reported marijuana as their primary drug of abuse, while 27% reported their primary drug of abuse as alcohol. A small minority of the sample indicated crack/cocaine (8%) or heroin (2%) as their main problem.

The single most frequent comorbid psychiatric diagnosis was conduct disorder (35%). Over half (53%) of the sample had been involved in drug sales. About half (49%) of the sample acknowledged serious violent criminal activity, 68% reported involvement in property crimes, and 21% reported weapons offenses. Nearly all the sample (97%) entered treatment under some kind of legal pressure (e.g., probation, parole, awaiting trial) and all but one adolescent had been suspended or expelled from school at least once. Approximately 70% of the sample completed their TC residential treatment program.

The percentage of the sample reporting substance use during the 5-year post-treatment period varied by type of drug used. The large majority of adolescents in the sample reported use of alcohol (89%) and marijuana (70%), while a minority reported any use of crack/cocaine (17%) or heroin/other opiates (12%). Accumulated months of drug use was examined to further understand the extent of drug use during the five-year follow-up period. Findings indicated that over the five years following treatment, the average number of months of use was 23.6 for marijuana, 4.2 for cocaine, and 3.3 for heroin.

Approximately 40% of the sample reported engaging in drug sales in the five-year follow-up period. During the five-year follow-up period, 29% of the sample admitted to engagement in violent crimes, 21% reported property crimes, and 18% endorsed weapons offenses. With the exception of property crime, proportionately more males than females were involved in all categories of criminal activity (i.e., violent crimes, weapons offenses, drug possession, and drug sales). Months of marijuana use was correlated with a diagnosis of conduct

disorder ($r = .20, p < .05$) and pretreatment involvement with violent crime ($r = .21, p < .05$). Post-treatment involvement in violent crimes was associated with a diagnosis of conduct disorder at treatment admission ($r = -.19, p < .05$), as well as pretreatment involvement in violent crime ($r = .22, p < .05$). Post-treatment involvement in property crimes was associated only with pretreatment violent crimes ($r = .19, p < .05$). Overall, significantly more individuals indicated cessation of drug sales, violent crimes, and property crimes compared with those who reported initiation of, or maintenance of involvement in these activities. Only “hustles” (i.e., gambling, fraud, prostitution) showed an increase between admission (4%) and post-treatment (45%) in the number of individuals involved in related activities. Jainchill and colleagues summarize the post-treatment profile of drug use in their sample as characterized by continued use, but add that involvement was primarily with marijuana and alcohol, and intermittent during the 5-year period following treatment.

Other Measures of Treatment Outcome

Time to Relapse

Cornelius and colleagues (2003) conducted a prospective study of 59 adolescents (aged 14 to 18 years, 66% male) following completion of outpatient substance abuse treatment. The researchers conducted comprehensive baseline assessments followed by monthly telephone assessments of substance usage and reported reasons for use. The most common substance use disorder at baseline was cannabis abuse or cannabis dependence which was diagnosed in 97% participants (57 of 59). Roughly two-thirds (64%) of adolescents in the sample

also had a baseline lifetime diagnosis of a substance use disorder besides cannabis abuse or cannabis dependence, including abuse/dependence on hallucinogens (32%), opioids (20%), stimulants (19%), cocaine (17%), inhalants (15%), and sedatives (10%). Overall, two-thirds (66%) of the sample “relapsed” (i.e., admitted to some drug use) within 6 months of treatment completion. The median time to drug relapse was only 54 days (+/- 14 days) or slightly less than two months. The three most commonly reported reasons for return to use were social pressure, withdrawal, and negative affect.

Cornelius and colleagues acknowledged that they defined relapse as the first use of drugs after the baseline assessment, but the authors add that their previous work indicated that relapse among adolescents generally involves a return to patterns of use that are similar to those exhibited prior to treatment, both in the type of substances used and the amounts consumed (Maisto et al., 2001). Cornelius and colleagues stated that the results of their study demonstrated that rapid relapse to drug use appears to be the norm among adolescents who have recently completed treatment for substance use disorders. The authors added that their results for the timing of relapse to drug use (roughly 2 months) were nearly as fast as their earlier findings of approximately one month for adolescent return to alcohol abuse post-treatment completion (Pollock et al., 2000).

Comorbidity and Relapse

Tomlinson, Brown, and Abrantes (2004) examined a sample of 207 adolescents (ages 13-17) with substance use disorders from 5 inpatient adolescent treatment programs in order to investigate psychiatric comorbidity and treatment outcomes. The sample was divided into two groups, including 126 adolescents (mean age = 15.5 years, 46% male) with comorbid Axis I psychiatric disorders (mood, anxiety, conduct, and attention-deficit/hyperactivity disorders) and 81 adolescents (mean age = 15.9 years, 53% male) with no additional Axis-I disorder beyond substance use disorder. The authors calculated the number of days to initial post-treatment use episode, as well as the percentage of youth in each group who had “major” relapse episodes (i.e., multiple alcohol and/or drug use episodes in the 6 months post-treatment) or “minor” relapse episodes (i.e., brief lapses that did not meet criteria for major relapse). Adolescents with comorbid psychiatric disorder were more likely to return to alcohol and other drug use in the 6-months following treatment completion as compared to adolescents without a comorbid psychiatric disorder (87% vs. 74%). Comorbid adolescents also returned to substance use more rapidly after discharge from treatment (Mean days of initial abstinence = 61.44 days vs. 82.78 days). Adolescents who returned to use of alcohol and other drug use following treatment were more likely to be major relapsers (83%) than minor relapsers (17%). Despite the high rates of relapse, both the comorbidity group and SUD-only group showed significant reductions in overall frequency of use from treatment intake to 6 months post-treatment. More

specifically, the comorbidity group decreased monthly substance use episodes by 79%, and the SUD-only group decreased monthly use episodes by 73%.

“Non-Problem” Use

Maisto and colleagues (2002) state that one of the major controversies in the literature on substance use disorders relates to whether treated individuals can achieve outcomes of sustained “non-problem” use. The authors examined a sample of 159 adolescents (ages 14-18, 70% male) presenting with alcohol use disorders (AUDs) at outpatient (49%), inpatient (38%), and residential (13%) treatment programs. They also examined a comparably aged sample of 148 adolescents (47% male) from the community (30% of whom were regular drinkers, i.e., use of alcohol 1 or more times/month for 6 or more months). One-year following treatment, 60% of the clinical sample reported problem drinking (i.e., endorsement of at least one AUD symptom). Of the remaining sample (i.e., 40%), 23% were drinking but reported no AUD symptoms (i.e., “non-problem” drinking) and 17% reported abstinence from alcohol. Paired-comparisons showed that at one-year, “non-problem” drinkers were consuming fewer drinks (mean drinks/occasion = 4.2) than problem drinkers (mean drinks per occasion = 8.5), but more than their community peers (mean drinks per occasion = 2.9). In addition, non-problem drinkers increased in psychosocial functioning and decreased in the number of illicit drugs used (mean number of illicit drugs = 1.2 drugs) relative to problem drinkers (mean number of illicit drugs = 3.2 drugs). Non-problem drinkers generally did not differ from alcohol abstainers in psychosocial functioning. Notably, alcohol abstainers reported a mean of nearly

one (.9) other drugs used, indicating that abstinence from alcohol did not necessarily indicate abstinence from illicit substances.

Maisto and colleagues note that in the treatment literature for both adults and adolescents, total abstinence is the standard used most in determining whether an individual has “relapsed” during or after a treatment episode. The authors argue that according to the abstinence standard, all the “non-problem” drinkers in their sample would have been identified as relapsers, with the associated connotations of treatment failure. They argue, however, that by standard of comparison with participants who were completely abstinent from alcohol, as well as with adolescents in the community, the non-problem drinkers might be viewed as functioning well after treatment. Maisto and colleagues suggest that a harm-reduction approach, which emphasizes a reduction in the negative consequences of substance use, may have considerable merit in the treatment of adolescents or at least in how the field views treatment effectiveness.

Context for Relapse/Initial Return to Substance Use

In an effort to examine differences in initial relapse circumstances, Ramo and Brown (2008) compared a sample of 188 adolescents from four inpatient psychiatric and substance abuse facilities (45% Male, 74% Caucasian) to a sample of 160 adults from a substance abuse and mental health program at a VA hospital (90% male, 63% Caucasian). Mean-days to first use was 167 days for adults (SD = 119) and 90 days (SD = 86) for adolescents. The authors found that two-thirds (67%) of adults first relapsed in social situations in which they experienced urges and temptations to drink/use, while one-third reportedly relapsed when they were

copied with negative emotions and also urges and temptations to drink/use. In contrast, most adolescents (69%) relapsed in social situations when they were trying to enhance a positive emotional state, while a smaller group (31%) relapsed when dealing with conflictual interpersonal situations accompanied by negative emotions and efforts to cope with urges and social pressures to drink. Ramo and Brown indicated that adults in their sample who first returned to use tended to be dealing with urges and or temptations that coincided with negative emotional states, as well as when they were in social situations when they may have been confronted with direct or indirect pressure to use. By contrast, adolescents were also much more likely to use substances to enhance a positive emotional state when in social situations. Notably, adolescents were five times more likely to relapse while in a positive emotional state than adults (41% vs. 9%). In addition, adolescents more often returned to use when they had urges or temptations to use when they were also experiencing negative emotions or negative interpersonal situations while in the presence of others. Ramo and Brown stated that their results were consistent with general patterns in previous research suggesting that the most common individual relapse precursor among adults is a negative emotional state (e.g., Marlatt & Gordon, 1985), whereas the most common relapse precursor among adolescents is precarious social situations (e.g., Brown et al, 1989; Myers & Brown, 1990).

Limitations of Previous Research

Mason and Windle (2002) note that some research has been focused on relatively minor forms of substance use (e.g., cigarette use) and offending behavior (e.g., property offending), adding that more research is needed to examine potential connections between more serious manifestations of both of these behaviors, such as hard drugs or serious violent offending. For example, serious illegal activity has been defined and examined in the DATOS family of studies as engagement in crimes involving confrontation with a victim, such as assault, armed robbery, and rape (Rounds-Bryant & Staab, 2001).

A number of studies have utilized arrest data given concerns about the ways that self-report measures are subject to both underreporting and exaggeration. However, Kinlock, Battjes, and Gordon (2004) argue that confidential self-report data provide much more complete measures of criminal activity than do arrest data. The authors highlight research documenting that among research participants with histories of substance abuse, as little as 1% of all offenses that are committed actually result in arrest (e.g., Inciardi et al., 1993). Murray and Farrington (2010) also argue that the prevalence rates for conduct disorder/delinquency appear to be much higher according to self-reports than based on other sources (e.g., official records, parental reports). For example, the authors note differences in parent and child reports from the Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) Study (Lahey et al., 2000). The MECA study utilized a cross-sectional survey of 1,285 youth, aged 9- to 17-years-old, and found that past-six-month prevalence rates for

conduct disorder did not change according to parent reports across the different age groups. However, rates of conduct disorder did increase over age based on adolescent self-reports. According to adolescents in the MECA study, the prevalence of conduct disorder increased for boys from 1% at ages 9-11 years to 6% for ages 12-14 years, and 11% for ages 15-17 years. For girls, prevalence of conduct disorder increased from 1% at ages 9-11 years to 3% at ages 12-14 years and 4% at ages 15-17 years. Mason and Windle (2002) also advocate for the use of self-report measures based on prior research demonstrating that self-reports of substance use and delinquency can be highly valid, particularly when collected in an appropriate setting that ensures confidentiality of responses (e.g., Windle, 1996; Winters, Stichfield, Henly, & Schwartz, 1991).

Paradise and Cauce (2003) state that meaningful differences in sample composition make comparisons across studies difficult. The authors suggest that the lack of consistent findings for associations between substance use and problem behaviors in the broader body of research may be a result of the different base rates of substance use and behavior problems between conventional (e.g., community and high school samples) and “at-risk” populations. They add that if there is a dependable longitudinal relationship between substance use and delinquent behavior for adolescence, it is more likely to be found in at-risk populations that include young people who consistently use substances and get into legal trouble, exactly the youth who are least likely to appear in representative high school samples.

Muck and colleagues (2001) note that research on the effectiveness of adolescent substance abuse treatment is in its infancy. The authors add that methodology is inconsistent across studies regarding factors such as the period(s) at which outcome is evaluated, the number of prior months of substance use being assessed, and how success is measured. Liddle and Dakof (1995) note that many studies of drug treatment outcome have focused on the evaluation of immediate changes, largely in terms of reductions in substance use, but have failed to evaluate the long-term maintenance of treatment effects. The authors add that clearly established standards are lacking for length of follow-up to evaluate maintenance of treatment gains with follow-up times for outcome studies ranging from several weeks to several years. Liddle and Dakof (1995) suggest that for problems like substance abuse, which have a chronic and cyclical course with periods of relapse and recovery, longer follow-up periods are necessary. They add that some researchers (e.g., Davidge & Forman, 1988) have argued that outcome studies for drug and alcohol abuse treatment should include follow-up assessments at least one-year after termination.

Mason and Windle (2002) acknowledge that investigations of stability and change in adolescent delinquency and drug use have begun to yield valuable insights, but the authors stress that multi-wave longitudinal studies have been lacking and could yield stronger inferences about putative causal processes than cross-sectional or two-wave studies. The authors argue that multi-wave longitudinal studies allow for the examination of the relationship between change in one variable and subsequent change in another variable.

Maisto, Kaczynski, and Ammerman (1996) state that treatment effectiveness traditionally has been defined predominantly by statistical differences between groups of individuals. The authors add that this approach has likely contributed to gaps between clinical research and practice and may reveal little about the clinical significance of group differences or treatment effects. Furthermore, researchers have often utilized complete abstinence from alcohol and other drugs as the lone measure of treatment success. A number of researchers have advocated for the examination of “minimal” (e.g., Waldron et al., 2001) or “non-problem” use (e.g., Maisto et al., 2002). For example, Waldron and colleagues (2001) have suggested the creation of dichotomous dependent variables classifying adolescents as having “minimal” use (i.e., use on 10% or less of days) or “heavy” use (i.e., greater than 10% of days) to help to evaluate the clinical significance of the reductions in substance use.

Rationale

Paradise and Cauce (2003) have emphasized that the understanding of the processes underlying the comorbidity between substance abuse and delinquency remains incomplete. Furthermore, the authors have argued that clinical intuition, rather than empirical evidence, has shaped the popular belief that alcohol and drug use drive delinquency during adolescence, and that substance use should therefore be the primary or initial focus of clinical intervention. Consequently, many substance abuse programs, including the facility used for this study, focus little on treatment specifically for conduct disorder. These programs instead subscribe to a “spill over” philosophy in which abstinence from substance use is expected to result in a subsequent cessation in delinquency. However, there is evidence that adolescents who demonstrate persistent delinquent behavior across multiple settings may require more intensive targeted interventions (Myers, Stewart, & Brown, 1998).

The current study had a number of potential advantages, most notably multi-wave data collected over a relatively long follow-up period. The study examined the occurrence of “rapid relapse” by measuring substance use behavior three-months post-treatment entry (i.e., approximately 1 to 2 months after planned 30- to 50-day inpatient stay). Research findings generally estimate that between two-thirds and four-fifths of both adults and adolescents return to substance use within 6-months of treatment exposure (Ramo & Brown, 2008). In fact, a number of previous studies measuring mean or median days to relapse have shown that the majority of adolescents return to substance use between one- and three-

months after substance abuse treatment (Cornelius et al., 2003; Maisto et al., 2001; Pollock et al., 2001; Ramo & Brown, 2008; Tomlinson, Brown, & Abrantes, 2004).

The study also sought to look beyond merely the short-term or immediate effects of substance abuse treatment for adolescents. Analyses examined the persistence of substance abuse, conduct disorder symptomatology, and delinquent behavior in the two-years following exposure to inpatient substance abuse treatment. Substance abuse was measured in terms of both frequency of use, as well as associated problems. The study also looked beyond abstinence as a lone indicator of treatment success by measuring the presence of “minimal” use (e.g., 10% or less of days) or “non-problem” use (i.e., participants reporting no symptoms of abuse or dependence) among adolescents who re-engaged in substance use following their exposure to an abstinence-based drug treatment program.

The study focused largely on conduct disorder, the most common comorbid diagnosis for adolescent alcohol and drug abusers (White et al., 2001). Analyses sought to look beyond more general categorizations (i.e., “conduct disordered” or “criminally active”) to examine potential differences within these groups.

Burt and Neiderhiser (2009) note that researchers have long advocated for the parsing of antisocial behavior (e.g., vandalism, theft, bullying/assault) into conceptually meaningful dimensions. For example, results from a number of studies using factor analytic approaches have indicated two factors largely based

on the absence or presence of aggression. More specifically, studies have distinguished between overt aggressive/oppositional behaviors and more covert, non-aggressive delinquent behaviors (Frick et al., 1993; Loeber & Schmaling, 1985). Results of these studies have generally suggested that rates of non-aggressive, rule-breaking behaviors are very similar across antisocial youth regardless of whether the youth demonstrated the onset of antisocial behavior in childhood (i.e., early-onset) or adolescence. In contrast, research findings have shown that youth displaying an early-onset of antisocial behavior are much more likely to engage in aggressive behaviors and to show persistent aggression over time (Lahey et al., 1992; Lahey et al., 1998). Burt and Neiderhiser add that research has continued to support the broad conceptual distinction between aggressive and non-aggressive behaviors, while also attempting to identify how particular deficits may be related to these different types of acts. For example, recent findings have suggested that deficits in emotional regulation appear to be specifically tied to aggression, whereas deficits in impulse control appear to be specific to non-aggressive, delinquent behavior (Burt & Donnellan, 2008; Burt & Larson, 2007; Pardini, Lochman, & Frick, 2003).

More recent studies have also examined callous-unemotional (CU) traits as a means of delineating subtypes of antisocial behavior. These studies have provided some support to the theory that youth who exhibit deficits in traits like empathy and guilt are more likely to demonstrate more severe and persistent antisocial behavior (McMahon, et al., 2010; Kolko & Pardini, 2010).

The present study distinguished between adolescents with mild/moderate conduct disorder versus severe conduct disorder based on criteria established by the DSM-IV-TR (American Psychiatric Association, 2000) and previous research. The DSM-IV-TR defines severe conduct disorder as many conduct problems in excess of those required to make a diagnosis and/or conduct problems that cause considerable harm to others (e.g., physical cruelty, forced sex, use of a weapon, stealing while confronting a victim, breaking and entering). In particular, the study sought to examine whether adolescents at the severe end of the conduct disorder continuum showed more severe and persistent antisocial behavior over time, as well as lesser likelihood of desistance of delinquent behavior as they approached young adulthood.

The authors of the assessment instrument used in the study, the Global Appraisal of Individual Needs (GAIN) (Dennis, Scott, Godley, & Funk, 1999) set the cut-off for severe conduct disorder at 9 or more conduct disorder symptoms of the 15 symptoms adopted from the DSM-IV (American Psychiatric Association, 1994). In virtually every instance in which an adolescent reported 9 or more conduct disorder symptoms, the items they endorsed included at least one item reflective of actions causing considerable harm to others. Consequently, an important distinction between adolescents in the mild/moderate severe conduct disorder groups was a willingness or propensity to engage in acts that cause considerable harm to others. Gender differences were also examined in terms of conduct disorder symptomatology, particularly with regard to likelihood of engagement in acts causing considerable harm to others.

Primary analyses used strict adherence to DSM-IV criteria for conduct disorder. However, it is important to note that regardless of how extensively youth engage in truancy and curfew violations, diagnostic criteria from the DSM-IV only consider staying out late and skipping school as symptomatic of conduct disorder if the behaviors initially manifested before the age of 13-years-old. Given the often extreme rates of skipping school and staying out late among adolescents in the sample, separate analyses were conducted in which current truancy and curfew violations were counted as symptoms of conduct disorder regardless of the initial age of onset for these behaviors.

The study also examined the continuity of substance use disorder categorizations (i.e., substance dependence, substance abuse, no substance use disorder) over time. Given that addiction or chemical dependency is often described as a progressive condition that worsens over time, it was of particular interest whether adolescents who endorsed substance dependence at treatment entry remained in that category at subsequent follow-up points.

Finally, the study examined service utilization following baseline treatment exposure. Chan, Godley, Godley, and Dennis (2009) have estimated that integrated substance abuse and mental health services are provided by only about half of substance abuse treatment programs. Many states, including the one in which the study sample was based, have mental health and substance abuse treatment systems that operate separately. Chan and colleagues stress that this separation of service agencies results in a substantial portion of individuals with co-occurring substance use and mental health disorders who do not receive mental

health services during the course of their treatment for substance use disorders. Using a pooled sample of 1,190 adolescents who received outpatient substance abuse treatment, Chan and colleagues (2009) found that only about one-third (35%) of youth with co-occurring mental health problems transitioned to mental health services (broadly defined to include psychotropic medication) during the 3-months following substance abuse services. Jaycox, Morral, and Juvonen (2003) also found that follow-up mental health services were relatively rare (16%) for youth with co-occurring mental health problems who received outpatient substance abuse treatment. Although, Jaycox and colleagues found higher rates for follow-up mental health care among adolescents with co-occurring mental health problems who were “stepping down” from higher levels of care, less than half (46%) of dually-diagnosed adolescents leaving residential substance abuse services had transitioned to mental health care in the 3-months post-discharge from substance abuse treatment. Consequently, analyses sought to examine potential relationships between treatment duration or treatment focus (e.g., substance abuse treatment versus mental health services) and outcomes such as frequency of substance use, symptoms of mental distress, and conduct disordered or criminal behaviors.

Statement of Hypotheses

Hypothesis I. More than half of adolescents in the sample will demonstrate “rapid relapse” by returning to substance use by the 3-month follow-up point.

Hypothesis II. At least two-thirds of the sample will return to substance use by the 6-month follow-up.

Hypothesis III. Less than one-quarter of adolescents in the sample who resume active consumption of alcohol or other drugs will endorse “non-problem” use (i.e., no symptoms of substance abuse/dependence).

Hypothesis VI. Males will be significantly more likely than females to endorse conduct problems that cause considerable harm to others.

Research Questions

Research Question I. How many adolescents will maintain “minimal” substance use (10% or less of days) across multiple follow-up points?

Research Question II. Will adolescents who demonstrate severe conduct disorder (i.e., engagement in behaviors that cause considerable harm to others) at treatment entry show more severe and persistent behavioral problems over time than their mild/moderate counterparts?

Research Question III. Will there be continuity in substance use disorder categorizations over time, particularly with respect to substance dependence?

Research Question IV. What relationships will be demonstrated between treatment duration or treatment focus (e.g., substance abuse treatment versus mental health services) and outcomes such as frequency of substance use, symptoms of conduct disorder, number of criminal activities, and symptoms of mental distress?

CHAPTER II

METHODS

Beginning in 1998, the federal Center for Substance Abuse Treatment (CSAT) within the Substance Abuse and Mental Health Services Administration (SAMHSA) funded 10 sites nationwide to participate in the Adolescent Treatment Model (ATM) initiative. This initiative was intended to empirically evaluate the effectiveness of promising adolescent substance abuse treatment models. Key components of the initiative included client-level assessment and treatment episode data to measure treatment effectiveness; development of treatment manuals that document and explicate treatment models in order to help facilitate replication; and cost analysis to evaluate costs associated with delivering services and allied interventions in each treatment model (Dasinger et al., 2004).

The current study utilized data from Thunder Road, a residential facility in Oakland, California that served as one of the ten ATM sites. Thunder Road is a fifty-bed residential substance abuse treatment program that serves adolescents ages 13- to 19-years old. Annual client admissions average over 300 teens per year, including adolescents from 24 counties throughout the state of California. The treatment facility is owned and operated by a nonprofit entity, Adolescent Treatment Centers, Inc., and it is a self-sustaining affiliate of the Sutter Health East Bay Hospital System. The facility is accredited by the Commission on the Accreditation of Rehabilitation Facilities (CARF). Clients are also served by a county-run alternative school that operates within the facility. Thunder Road operates with dual licensure through the California Department of Health

Services, both as a chemical dependency recovery hospital (CDRH) and as a group-home. Thunder Road's CDRH offers an intensive 30- to 50-day inpatient program, serving primarily private pay clients and those whose treatment is authorized by third-party managed-care payers. Thunder Road also operates a group-home track which provides projected residential stays of 6 to 12 months, and serves primarily clients referred and funded by the juvenile justice system or county social services.

Both treatment tracks include "guarded sobriety," structured living environments, individual and group therapy, and interventions to address family issues in a safe and structured milieu. Therapy sessions are usually conducted by certified alcohol and drug counselors. Floor staff are mostly comprised of "non-professionals" conversant with 12-step recovery principles, usually through personal involvement in a 12-step program. Staff psychiatrists are primarily responsible for conducting intake assessments, medication management, and supervising treatment staff. Primary goals for both treatment tracks include reunifying adolescents with family, addressing destabilizing influences within each client's family system, and the development of long-term recovery plans.

The 12-step recovery precepts serve as one of the cornerstones of the program, including the understanding of recovery as a lifelong endeavor, providing models for sustaining abstinence, and emphasizing the building and fortification of a drug-free peer network. Positive peer influence within the residential treatment setting is supported through a system of peer government and leadership, with clients assuming progressively greater responsibilities

including the mentorship of newer clients. Both treatment tracks consist of three stages focused sequentially on (1) orientation and education, (2) primary treatment, and (3) reunification and re-entry. Clients are considered to be in orientation throughout stage 1 of their treatment. This lasts approximately 2 weeks for short-term CDRH clients and up to 3 months for long-term group-home clients. Stage 1 includes completion of a number of comprehensive assessments, as well as addiction education and learning assignments on emotional, physical, and intellectual functioning, as well as spiritual development. Stage 2 is intended to address powerlessness, inability to manage age-appropriate skills and tasks, and core client issues such as identification of positive role models, family responsibility, problem solving and interpersonal skills, planning and organization, enhancing judgment, and development of a specific recovery plan. During stage 3, clients prepare for reentry and family reunification, including preparation of a comprehensive continuing care contract. Stage 3 requires clients to identify how they intend to improve family relationships, handle social situations, use their Higher Power, and take care of themselves physically, emotionally, and spiritually. Prior to completing treatment, each adolescent is required to establish a relationship with a 12-step sponsor outside the treatment program. The final stage of treatment is continuing care, an outpatient, after-care phase consisting of 2 meetings at the facility each week for clients and family members. At one weekly meeting, groups of youths and parents meet together in a multi-family group. At a second weekly meeting, youths and their parents/guardians meet in separate group sessions (Shane, Cherry, & Gerstel,

2003). Continuing care services are available for up to one-year following initial treatment exposure.

Shane, Cherry, and Gerstel (2003) state that the typical Thunder Road client is 16 years old, has been using drugs for about 5 years, is often failing school or chronically truant, has a recent history of involvement with a variety of institutions (including locked facilities), and comes from a family that is struggling with some form of addiction. In the calendar year preceding the initial year of data collection, Thunder Road admitted a total of 296 adolescent clients. Of these youth, 177 (60%) were male and 119 (40%) were female. By treatment track, 203 (69%) entered through the short-term inpatient (CDRH) track and 93 (31%) entered through the group home track. Average age at admission to the short-term inpatient track was 16.3 years for males and 16.0 years for females, whereas average age at admission for the group home track was 16.9 years for males and 16.3 years for females. Race/ethnicity for the CDRH was 65% Caucasian, 18% Hispanic, 5% African American, 4% Asian/Pacific Islander, and 6% other ethnic group. Race/ethnicity for the group home was 48% Caucasian, 25% Hispanic, 17% African American, 2% Asian/Pacific Islander, and 7% other ethnic group. (Shane, Cherry, & Gerstel, 2003).

First wave baseline collection at Thunder Road took place between April 2000 and April 2001. Overall, 220 interviews were conducted at baseline, 14 of which were excluded because clients remained in treatment less than 7 days. Of the 206 remaining interviews, 149 (72%) were with clients of the CDRH, while 57 (28%) were with adolescents in the group-home. Follow-up interviews were

conducted at 3-, 6-, 9-, 12-, and 24-months, the last of which were completed in September 2002. Retention was very good, especially up to the year-one follow-up (199 of original 206 clients). At the year-two follow-up, 156 of the original 206 clients participated.

Participants

The current study focused on the short-term inpatient (i.e., CDRH) cohort (i.e., clients from the group home track were excluded from the study). This restriction was intended to ensure that clients were consistent in terms of level of care received, as well as similar in terms of planned length of stay (30 to 50 days). In addition, short-term residential clients were more likely to be outside of controlled environments at subsequent follow-up points (especially at the 3-month follow-up point that served as a proxy for functioning shortly after treatment completion). The short-term inpatient sample of 149 clients was further restricted to exclude 11 clients (7%) outside of the ages of 14- to 17-years-old. The remaining sample of 138 clients was nearly two-thirds male (65%) with a mean age of 15.96 years at treatment entry.

Table 1. Race/Ethnicity of Adolescents in Inpatient Sample

Caucasian	Multi-racial	Hispanic	American-Indian	African-American	Asian/Pacific Islander	Other
69%	13%	9%	3%	2%	1%	3%

Table 2. Home Living Arrangement

Single Parent Home	Two Parents Together	Parents Separated w/ Shared Custody	Live w/ Other Family	Other Living Arrangement
49%	31%	11%	6%	3%

Table 3. Source of Treatment Referral

Counselor/Mental Health Professional	Other Substance Abuse Program	Doctor/Health Facility	Insurance Company	Probation	School Staff	Family Member/Friend
23%	21%	15%	15%	11%	8%	7%

As illustrated above, over two-thirds (69%) of the sample were Caucasian and less than one-third (31%) of the sample lived in a two-parent home. Only a small minority (11%) of youth in the sample were referred by the criminal justice system. The vast majority (91%) of the sample endorsed some family history of alcohol and/or drug abuse in their family. Overall, 61% of the sample endorsed some previous treatment for alcohol or drug use, including one-fifth (20%) of the sample who endorsed a past-history of 2 or more treatment exposures.

The vast majority (98%) of the sample had completed middle-school and advanced to high school. Overall, 80% of the sample had attended some school in

the past-month. Notably, nearly half (48%) of the sample reported a history of receiving some special educational services.

Study retention was strong for this sample, especially at the year-one follow-up. Overall, 132 of 138 initial clients (96%) completed year-one follow-up interviews (mean age = 16.96 years; 63% male), whereas 103 clients (75%) completed interviews two years after treatment intake (mean age = 17.99 years; 61% male).

Procedure

Recruitment into the study and completion of baseline interviews were essentially sequential, and in-step with intake to treatment services. The recruitment sample was comparable to the client population served by the tracks within the program. Participation in the study was voluntary and participants were informed that their individual data would not be shared with treatment and/or other service providers, nor would information provided in the assessment process impact their access to services. Initial interviews were conducted at the treatment facility within one-week of admission. Intake interviews were conducted in-person by trained research assistants who read survey questions and recorded client responses. Baseline interviews took an average of 83 minutes to complete. Follow-up assessment data were collected at 3-, 6-, 9-, 12-, and 24-months after baseline interview. Follow-up interviews were conducted in-person whenever possible, but interviews were also conducted by phone when necessary. Participants received \$20 for the completion of the 3-, 6-, and 9-month interviews, and \$45 for completion of annual interviews. Protocols established a six-week

window for completion of follow-up interviews, ranging between two-weeks before and four-weeks after the due date of the next assessment, calculated in relation to the date of the initial baseline assessment (Shane, Jasiukaitis, & Green, 2003).

Measures

The Global Appraisal of Individual Needs (GAIN) (Dennis, Scott, Godley, & Funk, 1999) is a biopsychosocial structured assessment battery developed as an instrument to integrate data collection for both clinical and research purposes. Clinical assessment components of the GAIN have been normed on both adolescents and adults (Dennis et al., 1999, 2000). The GAIN is currently one of the most widely used measures in adolescent treatment studies in the United States (Buchan, Tims, & Dennis, 2000; Dennis, Babor, et al., 2000). The instrument has been used in over 500 agencies and research projects (Dennis, White, Titus, & Unsicker, 2007)

Two versions of the GAIN were used for the study: the GAIN-I (intake version) and the GAIN-M90 (i.e., 90 days post-intake). The GAIN-M90 contains a subset of items contained in the GAIN-I and was administered at each follow-up point to evaluate change over time. The GAIN has scales comprised of symptom counts that were based on the DSM-IV (American Psychiatric Association, 1994), as well as symptoms that map onto American Society of Addiction Medicine (ASAM) Patient Placement Criteria for the Treatment of Substance-Related Disorders (Mee-Lee et al., 2001).

The content of the GAIN is divided into eight areas: background and treatment arrangements, substance use, physical health, risk behaviors, mental health, environment, legal/justice, and vocational sections. For each area, questions provide symptom/event counts, change scores, and indices for major problems and recency of problems. The instrument also measures lifetime service utilization, recency of utilization, and frequency of utilization. GAIN items can be combined into over 100 scales and subscales that can be used in diagnosis, placement, treatment planning, and outcome monitoring.

The GAIN's main scales have shown alphas over .9, the subscales have shown alphas over .7, and test-retest on core measures of change have alphas ranging from .7 to .9 when used with adolescents and adults, as well as with outpatients and inpatients (Dennis, Babor, et al., 2002; Dennis et al., 2003). Diagnoses based on the GAIN have been shown to have good test-retest reliability for substance use disorders ($k = .6$ to $.7$) and to accurately predict independent and blind staff psychiatric diagnoses of co-occurring psychiatric disorders, including mood disorders ($k = .85$) and conduct disorder/oppositional defiant disorder ($k = .82$). The GAIN collects detailed information on criminal activity regardless of whether the activity resulted in arrest (French et al., 2003).

Substance Frequency Index

The GAIN's Substance Frequency Index (SFI; see Appendix A) can be used to calculate an average percentage of days during a 90-day period that an adolescent reports each of the following: days of "any" substance use; days of "heavy" substance use (i.e., days in which respondent indicates that they were

“drunk or high for most of the day”); and days of use for each particular substance (i.e., alcohol, cannabis, crack/cocaine, and heroin/opioids). The scale ranges from 0 to 1, with a higher number indicating more overall reported use. The SFI has good internal consistency ($\alpha = .74-.77$) and test-retest reliability ($p = .93$) and is sensitive to change (Dennis, Dawud-Noursi, et al., 2003; Dennis, Titus, et al., 2002). The SFI has been demonstrated to be a better overall predictor of substance-related problems (e.g., withdrawal, abuse/dependence symptoms, illegal activity, emotional problems) than individual self-report items (e.g., past month abstinence, days of use, peak use, recency of use), biometric measures (e.g., urine, saliva), or various combinations of these measures in both adults and adolescents (Lennox, Dennis, Scott, & Funk, 2005).

Substance Problem Index

The GAIN's Substance Problem Index (SPI; see Appendix B) is based on recency ratings (e.g., past month 2-12 months ago, more than 12 months ago, never) on 16 items adapted from the DSM-IV (American Psychiatric Association, 1994) and the Office of Applied Studies (1995). The SPI contains 3 subscales: the Substance Issues Index (SII, 5 items) which measures three lower severity symptoms of use (hiding use, people complaining about use, and weekly use), as well as two items indicating substance-induced psychological or health problems (e.g., depression, disinterest, numbness, etc.); the Substance Abuse Index (SAI, 4 items) measuring DSM-IV defined substance abuse symptoms (disruption of social obligations due to use, use endangering self or others, legal problems related to use, and continuing use when negative consequences were apparent);

and the Substance Dependence Index (SDI, 7 items) measuring DSM-IV defined symptoms of substance dependence (tolerance, withdrawal, more taken than intended, unsuccessful efforts to reduce use, time lost in efforts to obtain or recover from substances, social/recreational activities given up for use, and persisting use in the face of related health problems). The past month SPI symptom count has shown excellent internal consistency (Cronbach's alpha = .90) and good test-retest reliability ($r = .70$) (Dennis, Dawud-Noursi, et al., 2003; Dennis, Titus, et al., 2002; Godley et al., 2002).

Conduct Disorder Index

The Conduct Disorder Index (CDI; see Appendix C) is composed of 15-items adapted from criteria outlined in the DSM-IV (American Psychiatric Association, 1994). Criteria for conduct disorder were met if participants reported engaging in 3 out of 15 DSM-IV listed behaviors (intimidating others, initiating physical fights, using a weapon in a fight, physical cruelty to people, physical cruelty to animals, confrontational theft, rape, arson, destruction of property, burglary, lying/conning, non-confrontational theft, and running away) during the past year (as well as truancy and curfew violations before age 13), with at least one behavior occurring in the past 6 months. To meet criteria for severe conduct disorder participants needed to endorse at least 3 conduct one symptoms overall and at least one symptom causing considerable harm to others (e.g., physical cruelty, forced sex, use of a weapon, stealing while confronting a victim, breaking and entering; American Psychiatric Association, 1994).

General Crime Index

The General Crime Index (GCI; see Appendix D) contains 19 items and creates a count of the number of different types of illegal activities during the past year which are endorsed by the respondent. Items are lay statements that correspond to the Uniform Crime Reports (Federal Bureau of Investigations, 1994) and have been included in the National Household Survey of Drug Abuse (Office of Applied Studies, 1995). The GCI includes three subscales, the Property Crime Index (PCI) related to illegal property crimes (vandalism, bad checks, theft, breaking and entering, etc.), the Interpersonal Crime Index (ICI) related to illegal personal crime (assault, rape, murder, etc.), and the Drug Crime Index (DCI) related to illegal drug-related activity (DUI, drug distribution, gang membership, prostitution, etc.).

Monahan, Steinberg, and Caufmann (2009) state that in the criminological literature, the number of different types of antisocial acts endorsed across respective categories are often summed to get a “variety score.” For example, an individual admitting to 5 different types of criminal offenses would receive a score of 5. Monahan and colleagues state that variety scores are commonly used to assess criminal activity (Hindelang et al., 1981) and have been shown to be a valid way of assessing antisocial behavior (Piquero, MacIntosh, & Hickerman, 2002). Variety scores have also been shown to be highly correlated with frequency of antisocial behavior (Chung & Steinberg, 2006).

General Mental Distress Index

The General Mental Distress Index (GMDI; see Appendix E) contains 26 items and creates a count of symptoms of somatization, depression, anxiety, and suicidal ideation. The items were based on factor analysis by Bohlig and Dennis (1996) of the Hopkin's Symptom Checklist (Derogotis, et al., 1973, 1974; Lipman, Covi, & Shapiro, 1979). The GMDI contains three subscales, the Somatic Symptom Index (SSI) related to physical symptoms commonly associated with mental distress, the Depressive Symptom Scale related to DSM-IV symptoms of depression, and the Anxiety/Fear Symptom Scale (AFSS) related to DSM-IV symptoms of anxiety disorders (particularly generalized anxiety disorder), as well as one item (i.e., "have you thought about ending your life or committing suicide) on suicidal ideation. Higher values on the GMDI indicate greater levels of internal mental distress.

Data from the first 1,028 adolescents admitted to the Adolescent Treatment Model (ATM) program indicated that GAIN scales replicated earlier results (Dennis, Scott, et al., 2000) in terms of high internal consistency on summary dimension scales, as well as their more specific subscales, including:

- Substance Problem Index (SPI-16 items, $\alpha = .90$) and its subscales: Substance Issues Index (SII-5 items, .67), Substance Abuse Index (SAI-4 items, .70), Substance Dependence Index (SDI-7 items, .83), and Substance Use Disorder Index (SUDI-11 items, .87).
- Behavioral Complexity Index (BCI-33 items, .91) and its subscales: Inattention Index (IAI- 9 items, .88), Hyperactivity-Impulsivity Index (HII-9 items, .81), Conduct Disorder Index (CDI-15 items, .82), and ADHD Index (ADHD-18 items, .90)
- Violence-Delinquency Index (VDI-22 items, .90) and its subscales: General Conflict Tactic Index (GCTI-12 items, .89), Property Crime Index (PCI-6 items, .75), Interpersonal Crime Index (ICI-7 items, .67), Drug Crime Index (DCI-4 items, .53) and General Crime Index (GCI-17 items, .84) (Dennis, Dawid-Noursi, et al., 2003).

Analyses

Given that the main goal of the short-term inpatient treatment program was abstinence from alcohol and other drugs, the introductory analyses were intended to be largely descriptive in terms of abstinence (or lack thereof) from substance use at numerous time points following treatment exposure. The short-term inpatient program allowed for forced abstinence of its participants (i.e., substances were rendered inaccessible) so clients had a period of “guarded sobriety” equivalent to their tenure in the program. Abstinence was captured by an item measuring the number of days (in the past-90-days) for which adolescents report using alcohol, marijuana, or other drugs, divided by the number of those days adolescents reported that they were outside of restricted environments (e.g. juvenile hall, hospital). Abstinence was measured at 3-months and one-year following treatment. Previous research of adolescents from substance abuse treatment samples have suggested “rapid relapse” among adolescents who complete drug treatment programs, averaging roughly one-month to resumption of alcohol use (Pollock et al., 2000) and two-months to resumption of drug use (Cornelius et al., 2003). Ramo and Brown (2008) have also noted that estimates from numerous studies generally suggest that between two-thirds and four-fifths of both adults and adolescents return to substance use again within 6-months of treatment episodes at community-based or hospital-based substance abuse programs (e.g., Brown, D’Amico, McCarthy, & Tapart, 2001; Cornelius et al., 2001).

Additional analyses moved beyond measures of complete abstinence from substance use, to examine indicators of potential “non-problem” use in terms of minimal endorsement of substance-related symptoms (as measured by the Substance Problems Index). Given the potential for minimization of problems related to substance use, particularly by more extreme substance users, a measure of minimal substance use was also examined. As suggested by Waldron and colleagues (2001), “minimal use” was defined as using 10% or less of days. Previous research has demonstrated that adolescents who relapse tend to return to patterns of use similar to those exhibited prior to treatment (Maisto et al., 2001).

Analyses also included an examination of conduct disorder within the sample. Adolescents were categorized as having conduct disorder if they endorsed 3 or more of the 15 DSM-IV-based symptoms listed on the Conduct Disorder Index (intimidating others, initiating physical fights, using a weapon in a fight, physical cruelty to people, physical cruelty to animals, confrontational theft, rape, arson, destruction of property, burglary, lying/conning, non-confrontational theft, and running away), as well as one-item from the General Crime Index measuring breaking and entering which is listed in the DSM-IV as the type of behavior that indicates severe conduct disorder. In an effort to differentiate between mild/moderate (lying, stealing without confronting victim, shoplifting) conduct disorder and more serious conduct disorder, a severe conduct disorder grouping was established based on the DSM-IV and GAIN. Criteria for severe conduct disorder was met for the study by either endorsement of many conduct problems in excess of those required to make a diagnosis (9+ out of 15 conduct disordered

behaviors based on GAIN scoring) or endorsement of conduct problems causing considerable harm to others (e.g., physical cruelty, forced sex, use of a weapon, stealing while confronting victim).

In addition to the measures of conduct disorder, analyses examined delinquency (as measured by the General Crime Index) within the sample. Although there is substantial overlap for the items within the Conduct Disorder and General Crime Indices, the General Crime Index measures a number of important behaviors absent from the Conduct Disorder Index. These behaviors include drug dealing, breaking and entering, auto-theft/joyriding, driving under the influence, prostitution, forgery, gang membership, and involvement in murder.

It was expected that adolescents who demonstrated severe conduct disorder or major delinquent behavior at treatment entry would be more likely engage in persistent delinquent behavior at the year-one and year-two follow-up points. Conversely, adolescents who demonstrated mild/moderate conduct disorder or minor delinquent behavior at treatment entry were expected to be more likely to “mature” out of or desist from delinquent behavior by the one-year and particularly the two-year follow-up period (at which point, the sample will average 18 years old).

CHAPTER III

RESULTS

The first analyses of the study focused on examining the ways in which the main variables of interest (i.e., days of substance use, conduct disorder behavior, criminal behavior, sexual activity, symptoms of general mental distress, substance-related problems, and symptoms specific to substance dependence) changed across the months from treatment entry (i.e., baseline) to the two-year follow-up point. As mentioned, follow-up interviews were conducted at 3-, 6-, 9-, 12-, and 24-months following treatment intake.

In most cases, data from all of these interview points were utilized. The most notable exception was in relation to the General Crime Index (GCI) which was not administered at the 3-month follow-up interview. The GCI served as the main scale of criminal behavior, in addition to providing one item about breaking and entering used to supplement the conduct disorder scale. Consequently, data for the conduct disorder and criminal behavior scales were unavailable for the 3-month follow-up point.

Given that analyses utilized repeated measures at several points in time, a multilevel regression approach was selected. Multilevel regression is currently the favored method for testing repeated measures in longitudinal data analysis, as opposed to a now out-of-date repeated measures ANOVA approach (Reise & Duan, 1999; Edwards, 2000; Gueorguieva & Krystal, 2004; O'Connell & McCoach, 2004).

Notably, all of the main variables of interest were skewed, sometimes extremely so. For example, variables such as days of use were considerably skewed towards frequent use (i.e., higher values) at baseline. This is not surprising given the admissions criteria for entry into the inpatient level for adolescent substance abuse treatment. In contrast, variables representing number of conduct disorder symptoms proved to be significantly skewed towards low values at all post-treatment follow-up points. In order to examine change across time for variables with this type of skewness, a regular multilevel regression (e.g., hierarchical linear model) could not be used. This is because regular multilevel regression assumes that the variables have a normal distribution.

Consequently, multilevel negative binomial regressions were utilized in all analyses for change over time. Multilevel Poisson regressions were also conducted for comparison purposes, but the multilevel negative binomial regression method was shown to be most appropriate in all cases. This is because the multilevel negative binomial regression approach was best at adjusting for issues of over-dispersion (i.e., variance greater than means) in the variables. This over-dispersion was particularly evident in follow-up interviews for variables such as proportion of days of substance use. For example, at the 3-month follow-up point, the standard deviation for proportion of days of use was .27, whereas the mean was only .19. In interpreting results from multilevel negative binomial regressions, it is important to note that this approach yields estimated values that are different and preferable to simple means, since these estimated values represent adjustments made in light of skewed distributions and over-dispersion.

In addition, the majority of multilevel negative binomial regressions did not demonstrate a fully linear relationship from baseline to the two-year follow up. Instead, most multilevel negative binomial regressions required a “piecewise” approach. For all regressions requiring a piecewise approach, the first “piece” represented change from baseline (i.e., treatment entry) to first post-treatment follow-up point (3-months post-treatment admission in most cases). The second “piece” then represented change from the first post-treatment follow-up to the two-year follow-up point. Days of any substance use serves as a good example of a variable that displayed this “hinged” piecewise (versus straight linear) relationship. More specifically, estimated days of any substance use failed to demonstrate continuous decline from baseline to the year-two follow-up period. Instead, days of any substance use dropped sharply from around 70% of days at treatment entry to around 20% of days at the 3-month follow-up, before then escalating back up to nearly 50% of all days by the two-year follow-up point. Exceptions to the piecewise approaches described above included change for symptoms of general mental distress, which did yield a single linear relationship (i.e., symptoms of mental distress showed continuous decline over time), as well as number of sex partners which did not demonstrate any significant change over time.

Finally, it is worth noting that although the data set was originally in SPSS format, the multilevel negative binomial regressions were done using the Stata statistical program. Use of Stata required that the data file be restructured vertically, as opposed to the horizontal format common to SPSS. In this format,

each subject response or value is counted as an observation. Given that analyses include data from multiple points in time, the overall number of observations is equivalent to the sum of the number of valid cases at each time point. For example, 138 adolescents reported on their days of substance use at baseline. The number of adolescents reporting on days of use at the 3-, 6-, 9-, 12-, and 24-month follow-ups were 127, 125, 116, 132, and 94 respectively. Therefore, the multilevel negative binomial regression for days of substance use included 732 total observations (i.e., $138 + 127 + 125 + 116 + 132 + 94$) from the study samples' initial 138 adolescents. It should be noted that within the corresponding box plots presented throughout the results section, outliers have been identified by an observation number. In the example of days of use, potential observation numbers ranged from 1 to 732.

Table 4. Multilevel Negative Binomial Regression for Change in Days of Use

Estimated Proportion of Days of Any Substance Use

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.399	.052	-7.70	0.000	-.501	-.298
monthpc2	.438	.058	7.51	0.000	.324	.552
constant	10.825	17.630	0.61	0.539	-23.728	45.378

Number of observations = 732

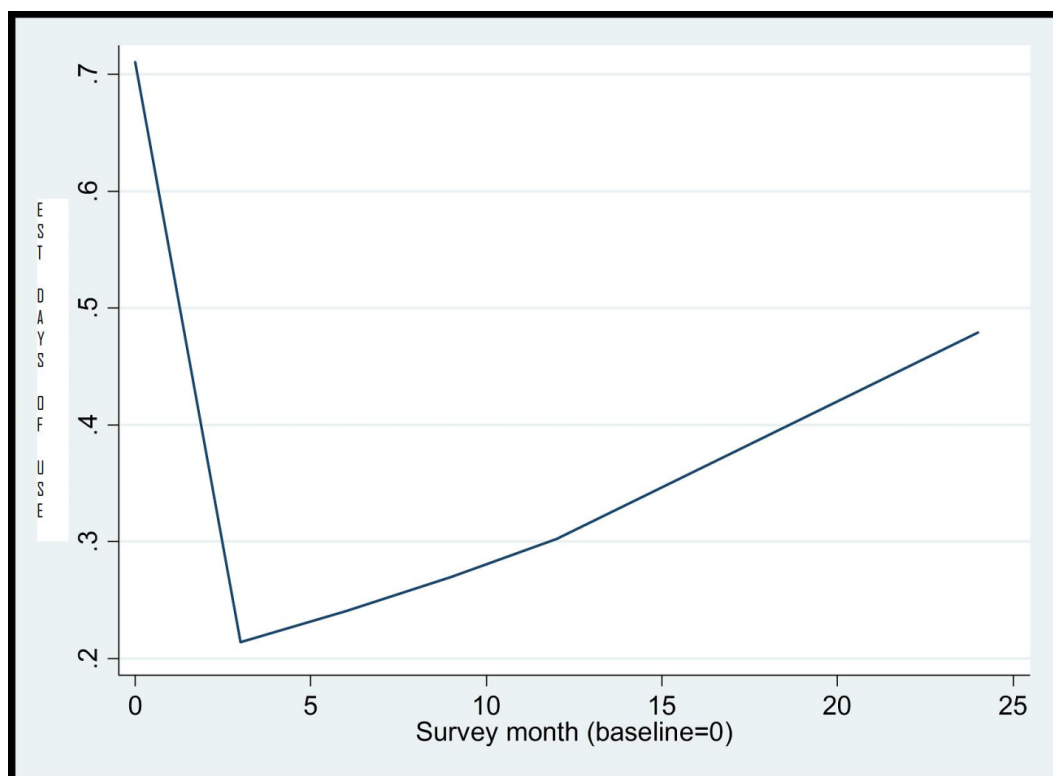
Number of groups = 138

Obs per group: min = 1
 avg = 5.3
 max = 6

Wald chi2(2) = 59.89

Prob > chi2 = 0.0000

Log likelihood = -478.52647



As mentioned earlier, days of substance use is expressed as a ratio of days of any reported substance use divided by number of days with access or ability to use (i.e., days outside of a controlled environment). The results indicate that estimated days of any substance use appeared to change significantly over time and in a two-piece fashion. Estimated days of use dropped greatly from treatment intake to the 3-month follow-up, but still remained above 20% at this lowest point. Estimated days of use steadily increased from the first post-treatment follow-up point (i.e., 3-months) to year-two. Estimated days of use never again achieved pre-treatment levels, but by the year-two follow-up, estimated days of use began to approach half of all days.

The following box plot illustrates the actual group means. As mentioned, the “floating” values displayed inside the box plots represent the unique observation numbers for major outliers. It is also important to note again that the standard deviation for days of use is greater than the mean for many of these follow-up points.

The days of use variable encompasses use of any and all substances. However, as noted previously, marijuana and alcohol account for the vast majority of substance use by adolescents presenting for drug treatment. Therefore, an additional variable representing “other drug use” was created using an item for which adolescents reported the number of days that they used drugs other than alcohol or marijuana. Given that this other drug use item was not captured at the year-two follow-up, it was excluded from the analyses for change over time. However, the group means for other drug use are provided below to illustrate the percent of the past-90-days that substances other than alcohol and marijuana were reported.

Table 6. Mean Values for Proportion of Days of Drug Use Besides Alcohol & Marijuana

	Days Other Drugs Baseline	Days Other Drugs Month 3	Days Other Drugs Month 6	Days Other Drugs Month 9	Days Other Drugs Month 12
N Valid	138	127	125	116	131
Missing	0	11	13	22	7
Mean	.19	.05	.05	.06	.10
Median	.08	.00	.00	.00	.00
Std. Deviation	.26	.13	.12	.13	.22
Minimum	.00	.00	.00	.00	.00
Maximum	1.00	.96	.89	.83	1.00

At treatment entry (i.e., baseline), the vast majority of adolescents endorsed some use of alcohol and marijuana (both 94%) in the previous 90-days. Nearly half (49%) of the sample reported hallucinogen use, followed closely by use of amphetamines or other stimulants (44%). Approximately one-fifth of the sample reported using opiates/pain killers (20%) or cocaine (19%). Less than

one-tenth of the sample reported use of tranquilizers (9%), crack (7%), sedatives/downers (7%), inhalants (4%), heroin (4%), or PCP (4%) in the 90-days before treatment intake.

By the two-year follow-up, the substances most commonly reported in the previous 90-days remained alcohol (71%) and marijuana (60%). The next most commonly reported substances remained hallucinogens (22%), amphetamines or other stimulants (18%), opiates/pain killers (17%), and cocaine (15%). At year-two, less than one-tenth of the sample reported use of tranquilizers (9%), sedatives/downers (9%), crack (4%), heroin (4%), and inhalants (3%) within the previous 90 days.

For additional perspective on substance use besides alcohol and marijuana, another variable was created in which days of other drug use was divided by days of any substance use. Group means for this variable are indicated below and very roughly approximate one-quarter of using days involving drug use besides consumption of alcohol and marijuana. It should be noted again that the standard deviation is greater than the mean for this variable.

Table 7. Mean Values for Proportion of Using Days For Drugs Besides Alcohol & Marijuana

	Percent Other Drugs Baseline	Percent Other Drugs Month 3	Percent Other Drugs Month 6	Percent Other Drugs Month 9	Percent Other Drugs Month 12
N Valid	138	92	95	78	94
Missing	0	46	43	60	44
Mean	.27	.29	.23	.25	.29
Median	.12	.10	.07	.03	.11
Std. Deviation	.33	.37	.32	.35	.38
Minimum	.00	.00	.00	.00	.00
Maximum	1.00	1.00	1.00	1.00	1.00

The next variable of interest in terms of change over time is the Conduct Disorder Index (CDI). As noted, this scale includes 15-items based on DSM-IV (American Psychiatric Association, 1994) criteria for conduct disorder. Respondents are asked to endorse which types of behaviors they have engaged in at least two times in the past year (at baseline) or past-90-days (at all follow-up interviews).

One of the initial operational questions for the study related to the way in which conduct disorder should be defined for the sample. For example, the DSM-IV criteria do not explicitly refer to breaking and entering as a symptom of conduct disorder, but these actions are given as an example in the text as the type of behavior that would specify a severe (versus mild or moderate) case of conduct disorder. Consequently, a breaking and entering item from the General Crime Scale (GCI) was added to the CDI scale for this study. Other significant problem behaviors from the GCI (e.g., drug dealing, driving under the influence, taking automobiles, gang membership, and prostitution) were not added to the conduct disorder scale, but examined separately.

The study's larger definitional issue for the conduct disorder categorization related to the behaviors of skipping school (i.e., truancy) and staying out later than parents/guardians want (i.e., curfew violations). According to the DSM-IV criteria, truancy and curfew violations differentiate those youth with conduct disorder only if these behaviors are manifest prior to age 13. Within the study sample, the vast majority of adolescents endorsed staying out late (85%) and skipping school (84%) prior to treatment admission, but less than one-third

(33% and 31% respectively) of the sample reported that they engaged in these behaviors prior to age 13.

In the interest of getting a better sense of how frequently adolescents in the sample engaged in acts of truancy and curfew violations, results from a supplemental scale, the National Youth Survey (NYS), were cross-referenced. The NYS was administered one-time as part of the 9-month follow-up interview. The NYS captured the number of times adolescents reported being truant from school or violating curfew in their lifetime. Because some adolescents in the sample reported lifetime incidents of truancy and curfew violations in the thousands, a decision was made to cap the total number of lifetime incidents on the NYS at 500 times. Overall, 5% of respondents reported incidents of truancy exceeding 500 times, and 11% reported incidents of curfew violations above 500 times.

Table 8. Lifetime Incidents of Truancy and Curfew Violations

		Lifetime NYS	
		In life, how many times been truant from school	In life, how many times violated curfew
N	Valid	118	116
	Missing	20	22
Mean		134.92	120.16
Median		80.00	40.00
Std. Deviation		144.85	171.06
Minimum		0	0
Maximum		500	500

As illustrated above, adolescents reported skipping school an average of 135 days ($SD = 145$) in their lifetime. Lifetime rates for violating curfew were

similarly high, averaging 120 nights ($SD = 171$). Given the high variability, median values also serve as useful descriptors of these behaviors. The median values for lifetime instances of truancy (80 days) and curfew violations (40 nights) continue to suggest that adolescents in the sample engaged in truancy and curfew violations at a very high frequency.

Given the high frequency that adolescents in the sample reported engaging in truancy and curfew violations, a decision was made to run multiple analyses. The first analyses (“CDsum”) used strict adherence to DSM-IV criteria in that truancy and staying out late were only counted for adolescents who indicated that these behaviors started before age 13. Additional analyses (“CDsumX”) were also calculated in which current truancy and curfew violations were counted as symptoms of conduct disorder regardless of their age of initiation. Furthermore, a subset of items from the CDI representing severe conduct disorder symptoms (i.e., those causing considerable harm to others such as using weapons in fights, physical cruelty, forced sex, and robbery using force) were used for additional analyses (CDSEV).

As mentioned earlier, some information for the Conduct Disorder Index was not obtained at the 3-month follow-up point. Consequently, the six-month interview served as the first post-treatment follow-up point for analyses of change for symptoms of conduct disorder.

Table 9. Multilevel Negative Binomial Regression for Change in
Conduct Disorder Symptoms

Estimated Sum of Conduct Disorder Symptoms

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.136	.012	-11.08	0.000	-.160	-.112
monthpc2	.083	.018	4.59	0.000	.047	.118
constant	2.057	.183	11.25	0.000	1.699	2.416

Number of observations = 617

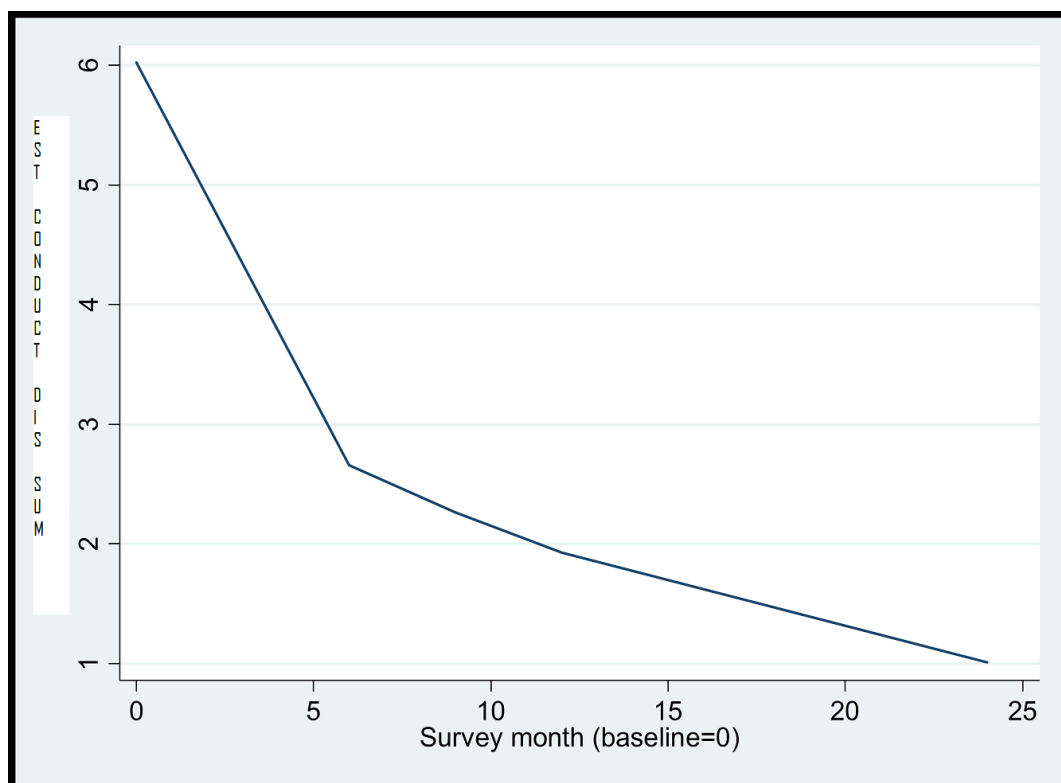
Number of groups = 138

Obs per group: min = 1
 avg = 4.5
 max = 5

Wald chi2(2) = 308.21

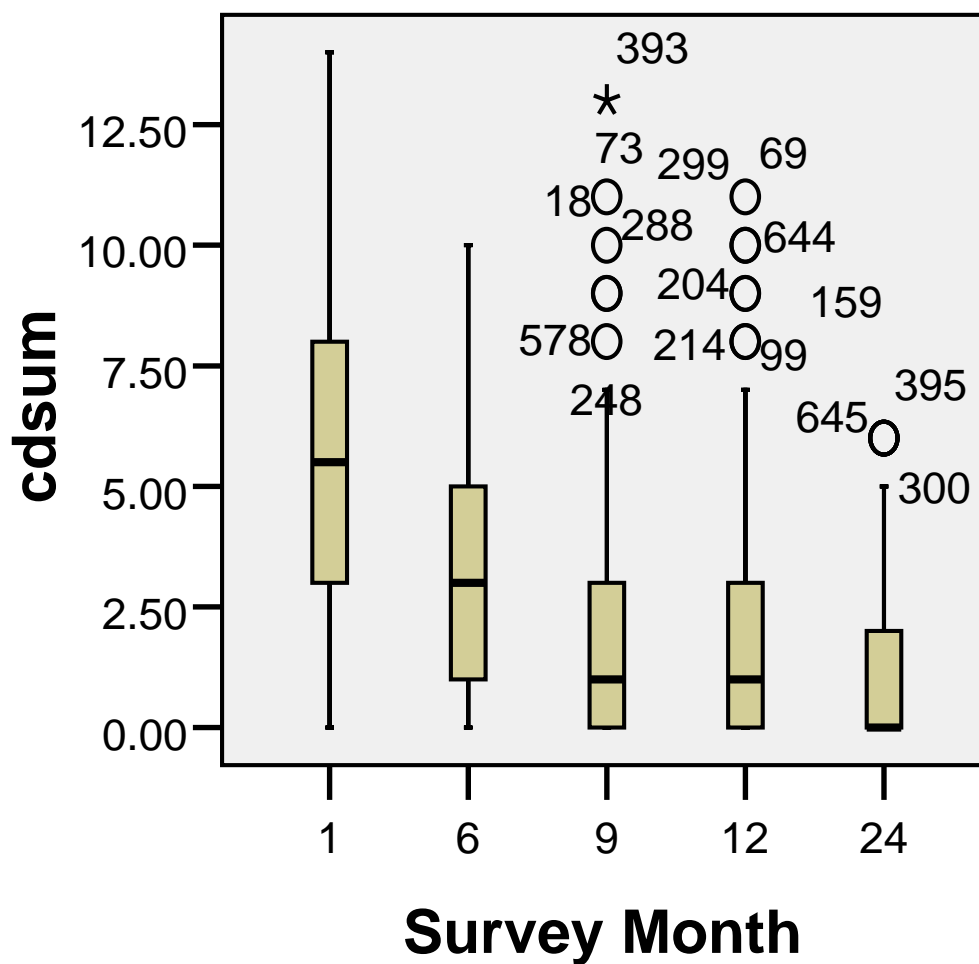
Prob > chi2 = 0.0000

Log likelihood = -1234.3159



The estimated number of conduct disorder symptoms appeared to change significantly over time, again in a piecewise fashion. By the first follow-up point (i.e., 6-months after treatment admission), estimated number of conduct disorder symptoms was less than the minimum 3 symptoms required for diagnosis of conduct disorder. By year-two, estimated values approached only one symptom. Actual group means are shown below:

Table 10. Mean Values for Number of Conduct Disorder Symptoms



		CD Sum Baseline	CD Sum Month 6	CD Sum Month 9	CD Sum Month 12	CD Sum Month 24
N	Valid	138	127	118	131	103
	Missing	0	11	20	7	35
Mean		5.72	2.91	2.04	1.89	1.27
Median		5.50	3.00	1.00	1.00	.00
Std. Deviation		3.28	2.41	2.59	2.50	1.81
Minimum		.00	.00	.00	.00	.00
Maximum		14.00	10.00	13.00	11.00	6.00

Table 11. Multilevel Negative Binomial Regression for Change in Symptoms for CDsumX (Staying Out Late/Truancy Counted Even If Initiated In Teen Years)

Estimated Sum of Conduct Disorder Symptoms

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.134	.012	-11.56	0.000	-.156	-.111
monthpc2	.077	.017	4.52	0.000	.044	.110
constant	2.051	.170	12.09	0.000	1.720	2.384

Number of observations = 617

Number of groups = 138

Obs per group: min = 1

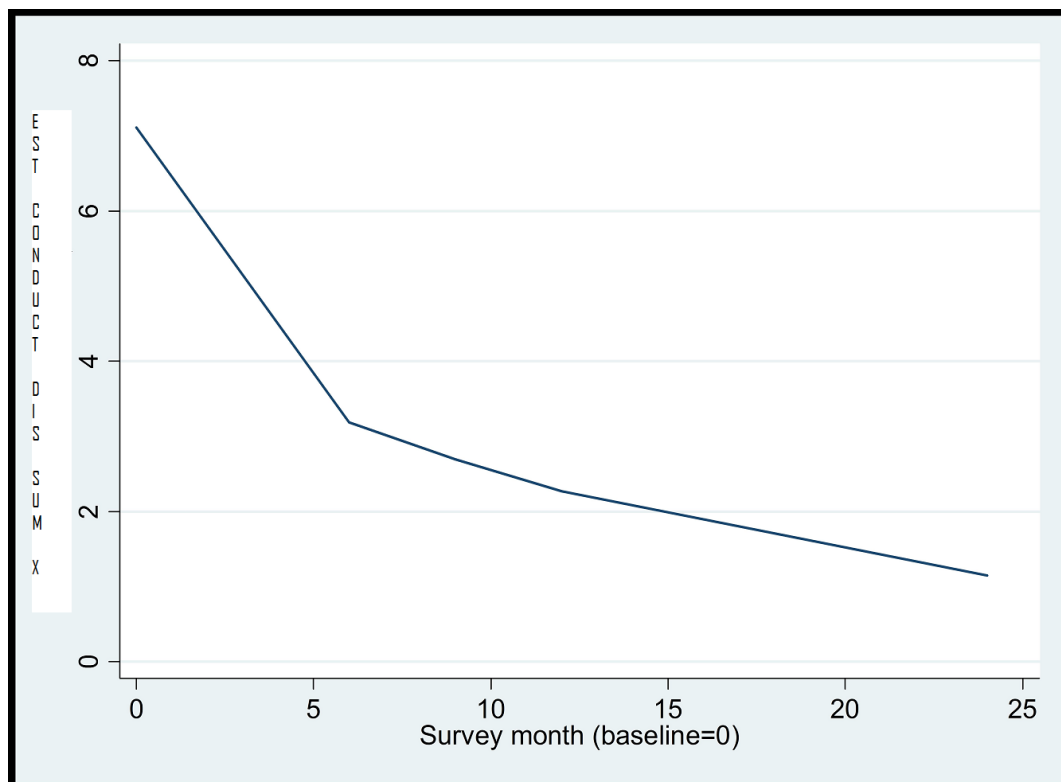
avg = 4.5

max = 5

Wald chi2(2) = 348.66

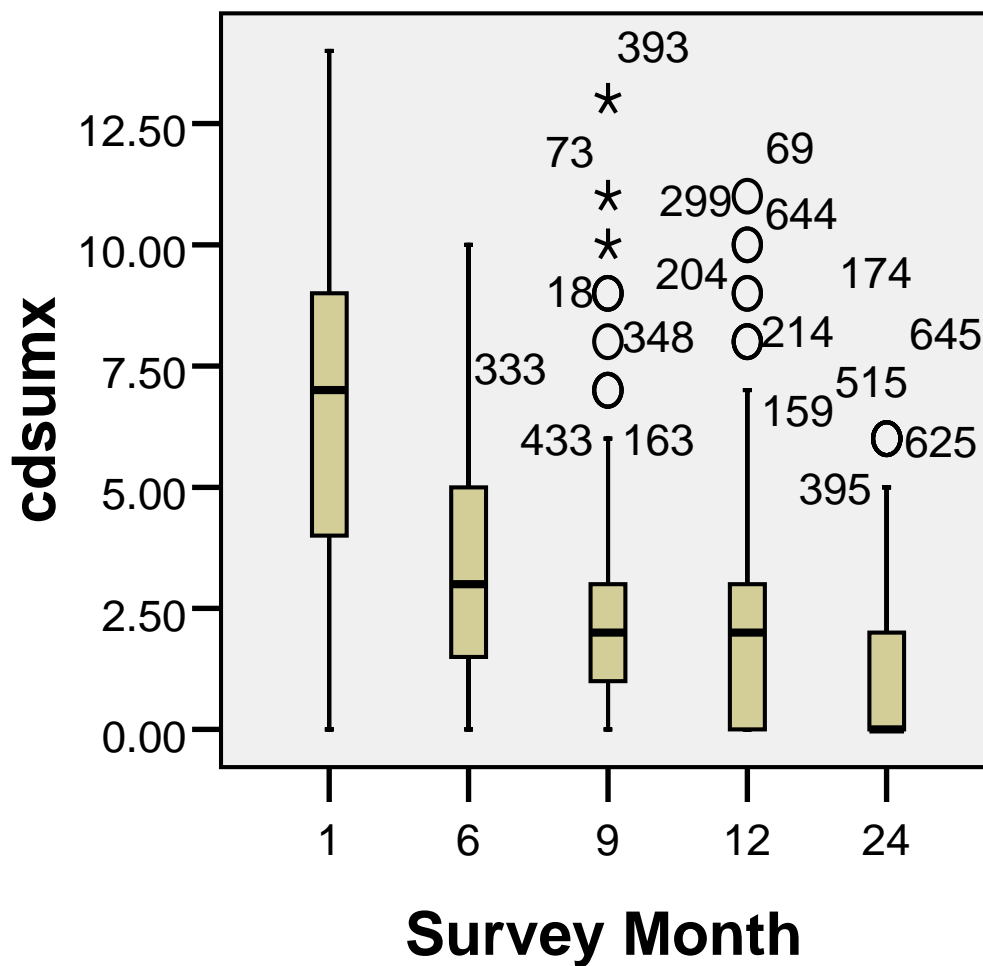
Prob > chi2 = 0.0000

Log likelihood = -1318.0233



Estimated number of conduct disorder symptoms for CDsumX appeared to change significantly over time in a fashion similar to CDsum. (i.e., when only counting conduct disorder symptoms that strictly adhere to DSM-IV criteria). Estimated values were slightly higher given the inclusion of truancy and curfew violations regardless of the age at which these behaviors were initiated. However, even with the inclusion of all truancy and curfew violations, the estimated number of conduct disorder symptoms remained below the minimum three symptoms needed for conduct disorder diagnosis from the 9-month follow-up onwards. The actual group means are listed below:

Table 12. Mean Values for Number of CDsumX Symptoms
(Staying Out Late/Truancy Starting After Age 12 included)



		CD Sum X Baseline	CD Sum X Month 6	CD Sum X Month 9	CD Sum X Month 12	CD Sum X Month 24
N	Valid	138	127	118	131	103
	Missing	0	11	20	7	35
Mean		6.78	3.51	2.44	2.22	1.45
Median		7.00	3.00	2.00	2.00	.00
Std. Deviation		3.13	2.62	2.65	2.58	1.89
Minimum		.00	.00	.00	.00	.00
Maximum		14.00	10.00	13.00	11.00	6.00

Table 13. Multilevel Negative Binomial Regression for Change in Severe CD Symptoms

Estimated Sum for Severe Conduct Disorder Symptoms

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.186	.024	-7.72	0.000	-.233	-.139
monthpc2	.123	.037	3.33	0.001	.051	.195
constant	2.889	.897	3.22	0.001	1.131	4.646

Number of observations = 617

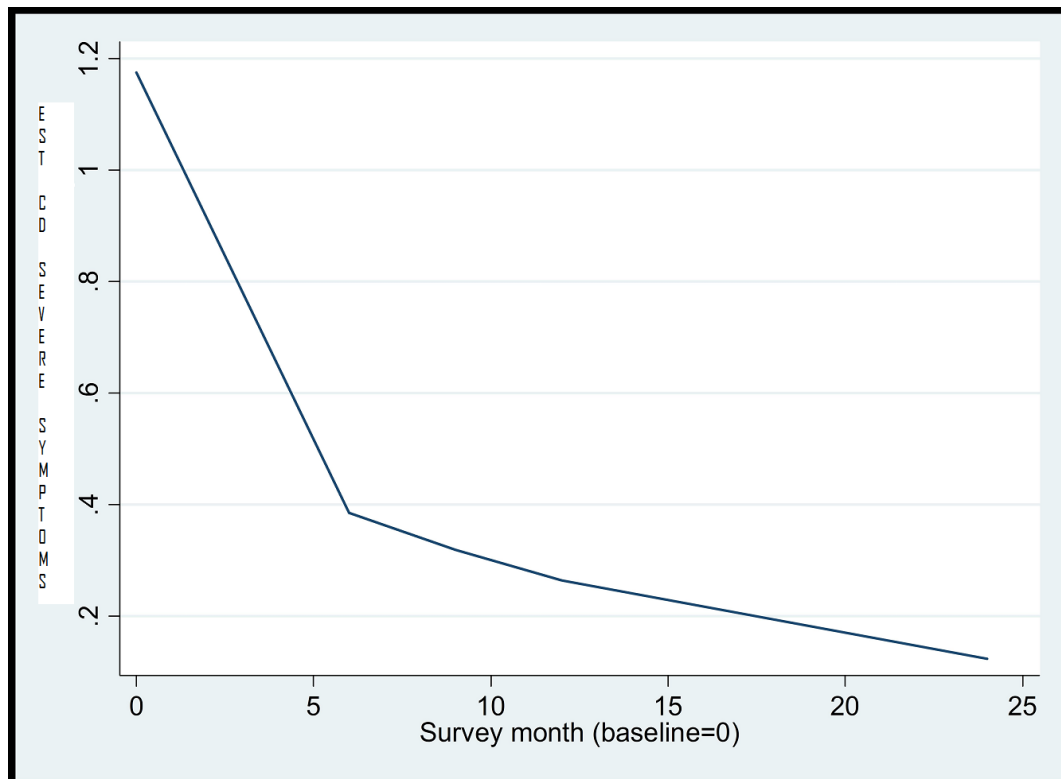
Number of groups = 138

Obs per group: min = 1
 avg = 4.5
 max = 5

Wald chi2(2) = 130.80

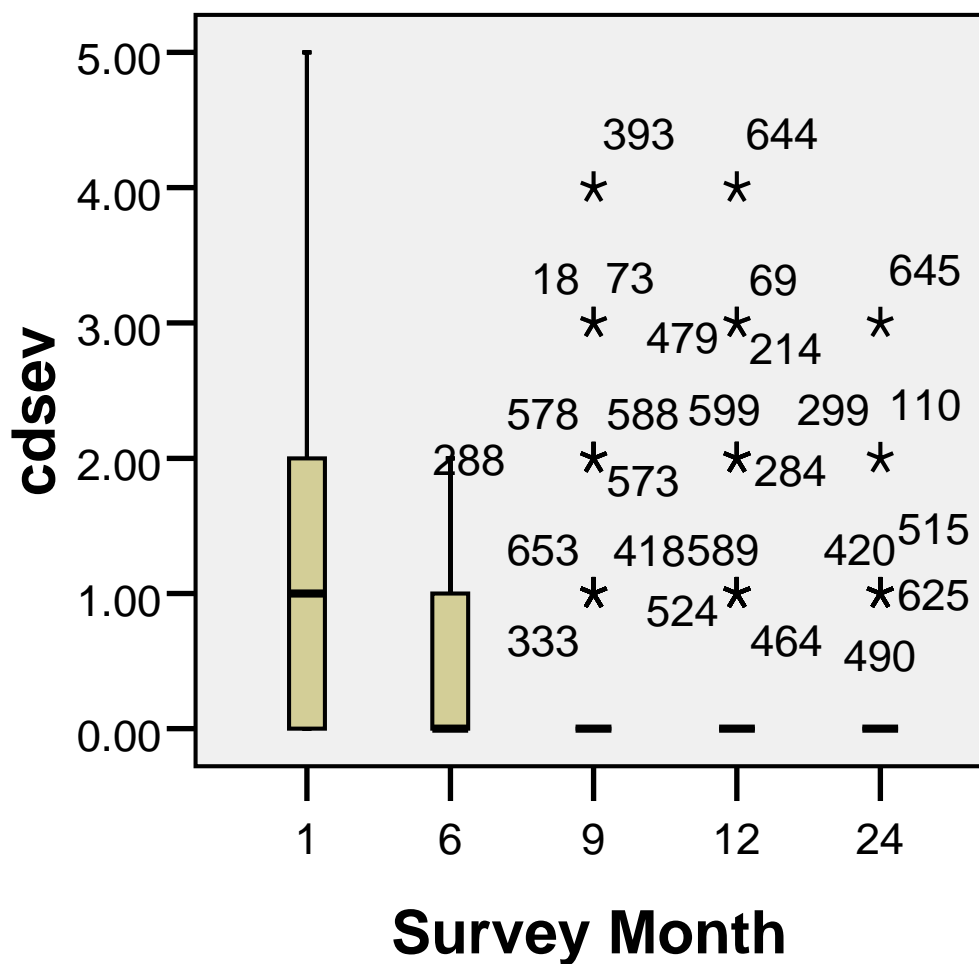
Prob > chi2 = 0.0000

Log likelihood = -495.91109



The estimated sum for the subset of severe conduct disorder symptoms also appeared to change significantly over time, again in a piecewise fashion. At baseline, estimated number of severe conduct disorder symptoms averaged more than one. All post-treatment follow-up points yielded estimates for severe conduct disorder symptoms that fell well below one symptom and estimates increasingly approached zero. Actual group means are listed below:

Table 14. Mean Values for Sum of Severe Conduct Disorder Symptoms



		CD Severe Symptoms Baseline	CD Severe Symptoms Month 6	CD Severe Symptoms Month 9	CD Severe Symptoms Month 12	CD Severe Symptoms Month 24
N	Valid	138	127	118	131	103
	Missing	0	11	20	7	35
Mean		1.16	.40	.27	.27	.14
Median		1.00	.00	.00	.00	.00
Std. Deviation		1.29	.61	.70	.69	.44
Minimum		.00	.00	.00	.00	.00
Maximum		5.00	2.00	4.00	4.00	3.00

For the baseline, year-one, and year-two interviews, the percentage of adolescents endorsing each item of the Conduct Disorder Index can be found in the Appendix F. The items are listed in descending order, based on most frequently endorsed symptoms of conduct disorder.

As mentioned, the vast majority of adolescents reported violating curfew (85%), skipping school (84%), and lying or conning (83%) in the year prior to treatment. At baseline, roughly half or more of the sample also reported shoplifting (69%), stealing (61%), vandalism (55%), and running away (48%). This was followed by bullying and physical cruelty (both 42%). Besides physical cruelty and breaking and entering (30%), less than one-fifth of the sample endorsed severe items at baseline, including taking things by force (19%), using weapons in fights (17%), and cruelty to animals (7%).

At year-one, lying and conning (39%), curfew violations (37%), shoplifting (26%), and skipping school (22%), remained the most frequently endorsed symptoms of conduct disorder. This was followed by stealing and vandalism (both 17%), running away from home (14%), and bullying (11%).

By year-two, even the most common conduct disorder behaviors were endorsed by less than one-quarter of the sample, including lying and conning (24%), skipping school (22%), curfew violations (19%), and shoplifting (15%). This was followed by starting lots of fights and stealing (both 13%), vandalism (11%), bullying (10%) and running away from home (4%).

Symptoms of severe conduct disorder are exceedingly rare at the year-one and year-two follow-up points, the most common being physical cruelty to people

which was endorsed by 11% of the sample at year-one and 6% of the sample at year-two. At year-one, 5% or less of the sample endorsed using weapons in fights (5%), breaking and entering (4%), taking things from people by force (4%), and physical cruelty to animals (2%), while less than 2% of the sample endorse any of these behaviors at year-two. Forced sex was reported by only one person at baseline, and was endorsed by no one in the subsequent follow-ups.

As mentioned, there is considerable overlap between the 15-item Conduct Disorder Index (CDI) and the 16-item General Crime Index (GCI). The GCI was included because it covers a number of significant problem behaviors absent from the DSM-IV criteria upon which the CDI was based. Unique problem behaviors from the GCI include drug sales, distribution, or manufacturing; driving under the influence; taking vehicles not belonging to individual; gang membership; and prostitution. Symptom sums for the GCI tended to be lower than sums for the CDI, because the CDI included behavior such as curfew violations, truancy, lying or conning, running away, and bullying. Again, it should be noted that the GCI was not included at the 3-month interview, thus the first post-treatment follow-up point for analyses of change in the number of criminal behaviors reported on the GCI was 6-months.

Table 15. Multilevel Negative Binomial Regression for Change in Criminal Behaviors

Estimated Sum of Criminal Behaviors

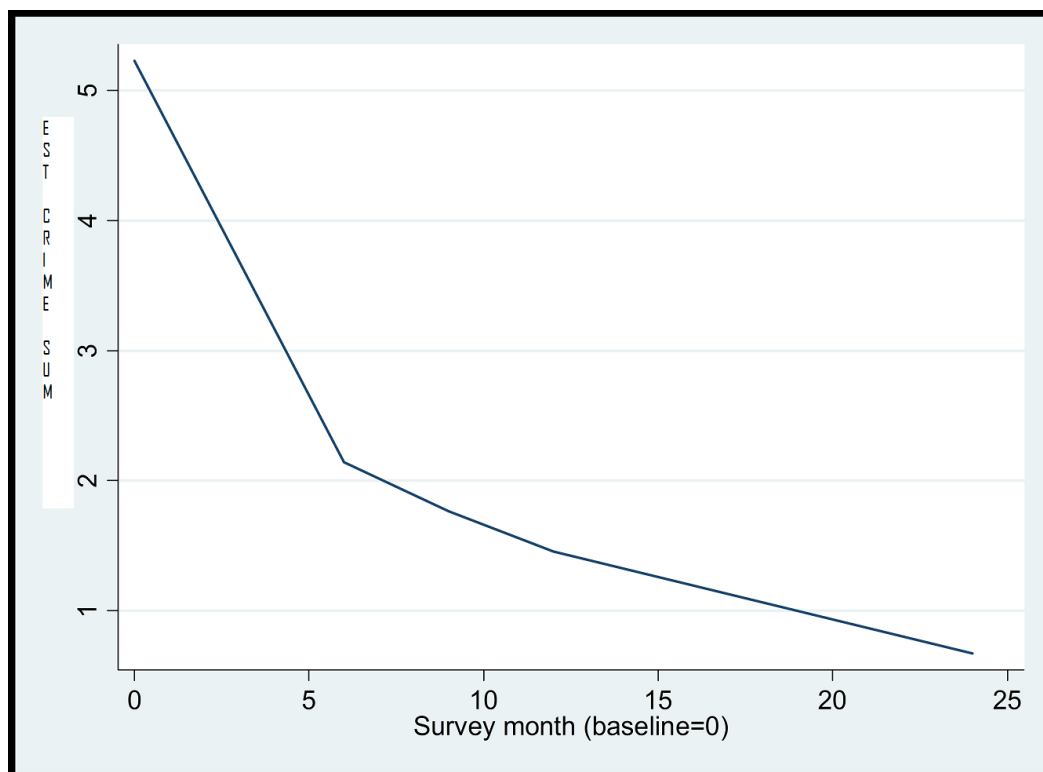
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.149	.016	-9.59	0.000	-.179	-.118
monthpc2	.084	.023	3.63	0.000	.039	.130
constant	1.461	.185	7.92	0.000	1.100	1.823

Number of observations = 588
 Number of groups = 138

Obs per group: min = 1
 avg = 4.3
 max = 5

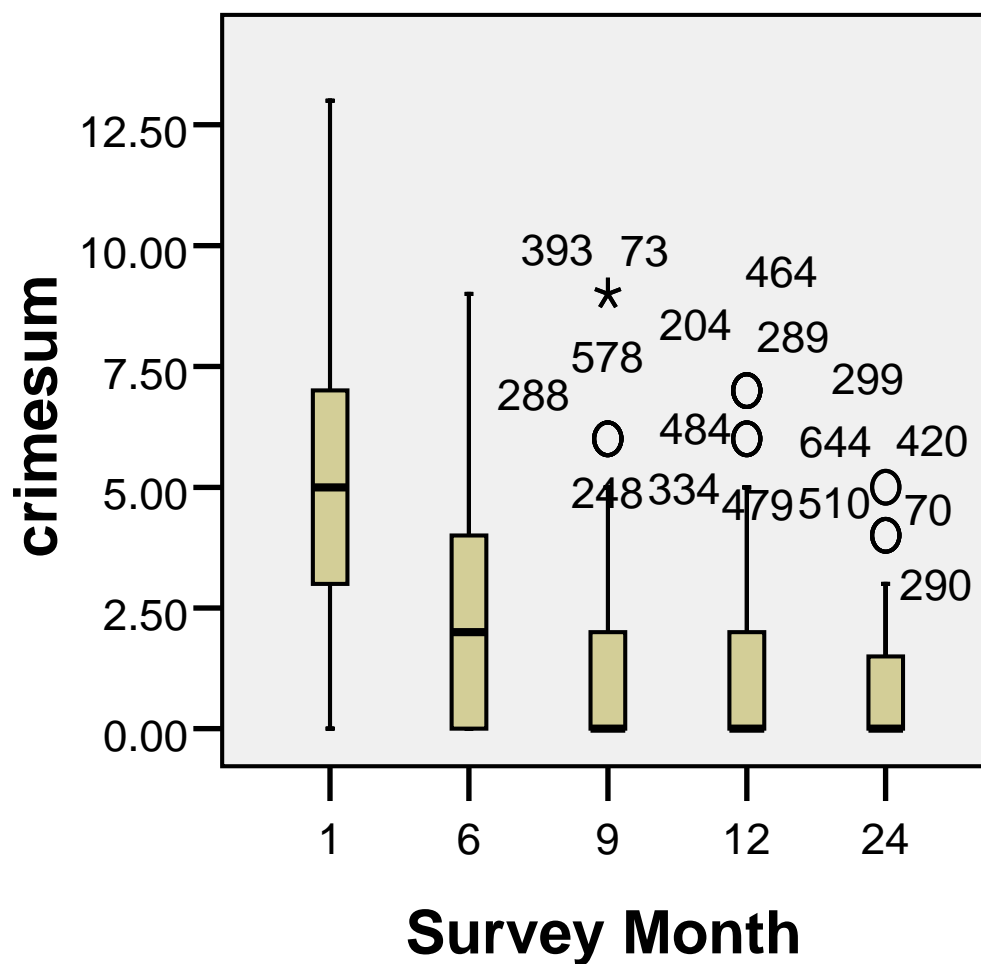
Wald chi2(2) = 259.33
 Prob > chi2 = 0.0000

Log likelihood = -1095.0375



As seen above, multilevel negative binomial regression results indicated that the estimated sum for types of criminal activity changed significantly over time in a piecewise fashion. At baseline, estimated number for different criminal behaviors averaged more than five. Estimated number of criminal behaviors dropped to around two at the first post-treatment follow-up (i.e., 6-months) to well below one by year-two. Actual group means are listed below:

Table 16. Mean Values for Number of Criminal Behaviors



		Crime Sum Baseline	Crime Sum Month 6	Crime Sum Month 9	Crime Sum Month 12	Crime Sum Month 24
N	Valid	138	105	111	131	103
	Missing	0	33	27	7	35
Mean		4.94	2.72	1.35	1.46	.85
Median		5.00	2.00	.00	.00	.00
Std. Deviation		3.20	2.34	2.02	2.05	1.33
Minimum		.00	.00	.00	.00	.00
Maximum		13.00	9.00	9.00	7.00	5.00

For the baseline, year-one, and year-two interviews, the percentage of adolescents endorsing each item of the General Crime Index can be found in the Appendix G. The items are listed in descending order, based on most frequently endorsed criminal acts.

As illustrated above, criminal behavior drops significantly throughout the two-years following treatment intake. At baseline, more than half of the sample endorsed engaging in the most common criminal acts of shoplifting (69%); stealing money or property (62%), drug dealing (57%), vandalism (55%), and physical fighting (54%). This is followed by driving under the influence (43%). By the two-year follow-up, less than 14% of the sample reported any of these behaviors.

At baseline, roughly 30% of the sample endorsed hurting someone badly enough that they needed medical attention (31%); breaking and entering (30%); and taking cars that didn't belong to them (28%). At the year-two follow-up, less than 4% of the sample endorsed any of these acts.

Armed robbery, gang membership, and arson were relatively uncommon at baseline (19%, 15%, and 10% respectively) and very rare at the year-one and year-two follow-ups (i.e., less than 5%). Prostitution, involvement in murder, and sexual assault were exceedingly rare at baseline and non-existent at the year-two follow-up.

Additional context for criminal behavior was provided through an item on the assessment that asked adolescents to report on the amount of income they earned through illegal activities. At baseline, half (50%) of the sample reported

some illegal income, with one-quarter indicating that they earned \$600 or more through illegal activity in the 90-days before treatment intake. Furthermore, 17% of the sample reported illegal income of \$1000 or more in the 90-days before treatment admission.

By the year-two follow-up point, one-quarter (26%) of the sample still reported some illegal income earned in the previous 90-days. Approximately 10% of the sample reported illegal income of at least \$600, while 8% indicated that they earned \$1000 or more through illegal activity in the past-90-days.

At baseline, the percentage of adolescents reporting illegal income (50%) was very similar to the percentage of adolescents reporting engagement in drug dealing (57%). Results from the year-two follow-up indicated that although one-quarter of the sample reported generating some income through illegal activity, only 12% of the sample endorsed drug dealing.

Comparisons were conducted to examine whether there appeared to be differences in behavioral problems by gender. Listed below are comparisons of male and female means for behavioral problems (i.e., CDsum, CDsumX, CDSevere, & CrimeSum) at baseline, year-one follow-up, and year-two follow-up. T-test results are presented with attention to statistically significant gender differences in sum number of conduct disorder symptoms and sum number of criminal activities.

Table 17. Baseline Gender Comparison of Mean Number of Behavioral Problems

Group Statistics - Baseline

W1- Gender		N	Mean	Std. Deviation	Std. Error Mean
CDsum	Male	89	6.36	3.29	.35
	Female	49	4.57	2.97	.42
CDsumX	Male	89	7.42	3.13	.33
	Female	49	5.61	2.79	.40
CDSevere	Male	89	1.48	1.32	.14
	Female	49	.57	.98	.14
CrimeSum	Male	89	5.65	3.13	.33
	Female	49	3.65	2.93	.42

CDsum: $t(136) = 3.16, p = .002$

CDsumX: $t(136) = 3.36, p = .001$

CDSevere: $t(136) = 4.22, p < .001$

CrimeSum: $t(136) = 3.67, p < .001$

Independent samples t-tests indicated that male and female study participants showed mean differences that were statistically significant for all of the behavioral problem variables at baseline. Despite the significant group differences, it should be noted that females in the sample showed substantial amounts of behavioral problems, and showed an average endorsement of enough symptoms to meet criteria for conduct disorder.

Table 18. Year-One Gender Comparison of Mean Number of Behavioral Problems

Group Statistics - 12 Month Follow-Up

	W5- Gender	N	Mean	Std. Deviation	Std. Error Mean
CDsum	Male	82	2.11	2.67	.29
	Female	49	1.51	2.14	.31
CDsumX	Male	82	2.48	2.75	.30
	Female	49	1.80	2.24	.32
CDSevere	Male	82	.37	.81	.09
	Female	49	.10	.37	.05
CrimeSum	Male	82	1.63	2.20	.24
	Female	49	1.16	1.75	.25

CDSevere: $t(129) = 2.15, p = .03$

For the year-one follow-up, independent samples t-tests indicated that male and female study participants displayed statistically significant differences only in terms of means for severe conduct disordered behavior. It is worth noting that both means are very low, representing fractions of a single symptom.

Table 19. Year-Two Gender Comparison of Mean Number of Behavioral Problems

Group Statistics - 24 Month Follow-Up

	W6- Gender	N	Mean	Std. Deviation	Std. Error Mean
CDsum	Male	63	1.38	1.90	.24
	Female	40	1.10	1.66	.26
CDsumX	Male	63	1.54	1.95	.25
	Female	40	1.30	1.80	.28
CDSevere	Male	63	.17	.52	.07
	Female	40	.05	.22	.03
CrimeSum	Male	63	.95	1.38	.17
	Female	40	.68	1.25	.20

For the year-two follow-up, independent samples t-tests indicated that male and female study participants did not show any statistically significant differences in terms of means for behavioral problems.

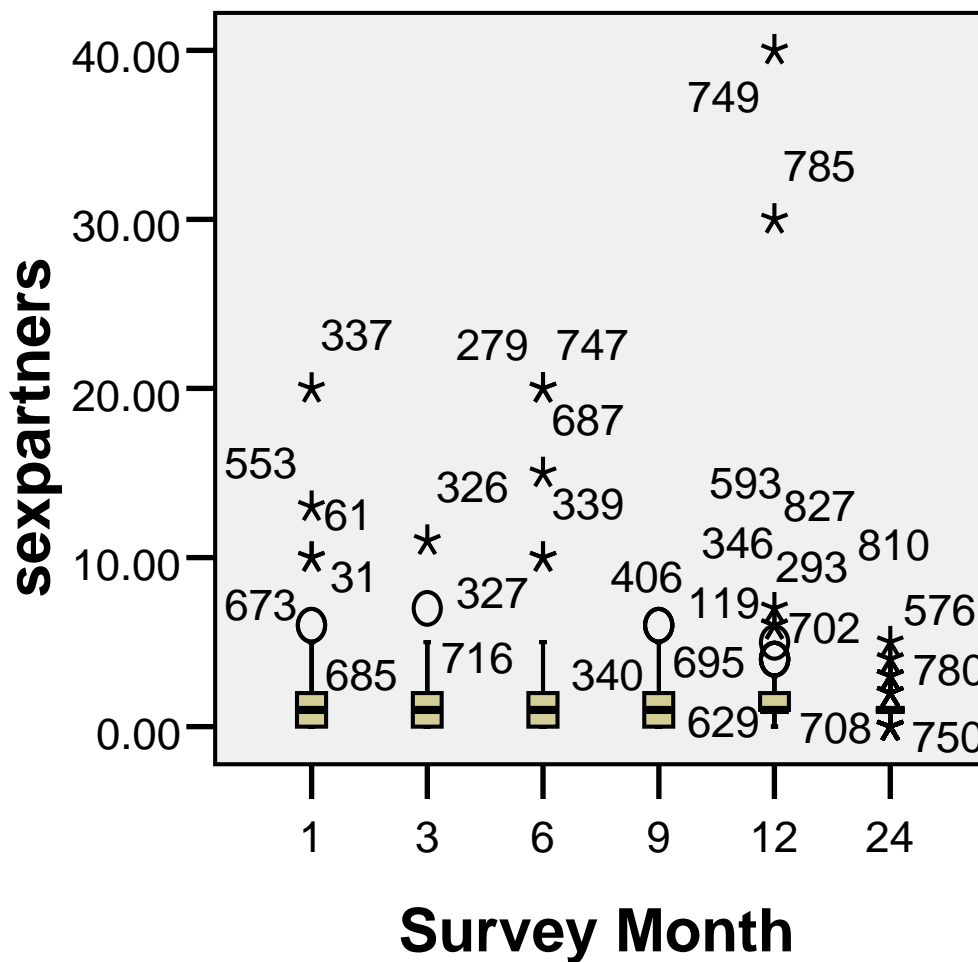
Number of sex partners was examined as an additional measure of problematic behavior among adolescents in the sample. As mentioned, sexually precocious or promiscuous behavior is often considered to be part of a constellation of problem behaviors including substance abuse and conduct disorder or delinquency (Elliot et al., 1989; Farrel et al, 1992; McGee & Newcomb, 1992). In addition, numerous research studies have shown positive associations between alcohol and marijuana use and early onset of sexual intercourse, engagement in unprotected sex, and having multiple sexual partners (Corbin & Fromme, 2002; Marlow, Devieux, Jennings, Lucenko, & Kalichman, 2001; Parkes, Wright, Henderson, & Hart. 2007; St. Lawrence, Crosby, Brasfield, & O'Bannon, 2002; Stueve & O'Donnell, 2005).

Table 20. Multilevel Negative Binomial Regression for Change in Number of Sex Partners

<u>Estimated Number of Sex Partners</u>						
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.008	.005	-1.48	0.140	-.018	.002
constant	1.366	.160	8.56	0.000	1.053	1.678
Number of observations	=	745				
Number of groups	=	138				
Obs per group: min	=	1				
avg	=	5.4				
max	=	6				
Wald chi2(1)	=	2.18				
Prob > chi2	=	0.1398				
Log likelihood	=	-1180.6964				

Results indicate that the estimated number of sex partners does not change significantly over time. The actual group means are listed below and indicate that respondents averaged less than two sex partners for the 90 day reporting windows that preceded each interview, including treatment intake. It is worth mentioning that the number of sex partners in the past 90 days was another variable showing considerable variability as evidenced by standard deviations greater than the means.

Table 21. Mean Values for Number of Sex Partners



	Sex Partners Baseline	Sex Partners Month 3	Sex Partners Month 6	Sex Partners Month 9	Sex Partners Month 12	Sex Partners Month 24
N Valid	138	127	127	118	132	103
Missing	0	11	11	20	6	35
Mean	1.70	1.32	1.77	1.35	1.84	1.09
Median	1.00	1.00	1.00	1.00	1.00	1.00
Std. Deviation	2.49	1.58	3.03	1.39	4.37	.96
Minimum	.00	.00	.00	.00	.00	.00
Maximum	20.00	11.00	20.00	6.00	40.00	5.00

The next variable of interest in terms of change over time was the General Mental Distress Index (GMDI). As mentioned earlier, the GMDI contains 21-items representing symptoms of somatization (e.g., sleep disturbance), depression (e.g., feeling very trapped, lonely, depressed, etc), anxiety (e.g., feeling very anxious, nervous, tense, etc.), and suicidal ideation (e.g., thoughts about ending life). With the exception of the baseline interview which asks about whether symptoms have been present during the past-year, all follow-up interviews asked adolescents to endorse items that have been present during the past-90-days.

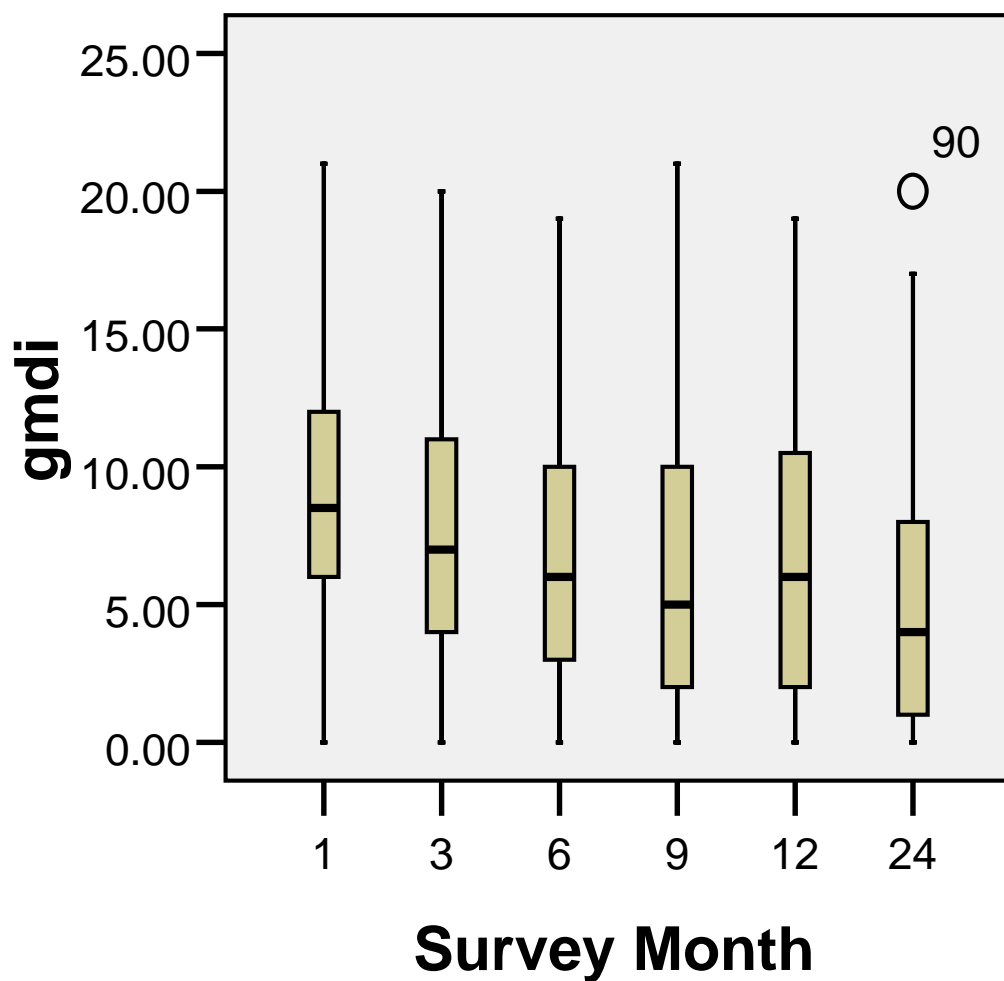
Table 22. Multilevel Negative Binomial Regression for Change in Mental Distress Symptoms

Estimated Symptoms of General Mental Distress Index (GMDI)

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.029	.003	-8.43	0.000	-.036	-.022
constant	1.881	.128	14.72	0.000	1.630	2.131
Number of observations = 743						
Number of groups = 138						
Obs per group: min = 1						
avg = 5.4						
max = 6						
Wald chi2(1) = 71.07						
Prob > chi2 = 0.0000						
Log likelihood = -2089.8776						
Display Constant On Original Scale For Interpretation of Effects:					8.6768395	
Predicted change in GMDI for a 1-unit increase in month:					-.24655496	

The estimated sum for symptoms of general mental distress appeared to change in a significant and linear (i.e., one-piece) fashion. Given the linear nature of the change over time, the model was able to predict the amount of change in mental distress symptoms per one month increase in time. In this instance, the model predicts that there will be a one-quarter of a symptom decrease (i.e., -.25) for every month that elapses from baseline to year-two. Actual group means are listed below:

Table 23. Mean Values for Number of Symptoms of General Mental Distress



	GMDI Baseline (1)	GMDI Month 3	GMDI Month 6	GMDI Month 9	GMDI Month 12	GMDI Month 24
N Valid	138	126	127	117	132	103
Missing	0	12	11	21	6	35
Mean	8.99	7.25	6.77	6.16	6.63	5.10
Median	8.50	7.00	6.00	5.00	6.00	4.00
Std. Deviation	4.74	4.63	4.73	5.12	5.20	4.76
Minimum	.00	.00	.00	.00	.00	.00
Maximum	21.00	20.00	19.00	21.00	19.00	20.00

For the baseline, year-one, and year-two interviews, the percentage of adolescents endorsing each item of the GMDI can be found in Appendix H. The items are listed in descending order, based on most frequently endorsed symptoms of mental distress.

At baseline, the majority of the sample endorsed the GMDI symptoms of irritability/temper (75%); feeling misunderstood (68%); getting into lots of arguments (62%); feeling very trapped, depressed, or hopeless about the future (61%); impaired memory, concentration, or decision making (61%); sleep disturbance (60%); loss of energy or interest (57%); and repetitive thoughts or actions (51%). Nearly half of the sample also endorsed feeling very shy, self-conscious, or uneasy (48%) and feeling very anxious, tense, or scared (46%). One-third or more of the sample reported being distrustful of others (42%); problems with trembling, heart racing, or restlessness (40%); body aches (38%); suicidal ideation (38%); dry mouth, bowel, or bladder problems (34%), headaches, dizziness, or numbness (33%), and paranoia (33%). Specific phobias (17%), agoraphobia (15%), and hallucinations (14%) were the least common symptoms of mental distress at treatment entry.

At the year-one follow-up, irritability/temper (71%) remained the most commonly endorsed symptom on the GMDI. Roughly half of the sample also reported sleep disturbance (52%), impaired memory, concentration, or decision making (49%), and feeling misunderstood (48%). Roughly one-third or more of the sample reported loss of energy or interest (42%); repetitive thoughts or actions (42%); feeling very trapped, depressed, or hopeless about the future (38%);

feeling very anxious, tense, or scared (37%); body aches (36%); getting into lots of arguments (34%); feeling very shy, self-conscious or uneasy (33%); and feeling distrustful of others (32%). Roughly one-quarter of the sample endorsed somatic complaints like trembling, heart racing, or restlessness (29%); headaches, dizziness, or numbness (26%); and dry mouth, bowel, or bladder problems (24%). The least common symptoms of mental distress remained paranoia (15%), specific phobias (15%), agoraphobia (12%), and hallucinations (12%). Notably, suicidal ideation (8%) was the least endorsed symptom of mental distress at year-one, down significantly from the 38% endorsement rate among adolescents entering treatment.

By the year-two follow up, roughly half of the sample reported problems with irritability/temper (51%), loss of energy or interest (49%), and sleep disturbance (47%). One-third or more of the sample reported impaired memory, concentration, or decision making (43%), repetitive thoughts or actions (36%), and feeling misunderstood (33%). One-quarter or more of the sample endorsed feeling very trapped, depressed, or hopeless about the future (30%); feeling very anxious, tense or scared (28%); feeling very shy, self-conscious, or uneasy (27%); and body aches (25%). Roughly one-fifth of the sample reported feeling distrustful of others (20%); getting into lots of arguments (19%); problems with trembling, heart racing, or restlessness (18%), headaches, dizziness, or numbness (18%); and dry mouth, bowel, or bladder problems (18%). The least common symptoms of mental distress remained paranoia (12%); agoraphobia (11%), specific phobias (10%), hallucinations (6%), and suicidal ideation (6%).

The next variable of interest related to the problems that adolescents associate with their alcohol and other drug (AOD) use. The Substance Problem Index (SPI) captures the number of substance-related problems that adolescents report as present during the previous month. As mentioned previously, the scale includes 5 lower severity substance-related issues (e.g., concealment of use, loved ones complaining about use), as well as 4 DSM-IV- based symptoms of substance abuse (e.g., continued use despite interference with responsibilities) and 7 DSM-IV based symptoms of substance dependence (e.g., using more than intended). These same 7 DSM-IV-based substance dependence symptoms were looked at separately as the Substance Dependence Index (SDI) subscale.

Multilevel negative binomial regressions were conducted for change in estimates for past-month sum count of substance-related problems (SPIMO), as well as past-month sum count of symptoms strictly indicative of substance dependence (DEPMO). As mentioned, these multilevel negative binomial analyses both required a piecewise approach.

Table 24. Multilevel Negative Binomial Regression for Change In Substance-Related Problems

Estimated Sum Count for Substance Problem Index – Past Month

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.422	.032	-13.26	0.000	-.485	-.360
monthpc2	.424	.036	11.66	0.000	.353	.495
constant	.694	.109	6.39	0.000	.481	.907

Number of observations = 741

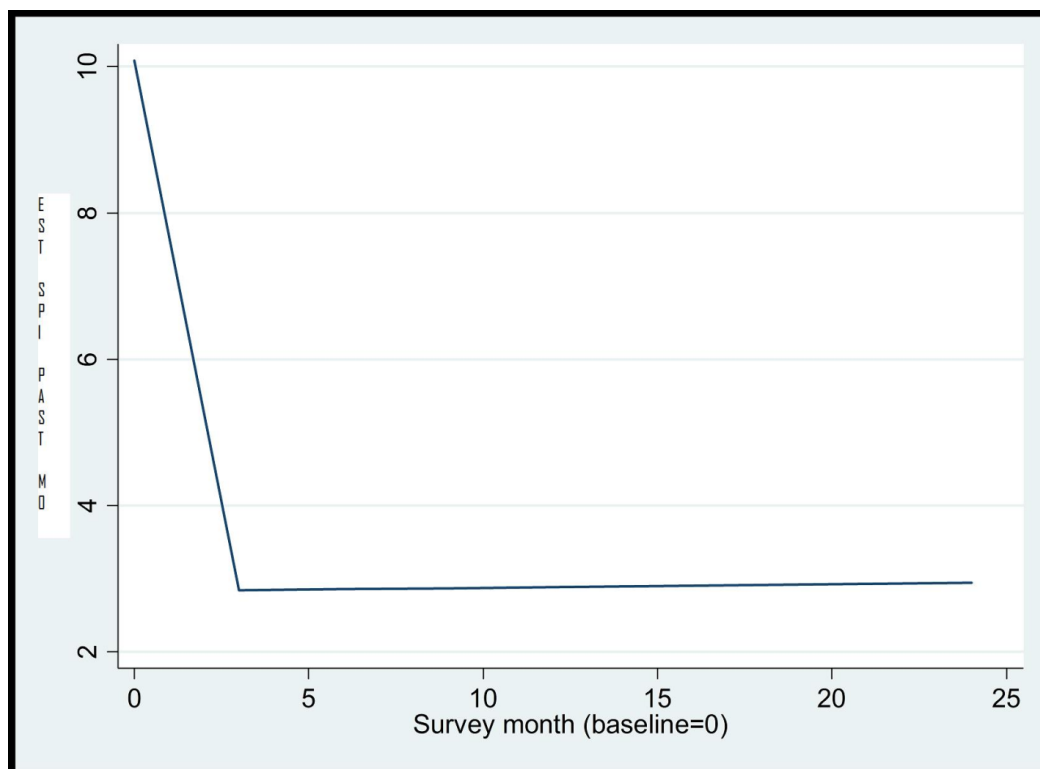
Number of groups = 138

Obs per group: min = 1
 avg = 5.4
 max = 6

Wald chi2(2) = 251.47

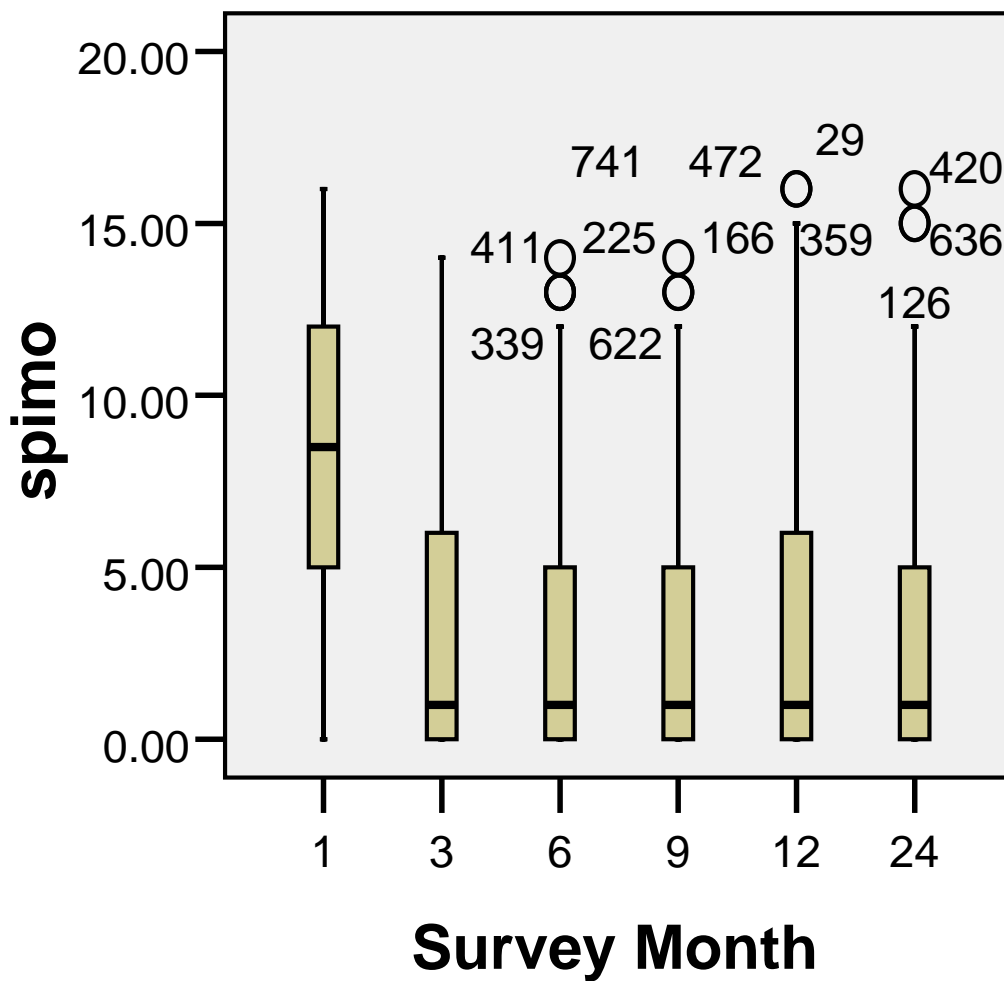
Prob > chi2 = 0.0000

Log likelihood = -1751.2598



Results indicated that the estimated number of substance-related problems changed significantly over time. As the graph illustrates, there is a major reduction in number of substance-related symptoms from baseline to the first post-treatment follow-up (i.e., 3-months). However, there was no significant change in problems associated with substance use over the months between the 3-month and year-two follow-up points. The actual group means are listed below:

Table 25. Mean Values for Number of Substance-Related Problems



	SPI Past Month Baseline	SPI Past Month Month 3	SPI Past Month Month 6	SPI Pas Montht Month 9	SPI Past Month Month 12	SPI Past Month Month 24
N Valid	138	127	126	115	132	103
Missing	0	11	12	23	6	35
Mean	8.28	3.57	3.02	3.04	3.40	3.20
Median	8.50	1.00	1.00	1.00	1.00	1.00
Std. Deviation	4.23	4.28	4.18	4.03	4.50	4.10
Minimum	.00	.00	.00	.00	.00	.00
Maximum	16.00	14.00	14.00	14.00	16.00	16.00

Table 26. Multilevel Negative Binomial Regression for Change in Symptoms of Dependence

Estimated Symptoms of Substance Dependency – Past Month

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
month0	-.407	.037	-10.88	0.000	-.480	-.334
monthpc2	.401	.043	9.29	0.000	.316	.485
constant	.687	.143	4.79	0.000	.406	.968

Number of observations = 742

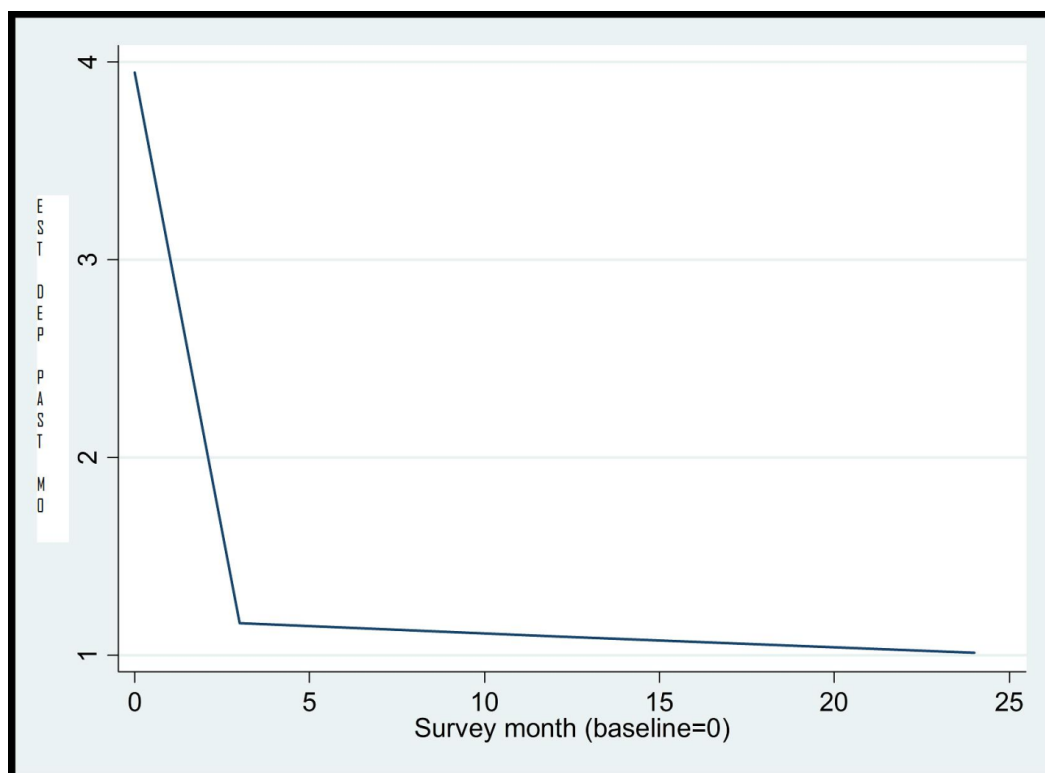
Number of groups = 138

Obs per group: min = 1
 avg = 5.4
 max = 6

Wald chi2(2) = 187.32

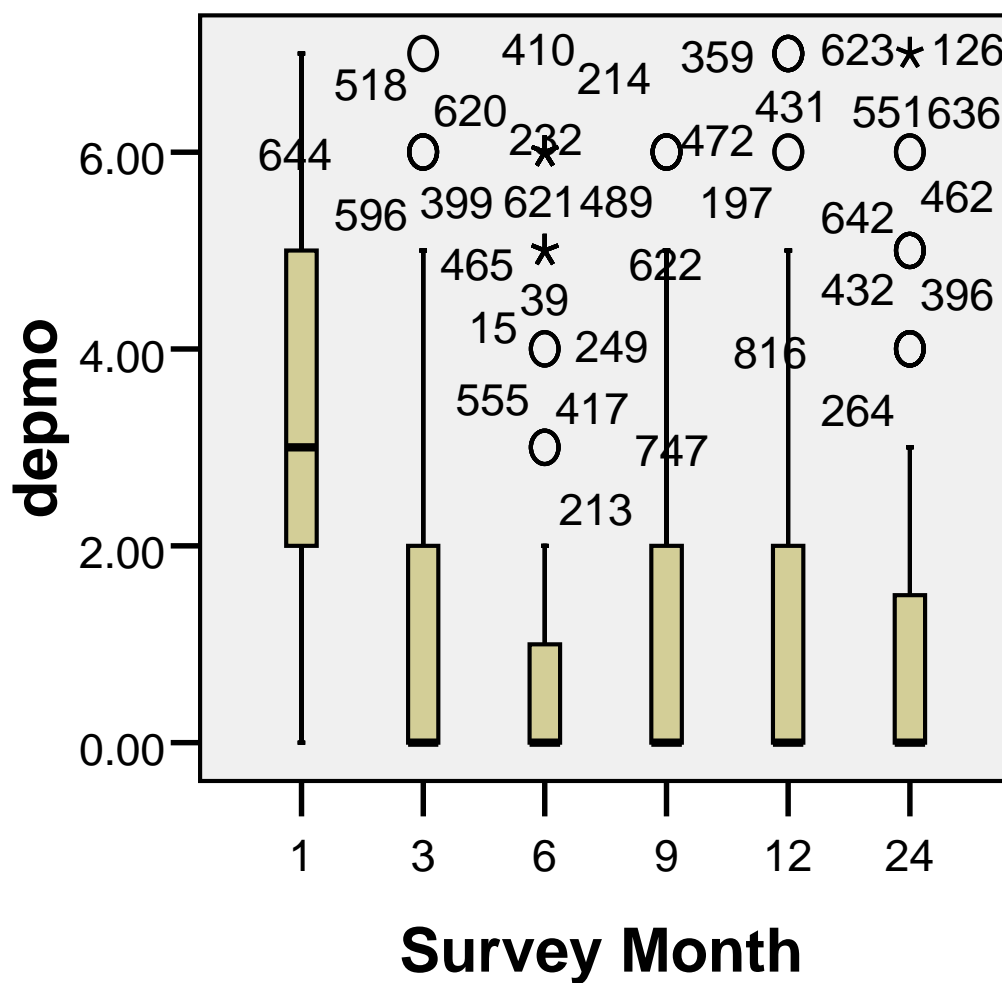
Prob > chi2 = 0.0000

Log likelihood = -1196.533



Results showed that the estimated values for sum of substance dependence symptoms also changed significantly over time. Estimated values approximated 4 symptoms of substance dependence at treatment entry, but estimated values approximated only one symptom of substance dependence at the post-treatment follow-ups thereafter. Actual mean values for sum of substance dependence symptoms are listed below:

Table 27. Mean Values for Number of Symptoms of Substance Dependence



	DEP Past Month Baseline	DEP Past Month Month 3	DEP Past Month Month 6	DEP Past Month Month 9	DEP Past Month Month 12	DEP Past Month Month 24
N Valid	138	127	126	116	132	103
Missing	0	11	12	22	6	35
Mean	3.38	1.35	1.13	1.22	1.24	1.19
Median	3.00	.00	.00	.00	.00	.00
Std. Deviation	2.22	1.93	1.90	1.90	1.99	1.94
Minimum	.00	.00	.00	.00	.00	.00
Maximum	7.00	7.00	6.00	6.00	7.00	7.00

For the baseline, year-one, and year-two interviews, the percentage of adolescents endorsing each past-month item of the SPI can be found in Appendix I. The items are listed in descending order, based on most frequently endorsed substance-related problems. The items are also identified as to whether they are DSM-IV-based symptoms of Substance Abuse (Abuse), DSM-IV-based symptoms of Substance Dependence (Dep), or lower severity Substance-Related Issues (Issue).

As noted, endorsement of numerous past-month substance-related problems was quite common at treatment intake. In fact, 10 of the 16 items on the SPI were endorsed by roughly half or more of the sample. However, there was a significant drop in the mean number of past-month substance-related problems from baseline (8.28) to the 3-month follow-up (3.57). This reduction in endorsement of past-month substance-related problems was maintained throughout the months between the 3-month and year-two follow-up interviews. However, there was a substantial amount of variability in the number of symptoms endorsed. Using the 3-month follow-up as an example, the standard deviation for number of substance-related problems endorsed was 4.28, which was higher than the mean of 3.57 items.

It is worth noting that across time, many of the most persistent past-month symptoms on the SPI included the lower severity substance-related “issues” such as weekly use, attempts to hide use, loved one’s complaining about use, and use causing feelings of depression, nervousness, or disinterest. The most common symptoms of substance abuse remained the endorsement of continued use despite

knowledge of potential fights or legal problems, as well as use causing unsafe situations. The most persistent symptom of substance dependence remained the endorsement of the item indicating lots of time spent acquiring, using, or recovering from effects of alcohol and other drugs.

These substance-related symptoms were followed by additional symptoms of abuse (i.e., use interfering with meeting responsibilities) and dependence (i.e., using more than intended; tolerance; continued use despite adding to emotional or physical problems; use causing abandonment of important activities; and inability to cut down or stop use). Less common substance-related symptoms included withdrawal problems, substance-induced physical problems, and use resulting in repeated legal problems.

By the year-two follow-up point, the most common past-month substance-related problems were substance issues including weekly use (50%), attempts to hide use (29%), and loved one's complaining about use (28%), as well as one symptom of dependence (i.e., spending lots of time getting, using, or recovering from effects of alcohol or other drugs; 27%). All the remaining past-month symptoms were endorsed by one-fifth or less of the sample by the year-two follow-up.

The current study was also concerned with a number of questions regarding group categories (i.e., minimal versus frequent substance use; substance abuse versus substance dependence; mild/moderate conduct disorder versus severe conduct disorder, etc.), as well as the persistence or continuity of these groupings over time. For each of these categorical analyses three groupings were

chosen (e.g., no substance use disorder; substance abuse; substance dependence). Analyses looked at these groupings at baseline (in the case of conduct disorder and substance use disorder) or 3-month follow-up (in the case of frequency of substance use), as well as at the year-one and year-two follow-up points.

McNemar-Bowker tests were used to look at change in these categories across the three different time points. The McNemar-Bowker Test is a chi-square test that may be used for within-subjects designs whenever individuals are measured or surveyed twice. This test is an extension of the McNemar test which was originally designed for binary (e.g., yes/no) dependent variables and applied to 2 X 2 contingency tables of dichotomous traits (i.e., two different classification values). The McNemar test can assess the consistency of a classification or response on two occasions. The test is often used in “before and after” designs such as analyses of subjects prior to and following treatment. Unlike the original McNemar test, the McNemar-Bowker test can be used for variables with more than two possible categories or outcomes. The McNemar-Bowker Test evaluates symmetry around the diagonal of the contingency table. The null hypothesis of the test is that the probabilities in the table satisfy symmetry (i.e., there is no significant shift from one response category to another from time 1 to time 2).

As discussed earlier, many studies that examine substance use following exposure to drug treatment focus exclusively on abstinence, particularly given that abstinence is often the explicit treatment goal for providers of drug treatment. The current study was interested in the idea of “minimal use” and sought to examine the number of individuals who return to substance use after treatment,

but do so minimally, especially across time. The current study used 10% of days as a cut-off point for minimal use as suggested by Waldron and colleagues (2001). Incidentally, in the interest of looking at use that is equivalent to once a week (or less), a cut-off point of 14.3% of days was contemplated. This higher cut-off resulted in a shift of only 4 cases, of the 90 adolescents reporting current use at the first post-treatment follow-up (i.e., 3 months), being re-categorized as minimal (versus frequent) users. Given the small difference in group size, as well as the fact that “weekly use” is listed as an “issue” on the Substance Problem Index (SPI), 10% of days was maintained as the cut-off point for minimal use in the study.

As mentioned, frequency of any substance use is measured as a ratio of the number of days of any substance use in the past 90 days divided by the number of days with access or opportunity to use (i.e., days outside of controlled environments). The three possible groupings created included “abstinent” (no use reported in past 90 days), “minimal use” (using 10% or less of days), and “frequent use” (using more than 10% of days). McNemar-Bowker tests were conducted to look at change in group category from 3-month follow-up to 12-month follow-up, 3-month follow-up to 24-month follow-up, and 12-month follow-up to 24-month follow-up.

**Table 28. McNemar-Bowker Test for Frequency of Use Groups
(minimal = 10% or less)**

3-Months to 12-Months

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Frequency of use group (3mo) *Frequency of use group (12mo)	122	88.4%	16	11.6%	138	100.0%
Frequency of use group (3mo) *Frequency of use group (24mo)	89	64.5%	49	35.5%	138	100.0%

Crosstab

		Frequency of use group (12mo)				Total
		Abstinent	Minimal	Frequent		
Frequency of use group (3mo)	Abstinent	Count	16	7	9	32
		% within Frequency of use group (3mo)	50.0%	21.9%	28.1%	100.0%
		% within Frequency of use group (12mo)	47.1%	28.0%	14.3%	26.2%
Minimal	Count	6	12	19	37	
		% within Frequency of use group (3mo)	16.2%	32.4%	51.4%	100.0%
		% within Frequency of use group (12mo)	17.6%	48.0%	30.2%	30.3%
Frequent	Count	12	6	35	53	
		% within Frequency of use group (3mo)	22.6%	11.3%	66.0%	100.0%
		% within Frequency of use group (12mo)	35.3%	24.0%	55.6%	43.4%
Total	Count	34	25	63	122	
		% within Frequency of use group (3mo)	27.9%	20.5%	51.6%	100.0%
		% within Frequency of use group (12mo)	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	7.265	3	.064
N of Valid Cases	122		

At the 3-month post-treatment follow-up, 44% of the sample reported frequent use, 30% reported minimal use (i.e., used 10% or less of days), and 26% reported abstinence. At the year-one follow-up, 51.6% of the sample reported frequent use, 20.5% reported minimal use, and 27.9% reported abstinence. Results from the 3-month follow-up seem to support the idea of rapid relapse following treatment exposure given that nearly three-quarters (74%) of the sample reportedly returned to substance use within 3-months of treatment admission. Furthermore, this 3-month follow-up point represented a passage of only two months following the roughly average one-month stay in a treatment program where sobriety was “guarded” or enforced by inpatient hospitalization. Nonetheless, it is interesting to note that more than half (57%) of the sample were abstinent or using less than 10% of days at the 3-month follow-up. In addition, nearly half (48%) of the sample were abstinent or using minimally at the year-one follow up.

Results from the McNemar-Bowker test looking at change in substance frequency category came close but did not achieve significance at the .05 level ($p = .064$). This suggests that adolescents’ group categories did not change significantly (i.e., people tend to stay in the category they start in) from the first post-treatment follow-up (i.e., 3 months) to the follow-up at year-one. Overall, 50% (16 of 32) of those abstinent at 3-months were also abstinent at year-one, 28% were using frequently, and 22% were using minimally. Nearly one-third (32.4%; 12 of 37) of those with minimal use at 3-months were minimal users at year-one, 51.4% were using frequently and 16.2% were abstinent. Two-thirds

(66%; 35 of 53) of those using frequently at 3-months were frequent users at year-one, 11% were using minimally and 23% were abstinent. Overall, 48% of the sample shifted to a different category from the 3-month follow-up to the year-one follow-up.

**Table 29. McNemar-Bowker Test for Frequency of Use Groups
(minimal = 10% or less)**

3-Months to 24-Months

		Crosstab				
		Frequency of use group (24mo)				
		Abstinent	Minimal	Frequent	Total	
Frequency of use group (3mo)	Abstinent	Count	5	8	8	21
		% within Frequency of use group (3mo)	23.8%	38.1%	38.1%	100.0%
		% within Frequency of use group (24mo)	33.3%	66.7%	12.9%	23.6%
	Minimal	Count	1	3	20	24
		% within Frequency of use group (3mo)	4.2%	12.5%	83.3%	100.0%
		% within Frequency of use group (24mo)	6.7%	25.0%	32.3%	27.0%
	Frequent	Count	9	1	34	44
		% within Frequency of use group (3mo)	20.5%	2.3%	77.3%	100.0%
		% within Frequency of use group (24mo)	60.0%	8.3%	54.8%	49.4%
Total	Count	15	12	62	89	
	% within Frequency of use group (3mo)	16.9%	13.5%	69.7%	100.0%	
	% within Frequency of use group (24mo)	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	22.694	3	.000
N of Valid Cases	89		

At the year-two follow-up, 69.7% of the sample reported frequent use, 13.5% reported minimal use, and 16.8% reported abstinence. In other words, 30% were abstinent or using minimally at year-two, compared to the roughly half or more of the sample who were abstinent or using minimally at the 3-month and year-one follow-ups.

The McNemar-Bowker test results indicated significant change in categories from the 3-month follow-up to the follow-up at year-two. Overall, 24% (5 of 21) of those reporting abstinence at the 3-month follow-up were abstinent at year two, 38% were using frequently, and 38% were using minimally. Only 13% (3 of 24) of those reporting minimal use at the 3-month follow-up were minimal users at year-two, 83% were frequent users, and 4% were abstinent. More than three-quarters (77%; 34 of 44) of frequent users at 3-months were frequent users at year-two, 2% were using minimally, and 21% were abstinent. Overall, 53% of the sample shifted categories from the 3-month to the 24-month follow-up.

**Table 30. McNemar-Bowker Test for Frequency of Use Groups
(minimal = 10% or less)**

12-Months to 24-Months

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Frequency of use group (12mo) * Frequency of use group (24mo)	94	68.1%	44	31.9%	138	100.0%

Frequency of use group (12m o) * Frequency of use group (24mo) Crosstabulation

		Frequency of use group (24mo)				Total
		Abstinent	Minimal	Frequent		
Frequency of use group (12m o)	Abstinent	Count	9	9	6	24
		% within Frequency of use group (12m o)	37.5%	37.5%	25.0%	100.0%
		% within Frequency of use group (24m o)	56.3%	75.0%	9.1%	25.5%
Minimal	Count	2	1	14	17	
		% within Frequency of use group (12m o)	11.8%	5.9%	82.4%	100.0%
		% within Frequency of use group (24m o)	12.5%	8.3%	21.2%	18.1%
Frequent	Count	5	2	46	53	
		% within Frequency of use group (12m o)	9.4%	3.8%	86.8%	100.0%
		% within Frequency of use group (24m o)	31.3%	16.7%	69.7%	56.4%
Total	Count	16	12	66	94	
		% within Frequency of use group (12m o)	17.0%	12.8%	70.2%	100.0%
		% within Frequency of use group (24m o)	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	13.545	3	.004
N of Valid Cases	94		

Results from the McNemar-Bowker test indicated a significant change in categories between the year-one and year-two follow-up points. Overall, 37.5% (9 of 24) of those abstinent at year-one were abstinent at year-two, 25% were using frequently, and 37.5% were using minimally. Only 6% (1 of 17) of those using minimally at year-one were using minimally at year two, 82% were using frequently, and 12% were abstinent. The majority (87%; 46 of 53) of those using frequently at year-one were using frequently at year-two, whereas 4% were using minimally and 9% were abstinent. Overall, 40% of the sample shifted categories between the year-one and year-two follow-ups.

Three categories were created for substance use disorders by using the items from the Substance Problem Index (SPI) that represent DSM-IV criteria for substance abuse and substance dependence. The three categories created were as follows: substance dependence (i.e., endorsement of at least 3 of 7 past-year symptoms of substance dependence), substance abuse (i.e., endorsement of at least 1 of 4 past-year symptoms of substance abuse and endorsement of no more than 2 past-year symptoms of substance dependence), and no substance use disorder (i.e., no endorsement of any symptoms of substance abuse or substance dependence). McNemar-Bowker tests were conducted to look at change in group category from baseline to 12-month follow-up, baseline to 24-month follow-up, and 12-month follow-up to 24-month follow-up.

Table 31. McNemar-Bowker Test for Substance Use Disorder Groups

Baseline to 12-Months**Case Processing Summary**

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SubUseDisorderBaseline * SubUseDisorderYr1	132	95.7%	6	4.3%	138	100.0%
SubUseDisorderBaseline * SubUseDisorderYr2	99	71.7%	39	28.3%	138	100.0%

Crosstab

		SubUse DisorderYr1				Total
		None	Substance Abuse	Substance Dependence		
SubUseDisorderBaseline	None	Count	1	0	0	1
		% within SubUseDisorderBaseline	100.0%	.0%	.0%	100.0%
		% within SubUseDisorderYr1	3.6%	.0%	.0%	.8%
Substance Abuse		Count	2	4	6	12
		% within SubUseDisorderBaseline	16.7%	33.3%	50.0%	100.0%
		% within SubUseDisorderYr1	7.1%	23.5%	6.9%	9.1%
Substance Dependence		Count	25	13	81	119
		% within SubUseDisorderBaseline	21.0%	10.9%	68.1%	100.0%
		% within SubUseDisorderYr1	89.3%	76.5%	93.1%	90.2%
Total		Count	28	17	87	132
		% within SubUseDisorderBaseline	21.2%	12.9%	65.9%	100.0%
		% within SubUseDisorderYr1	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	29.579	3	.000
N of Valid Cases	132		

At treatment intake, the vast majority of adolescents (90%) endorsed enough symptoms to be in the substance dependence category. The remainder of the sample fell into the substance abuse category (9%), with the exception of one respondent (1%) who fell into the no substance use disorder category based on failure to endorse of any symptoms of substance abuse or substance dependence. At the year-one follow-up, two-thirds (66%) of the sample fell into the substance dependence category, whereas 13% reported symptoms substance abuse, and 21% endorsed no substance use disorder.

Results of the McNemar-Bowker test indicated significant change in substance use disorder categories from baseline to the year-one follow-up. Overall, 100% (1 of 1) of those reporting no substance use disorder at baseline reported no substance use disorder at year-one. One-third (33%; 4 of 12) of those endorsing substance abuse at baseline reported substance abuse at year-one, 50% reported substance dependence, and 17% reported no substance use disorder. More than two-thirds (68%; 81 of 119) of those endorsing substance dependence at baseline reported substance dependence at the year-one follow-up, 11% reported substance abuse, and 21% reported no substance use disorder. Overall, 35% of the sample shifted substance use disorder categories from baseline to the 12-month follow-up.

Table 32. McNemar-Bowker Test for Substance Use Disorder Groups
Baseline to 24-Months

Crosstab

		SubUseDisorderYr2			Total	
		None	Substance Abuse	Substance Dependence		
SubUseDisorderBaseline	None	Count	1	0	0	1
		% within SubUseDisorderBaseline	100.0%	.0%	.0%	100.0%
		% within SubUseDisorderYr2	3.7%	.0%	.0%	1.0%
	Substance Abuse	Count	2	3	2	7
		% within SubUseDisorderBaseline	28.6%	42.9%	28.6%	100.0%
		% within SubUseDisorderYr2	7.4%	13.0%	4.1%	7.1%
	Substance Dependence	Count	24	20	47	91
		% within SubUseDisorderBaseline	26.4%	22.0%	51.6%	100.0%
		% within SubUseDisorderYr2	88.9%	87.0%	95.9%	91.9%
Total	Count	27	23	49	99	
	% within SubUseDisorderBaseline	27.3%	23.2%	49.5%	100.0%	
	% within SubUseDisorderYr2	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	40.727	3	.000
N of Valid Cases	99		

At the year-two follow-up, half of adolescents (50%) endorsed enough symptoms to fall into the substance dependence category, while 23% reported substance abuse, and 27% endorsed no substance use disorder. Results from the McNemar-Bowker test indicated that substance use disorder categories changed significantly from baseline to the year-two follow-up. Again, the one person who reported no substance use disorder at baseline reported no substance use disorder at year two. Overall, 42.9% (3 of 7) of those adolescents endorsing substance abuse at baseline also endorsed substance abuse at year-two, 28.6% reported substance dependence, and 28.6% endorsed no substance use disorder. A little more than half (52%; 47 of 91) of those endorsing substance dependence at baseline reported substance dependence at the year-two follow-up, 22% reported substance abuse, and 26% endorsed no substance use disorder. Overall, 49% of the sample shifted substance use disorder categories from baseline to the year-two follow-up.

Table 33. McNemar-Bowker Test for Substance Use Disorder Groups

12-Months to 24-Months

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
SubUseDisorderYR1 *						
SubUseDisorderYr2	99	71.7%	39	28.3%	138	100.0%

SubUseDisorderYR1 * SubUseDisorderYr2 Crosstabulation

		SubUseDisorderYr2				Total
		None	Substance Abuse	Substance Dependence		
SubUseDisorderYR1	None	Count	11	5	3	19
		% within SubUse DisorderYR1	57.9%	26.3%	15.8%	100.0%
		% within SubUse DisorderYr2	40.7%	21.7%	6.1%	19.2%
Substance Abuse		Count	6	3	5	14
		% within SubUse DisorderYR1	42.9%	21.4%	35.7%	100.0%
		% within SubUse DisorderYr2	22.2%	13.0%	10.2%	14.1%
Substance Dependence		Count	10	15	41	66
		% within SubUse DisorderYR1	15.2%	22.7%	62.1%	100.0%
		% within SubUse DisorderYr2	37.0%	65.2%	83.7%	66.7%
Total		Count	27	23	49	99
		% within SubUse DisorderYR1	27.3%	23.2%	49.5%	100.0%
		% within SubUse DisorderYr2	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	8.860	3	.031
N of Valid Cases	99		

Results of the McNemar-Bowker test indicated a significant change in substance use disorder category between the year-one and year-two follow-ups. Overall, 58% (11 of 19) of those endorsing no substance use disorder at year-one reported no substance use disorder at year-two, 16% endorsed substance dependence, and 26% reported substance abuse. Roughly one-fifth (21%; 3 of 14) of those who endorsed substance abuse at year-one reported substance abuse at year-two, 36% endorsed substance dependence, and 43% reported no substance use disorder. Finally, 62% (41 of 66) of those endorsing substance dependence at year-one reported substance dependence at year-two, 23% endorsed substance abuse, and 15% reported no substance use disorder. Overall, 44% of the sample shifted substance use disorder category from the 12-month to the 24-month follow-up.

For the baseline, year-one, and year-two interviews, the percentage of adolescents endorsing each past-year item of substance abuse or substance dependence from the SPI can be found in Appendix J. This is similar to the SPI listings that were associated with the change analyses (i.e., multilevel negative binomial regressions) reported earlier, but the focus is expanded to include symptoms present during the past-year (versus only those symptoms present during the past-month). In addition, the listings include only DSM-IV symptoms of substance abuse and substance dependence (i.e., the 5 lesser substance-related “issues” are excluded). The items are listed in descending order, based on most frequently endorsed symptoms of substance abuse and substance dependence.

It is notable that with the exception of withdrawal problems (still quite high at 47%), each past-year symptom of substance abuse or substance dependence was endorsed by more than half of the sample at baseline. More than two-thirds of the sample endorsed the four most common substance dependence symptoms at baseline, including spending a lot of time getting, using, or feeling effects of substances (94%), using more than intended (80%), giving up important activities due to substance use (71%), and tolerance (67%). Other common symptoms of dependence at baseline included continued use of substances knowing that use contributes to physical or emotional problems (64%) and inability to cut back or stop substance use (63%). Approximately three-quarters of the sample endorsed the most common symptoms of substance abuse including continued substance use despite interference with responsibilities (76%) and continued substance use knowing it could lead to fights or legal problems (75%). These symptoms were followed by abuse symptoms including substance use creating unsafe situations (57%) and repeated legal problems related to use (52%).

Results of the year-one follow-up are similar to findings at baseline in that all substance use disorder items were endorsed by roughly half or more of the sample, with the exception of withdrawal problems (42%) and repeated legal problems related to use (35%). At year-one, roughly 60% of the sample reported spending a lot of time getting, using, or feeling effects of substances; increased tolerance; continued use knowing that it could lead to fights or legal problems; using more than intended, and use despite interference with responsibilities. This was followed by giving up important activities due to substance use (55%),

inability to cut back or stop use, substance use creating unsafe situations (50%), and continued use of substances knowing that it contributes to physical or emotional problems (48%)

At the year-two follow-up, there was only one item that was endorsed by more than half of the sample: spending a lot of time getting, using, or feeling effects of substances (57%). The other most common substance use disorder symptoms shifted to tolerance (50%), use creating unsafe situations (49%), using more than intended (48%), continued use knowing that it could lead to fights or legal problems (45%), and continued use knowing that it contributes to physical or emotional problems (39%). More than one-third of the sample endorsed use interfering with responsibilities (37%), inability to cut down or stop use (36%), and giving up important activities due to use (36%). The least common symptoms at year-two were withdrawal problems (28%) and repeated legal problems due to substance use (26%).

Three conduct disorder categories were created using the Conduct Disorder Index (CDI), including a no conduct disorder group (i.e., endorsement of less than three symptoms on the CDI), a mild/moderate conduct disorder group (i.e., endorsement of at least 3 symptoms on the CDI and no endorsement of any severe symptoms), and a severe conduct disorder group (endorsement of at least 3 symptoms on the CDI, including at least one severe symptom). As referenced earlier, 6 of the 16 symptoms on the CDI were considered severe given the considerable harm they pose to others. These severe symptoms included using a weapon in fights, physical cruelty to people, physical cruelty to animals, taking

money or things from person by force, forced sex, and breaking and entering. It should be noted that at baseline, respondents endorsed symptoms occurring in the past year, whereas participants were asked to endorse symptoms occurring in only the past-90-days for the year-one and year-two follow-up points.

McNemar-Bowker tests were conducted to look at change in group category from baseline to 12-month follow-up, baseline to 24-month follow-up, and 12-month follow-up to 24-month follow-up. Separate analyses were run for CDsum (i.e., only counting truancy and curfew violations for respondents who reportedly engaged in these behaviors prior to age 13) and CDsumX (i.e., counting current truancy and curfew violations as symptoms of conduct disorder regardless of age of initiation).

Table 34. McNemar-Bowker Test for Conduct Disorder Groups

Baseline to 12-Months**Case Processing Summary**

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
cdgrp.1: Conduct disorder group * cdgrp.12: Conduct disorder group	131	94.9%	7	5.1%	138	100.0%

cdgrp.1: Conduct disorder group * cdgrp.12: Conduct disorder group Crosstabulation

		cdgrp.12: Conduct disorder group				
		Not CD	Mild	Severe	Total	
cdgrp.1: Conduct disorder group	Not CD	Count	18	3	1	22
		% within cdgrp.1: Conduct disorder group	81.8%	13.6%	4.5%	100.0%
		% within cdgrp.12: Conduct disorder group	19.6%	17.6%	4.5%	16.8%
Mild	Count	24	8	2	34	
		% within cdgrp.1: Conduct disorder group	70.6%	23.5%	5.9%	100.0%
		% within cdgrp.12: Conduct disorder group	26.1%	47.1%	9.1%	26.0%
Severe	Count	50	6	19	75	
		% within cdgrp.1: Conduct disorder group	66.7%	8.0%	25.3%	100.0%
		% within cdgrp.12: Conduct disorder group	54.3%	35.3%	86.4%	57.3%
Total	Count	92	17	22	131	
		% within cdgrp.1: Conduct disorder group	70.2%	13.0%	16.8%	100.0%
		% within cdgrp.12: Conduct disorder group	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	65.412	3	.000
N of Valid Cases	131		

At treatment intake, 57% of the sample fell into the severe conduct disorder category, 26% fell into the mild/moderate category, and 17% fell into the no conduct disorder category. In contrast, by year-one only 17% of the sample fell into the severe conduct disorder category, 13% fell into the mild/moderate conduct disorder category, and 70% fell into the no conduct disorder category.

The McNemar-Bowker test indicates a significant change in conduct disorder category from baseline to year-one. Overall, 81.8% (18 of 22) of those in the no conduct disorder category at baseline remained in this category at year-one, 4.5% reported severe conduct disorder, and 13.6% reported mild/moderate conduct disorder. Slightly less than one-quarter (23.5%; 8 of 34) of those in the mild/moderate conduct disorder group at baseline endorsed mild/moderate conduct disorder at year one, 5.9% reported severe conduct disorder, and 70.6% reported no conduct disorder. One-quarter (25%; 19 of 75) of those in the severe conduct disorder group at baseline remained in that respective category at year-one, 8% reported mild/moderate conduct disorder, and 67% reported no conduct disorder. Overall, approximately two-thirds (66%) of the sample changed conduct disorder groups from baseline to 12-month follow-up.

Table 35. McNemar-Bowker Test for Conduct Disorder Groups

Baseline to 24-Months**Case Processing Summary**

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
cdgrp.1: Conduct disorder group * cdgrp.24: Conduct disorder group	103	74.6%	35	25.4%	138	100.0%

cdgrp.1: Conduct disorder group * cdgrp.24: Conduct disorder group Crosstabulation

			cdgrp.24: Conduct disorder group			Total
			Not CD	Mild	Severe	
cdgrp.1: Conduct disorder group	Not CD	Count	15	1	2	18
		% within cdgrp.1: Conduct disorder group	83.3%	5.6%	11.1%	100.0%
		% within cdgrp.24: Conduct disorder group	18.8%	8.3%	18.2%	17.5%
	Mild	Count	23	4	3	30
		% within cdgrp.1: Conduct disorder group	76.7%	13.3%	10.0%	100.0%
		% within cdgrp.24: Conduct disorder group	28.8%	33.3%	27.3%	29.1%
	Severe	Count	42	7	6	55
		% within cdgrp.1: Conduct disorder group	76.4%	12.7%	10.9%	100.0%
		% within cdgrp.24: Conduct disorder group	52.5%	58.3%	54.5%	53.4%
Total	Count	80	12	11	103	
	% within cdgrp.1: Conduct disorder group	77.7%	11.7%	10.7%	100.0%	
	% within cdgrp.24: Conduct disorder group	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	58.130	3	.000
N of Valid Cases	103		

At the year-two follow-up, only 10.7% of the sample fell into the severe conduct disorder group, while only 11.6% fell into the mild/moderate group. Over three-quarters (77.7%) of the sample fell into the no conduct disorder group at year-two.

Results from the McNemar-Bowker test indicated a significant change in conduct disorder group from baseline to the year-two follow-up. Overall 83% (15 of 18) of those in the no conduct disorder group at baseline continued to be in the no conduct disorder grouping at year-two, 11% reported severe conduct disorder, and 6% reported mild/moderate conduct disorder. In contrast, only 13% (4 of 30) of those in the mild/moderate group remained in the mild/moderate group at year two, 10% reported severe conduct disorder, and 77% reported no conduct disorder. A little more than one-tenth (11%; 6 of 55) of those in the severe conduct disorder group at baseline remained in the severe conduct disorder category at year-two, 13% report mild/moderate conduct disorder, and 76% endorse no conduct disorder. Overall, three-quarters (76%) of the sample changed conduct disorder group from baseline to year-two.

Table 36. McNemar-Bowker Test for Conduct Disorder Groups

12-Months to 24-Months**Case Processing Summary**

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
cdgrp.12: Conduct disorder group * cdgrp.24: Conduct disorder group	103	74.6%	35	25.4%	138	100.0%

cdgrp.12: Conduct disorder group * cdgrp.24: Conduct disorder group Crosstabulation

		cdgrp.24: Conduct disorder group				
		Not CD	Mild	Severe	Total	
cdgrp.12: Conduct disorder group	Not CD	Count	61	5	7	73
		% within cdgrp.12: Conduct disorder group	83.6%	6.8%	9.6%	100.0%
		% within cdgrp.24: Conduct disorder group	76.3%	41.7%	63.6%	70.9%
Mild	Count	11	2	2	15	
		% within cdgrp.12: Conduct disorder group	73.3%	13.3%	13.3%	100.0%
		% within cdgrp.24: Conduct disorder group	13.8%	16.7%	18.2%	14.6%
Severe	Count	8	5	2	15	
		% within cdgrp.12: Conduct disorder group	53.3%	33.3%	13.3%	100.0%
		% within cdgrp.24: Conduct disorder group	10.0%	41.7%	18.2%	14.6%
Total	Count	80	12	11	103	
		% within cdgrp.12: Conduct disorder group	77.7%	11.7%	10.7%	100.0%
		% within cdgrp.24: Conduct disorder group	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	3.602	3	.308
N of Valid Cases	103		

Results from the McNemar-Bowker test indicated that conduct disorder group categorizations did not change significantly from year-one to year-two. Overall, 83.6% (61 of 73) of those in the no conduct disorder group at year-one still remained in the no conduct disorder group at year-two, 9.6% endorsed severe conduct disorder, and 6.8% reported mild/moderate conduct disorder. Only 13.3% (2 of 15) of those in the mild/moderate conduct disorder group at year-one remained in that category at year-two, 13.3% reported severe conduct disorder, and 73.3% reported no conduct disorder. Only 13.3% (2 of 15) of those in the severe conduct disorder category at year-one remained in that category at year-two, 33.3% endorsed mild/moderate conduct disorder, and 53.3% reported no conduct disorder. Overall, only 37% of the sample changed their conduct disorder category from the year-one to the year-two follow-up.

**Table 37. McNemar-Bowker Test for CDsumX
(Including Truancy/Curfew Starting Age 12+)**

Baseline to 12-Months

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
cdxgrp.1: Conduct disorder group (sumx) * cdxgrp.12: Conduct disorder group (sumx)	131	94.9%	7	5.1%	138	100.0%
cdxgrp.1: Conduct disorder group (sumx) * cdxgrp.24: Conduct disorder group (sumx)	103	74.6%	35	25.4%	138	100.0%

Crosstab

		cdxgrp.12: Conduct disorder group (sum x)				Total
		Not CD	Mild	Severe		
cdxgrp.1: Conduct disorder group (sum x)	Not CD	Count	6	0	0	6
		% within cdxgrp.1: Conduct disorder group (sum x)	100.0%	.0%	.0%	100.0%
		% within cdxgrp.12: Conduct disorder group (sum x)	7.6%	.0%	.0%	4.6%
	Mild	Count	30	17	3	50
		% within cdxgrp.1: Conduct disorder group (sum x)	60.0%	34.0%	6.0%	100.0%
		% within cdxgrp.12: Conduct disorder group (sum x)	38.0%	56.7%	13.6%	38.2%
	Severe	Count	43	13	19	75
		% within cdxgrp.1: Conduct disorder group (sum x)	57.3%	17.3%	25.3%	100.0%
		% within cdxgrp.12: Conduct disorder group (sum x)	54.4%	43.3%	86.4%	57.3%
Total	Count	79	30	22	131	
	% within cdxgrp.1: Conduct disorder group (sum x)	60.3%	22.9%	16.8%	100.0%	
	% within cdxgrp.12: Conduct disorder group (sum x)	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	79.250	3	.000
N of Valid Cases	131		

As discussed previously, the DSM-IV only considers current truancy and curfew violations as indicative of conduct disorder if the behavior is manifest before the age of 13. CDsumX counts truancy and staying out later than parents want even for those respondents who don't report starting these behaviors until their teen years. Also as mentioned, the vast majority of the sample (85%) endorsed both staying out late and skipping school at baseline, but less than one-third of the sample reported that they started engaging in these behaviors prior age 13. When including truancy and staying out late regardless of the age of initiation, only 5% of the sample fell into the no conduct disorder category at baseline. This is in comparison to baseline rates of 17% for the no conduct disorder category when using CDsum (i.e., only counting truancy and curfew violations for those who started engaging in these behaviors before age 13). By the year-one follow-up, the majority (60%) of the sample fell into the no conduct disorder category even when counting truancy and curfew violations that did not start until the teen years. In comparison, the no conduct disorder rates were 70% at baseline using CDsum.

The McNemar-Bowker test results for CDsumX indicated a significant change in conduct disorder group category between baseline and the year-one follow-up. Every respondent (6 of 6) in the no conduct disorder group at baseline remained in that category one-year later. Approximately one-third (34%; 17 of 50) of those in the mild/moderate conduct disorder group remained in that group at year-one, 6% reported severe conduct disorder, and 60% reported no conduct disorder. One-quarter (25.3%; 19 of 75) of those in the severe conduct disorder

group remained in that group at the year-one follow-up, 17.3% endorsed mild/moderate conduct disorder, and 57.3% fell into the no conduct disorder group. Overall, more than two-thirds (68%) of the sample shifted conduct disorder groups from baseline to the year-one follow-up.

**Table 38. McNemar-Bowker Test for CDsumX
(Including Truancy/Curfew Starting Age 12+)**

Baseline to 24-Months

Crosstab

		<u>cdxgrp.24: Conduct disorder group (sum x)</u>				
			Not CD	Mild	Severe	Total
cdxgrp.1: Conduct disorder group (sum x)	Not CD	Count	3	1	1	5
		% within cdxgrp.1: Conduct disorder group (sum x)	60.0%	20.0%	20.0%	100.0%
		% within cdxgrp.24: Conduct disorder group (sum x)	3.9%	6.7%	9.1%	4.9%
	Mild	Count	33	6	4	43
		% within cdxgrp.1: Conduct disorder group (sum x)	76.7%	14.0%	9.3%	100.0%
		% within cdxgrp.24: Conduct disorder group (sum x)	42.9%	40.0%	36.4%	41.7%
	Severe	Count	41	8	6	55
		% within cdxgrp.1: Conduct disorder group (sum x)	74.5%	14.5%	10.9%	100.0%
		% within cdxgrp.24: Conduct disorder group (sum x)	53.2%	53.3%	54.5%	53.4%
Total	Count	77	15	11	103	
	% within cdxgrp.1: Conduct disorder group (sum x)	74.8%	14.6%	10.7%	100.0%	
	% within cdxgrp.24: Conduct disorder group (sum x)	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	69.546	3	.000
N of Valid Cases	103		

Even using the more liberally inclusive CDsumX, three-quarters (75%) of the sample fell into the no conduct disorder category by the year-two follow-up. This is only slightly less than the 78% rate for no conduct disorder using CDsum. At year-two, only a minority of the sample remained categorized as conduct disordered, including 15% in the mild/moderate category, and 11% in the severe conduct disorder category.

McNemar-Bowker test results indicated a significant change in conduct disorder group category between baseline and the two-year follow-up. Overall, 60% (3 of 5) of those in the no conduct disorder group at baseline remained in that category two years later, 20% report mild/moderate conduct disorder, and 20% reported severe conduct disorder. Only 14% (6 of 43) of those in the mild/moderate group remained in this group at year-two, 9% reported severe conduct disorder, and 77% reported no conduct disorder. Only 11% (6 of 55) of those in the severe conduct disorder group remained in this group at year two, 14.5% reported mild/moderate conduct disorder, and 74.5% endorsed no conduct disorder. Overall, 85% of the sample shifted conduct disorder group from baseline to the year-two follow-up.

**Table 39. McNemar-Bowker Test for CDsumX
(Including Truancy/Curfew Starting Age 12+)**

12 to 24 Months

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
cdxgrp.12: Conduct disorder group (sumx) * cdxgrp.24: Conduct disorder group (sumx)	103	74.6%	35	25.4%	138	100.0%

cdxgrp.12: Conduct disorder group (sumx) * cdxgrp.24: Conduct disorder group (sumx) Crosstabulation

		cdxgrp.24: Conduct disorder group (sum x)				Total
		Not CD	Mild	Severe		
cdxgrp.12: Conduct disorder group (sum x)	Not CD	Count	51	5	6	62
		% within cdxgrp.12: Conduct disorder group (sum x)	82.3%	8.1%	9.7%	100.0%
		% within cdxgrp.24: Conduct disorder group (sum x)	66.2%	33.3%	54.5%	60.2%
	Mild	Count	18	5	3	26
		% within cdxgrp.12: Conduct disorder group (sum x)	69.2%	19.2%	11.5%	100.0%
		% within cdxgrp.24: Conduct disorder group (sum x)	23.4%	33.3%	27.3%	25.2%
	Severe	Count	8	5	2	15
		% within cdxgrp.12: Conduct disorder group (sum x)	53.3%	33.3%	13.3%	100.0%
		% within cdxgrp.24: Conduct disorder group (sum x)	10.4%	33.3%	18.2%	14.6%
Total	Count	77	15	11	103	
	% within cdxgrp.12: Conduct disorder group (sum x)	74.8%	14.6%	10.7%	100.0%	
	% within cdxgrp.24: Conduct disorder group (sum x)	100.0%	100.0%	100.0%	100.0%	

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
McNemar-Bowker Test	8.134	3	.043
N of Valid Cases	103		

Results from the McNemar-Bowker test were just below the .05 significance level, indicating a statistically significant change in conduct disorder group categorizations between the year-one and year-two follow-up. This is in contrast to CDsum which did not demonstrate significant group change between the year- and year-two follow-up points. Overall, the vast majority (82%; 51 of 62) of those in the no conduct disorder group at year-one remained in the no conduct disorder group at year-two, 10% reported severe conduct disorder, and 8% reported mild/moderate conduct disorder. Slightly less than one-fifth (19%; 5 of 26) of those in the mild/moderate group at year-one remained in this group at year-two, 69% reported no conduct disorder, and 12% reported severe conduct disorder. Only 13.3% (2 of 15) of those in the severe group at year-one remained in this group at year-two, 53.3% reported no conduct disorder, and 33.3% reported mild/moderate conduct disorder. Overall, 44% of the sample shifted conduct disorder group from the year-one to the year-two follow-up point.

The final questions of interest for the current study related to the ways in which quantity or duration of treatment (i.e., number of days) and types of care received (e.g., substance abuse versus mental health treatment; inpatient versus outpatient, etc.) were associated with or predictive of the main outcomes of interest (i.e., days of substance use, conduct disorder symptoms, criminal behaviors, and symptoms of general mental distress). For example, it was of interest whether presence and/or duration of mental health treatment would be related to subsequent reductions in general mental distress. Conversely, it was of interest whether mental health treatment might be associated with reduced

substance use despite the presumed treatment emphasis on psychological functioning.

As mentioned, for the first year after treatment intake, adolescents completed interviews every 3-months and they reported on the number of days during this time that they participated in substance abuse and mental health treatment, as well as other supplemental services. Services captured included inpatient and outpatient substance abuse treatment, as well as inpatient and outpatient mental health treatment. In addition, adolescents reported on the number of days they attended peer self-help group meetings (e.g., Alcoholics Anonymous/Narcotics Anonymous/Marijuana Anonymous), as well as days they spent on probation, days they were incarcerated in juvenile detention or jail, and the number of days they were administered drug tests. The past-90-days measures of services received from the 3-, 6-, 9-, and 12-month follow-up interviews were summed to get the total amount of care received over the year following treatment intake.

As noted earlier, study participants were initially clients at an inpatient adolescent drug treatment program with prescribed length of care usually lasting one- to two-months. To be eligible for study inclusion, adolescents needed to have stayed at the initial inpatient substance abuse treatment facility for at least 7 days (i.e., they needed to have received a minimum of 1 week of inpatient drug treatment).

Table 40. Total Annual Treatment Episodes and Length of Initial Treatment

		Total Discreet TX Episodes (SA & MH)	Index TX Days (Chart Review)	3- Month Follow-Up Interview
N	Valid	100	103	127
	Missing	38	35	11
Mean		2.29	27.50	28.71
Median		2.00	29.00	30.00
Std. Deviation		1.22	10.21	10.95
Minimum		1	7	7.00
Maximum		6	62	59.00

As illustrated above, adolescents received an average of 2.29 discreet substance abuse or mental health treatment episodes (SD = 1.22, median = 2), including their participation in the initial drug treatment facility, over the year following intake. Treatment episodes were considered discreet when they involved services from separate providers/agencies, as well as in cases where clients completed treatment, but were later re-admitted to the same program (usually the initial drug treatment facility) for another full prescribed length-of-stay. The mean value for number of treatment episodes over the first year suggested that adolescents averaged at least one additional substance abuse or mental health based treatment experience beyond their initial period of inpatient drug treatment, often through separate treatment providers. Results from the 3-month follow-up indicated that adolescents reported that they had received an average of 28.71 days (SD = 10.95, median = 30) of inpatient substance abuse treatment. These values were very similar to and consistent with the 27.50 day average (SD = 10.21, median = 29) yielded by a chart review of client intake and discharge dates.

Table 41. Total Days of Substance Abuse Treatment

		One Year Days SA Inpatient	One Year Days SA Outpatient	One Year Days All Combined SA TX	One Year Days Self Help (AA/NA)
N	Valid	107	107	107	108
	Missing	31	31	31	30
Mean		40.64	26.65	67.29	73.59
Median		30.00	18.00	61.00	58.00
Std. Deviation		39.39	27.75	45.33	60.50
Minimum		7.00	.00	7.00	.00
Maximum		224.00	101.00	224.00	241.00

Adolescents reported an annual average of 67.29 days of any substance abuse treatment (SD = 45.33, median = 61). This includes an average of 40.64 days of inpatient substance abuse treatment (SD = 39.39, median = 30) and an average of 26.65 days of outpatient substance abuse treatment (SD = 27.75, median = 18). Adolescents reported attending an average of 73.59 peer self-help (e.g., AA/NA/MA) support groups (SD = 60.50, median = 58) over the year following initial treatment intake.

Table 42. Total Days of Mental Health Treatment

		One Year Days MH Hospital	One Year Days MH Outpatient	One Year Days All MH TX
N	Valid	111	108	108
	Missing	27	30	30
Mean		.53	24.38	24.93
Median		.00	12.00	13.00
Std. Deviation		1.95	33.92	34.53
Minimum		.00	.00	.00
Maximum		14.00	162.00	162.00

By the year-one follow-up interview, adolescents reported receiving an average total of 24.93 days of any mental health care ($SD = 34.53$, median = 13). This included an average of 24.38 days of outpatient mental health care ($SD = 33.92$, median = 12). Days of hospitalization (i.e., inpatient treatment) for mental health care were exceedingly rare, with an average of .53 days over the year ($SD = 1.95$, median = 0).

Table 43. Total Days of Drug Testing, Probation, and Incarceration

		One Year Days Drug Tests	One Year Days Probation	One Year Days Detention/Jail
N	Valid	108	108	108
	Missing	30	30	30
Mean		17.77	110.79	15.79
Median		10.00	.00	.00
Std. Deviation		24.06	140.72	43.25
Minimum		1.00	.00	.00
Maximum		149.00	360.00	246.00

As illustrated above, adolescents reported that they were given an average of 17.77 drug tests ($SD = 24.06$, median = 10) over the year. Annual days on probation appeared to be especially variable with an average of 110.79 days ($SD = 140.72$), but a median of zero days. Nearly half (48%) of the sample reported being on probation at some point during the year following treatment entry. Notably, 30% of the sample spent at least 200 days of the year on probation, while 15% of the sample indicated that they were on probation for the entire year. Annual days spent in juvenile detention or jail was also quite variable with an average of 15.79 days ($SD = 43.25$), but with a median of zero.

Spearman's rho non-parametric correlations are listed below for associations between annual summed treatment/service amounts and past-90-day values for proportional days of use and symptoms of general mental distress at the year-one follow-up:

Table 44. Correlations Between Annual Amount of Treatment/Services Received and Days of Any Substance Use and Symptoms of General Mental Distress

Correlations				
			days of use	gmdi
Spearman's rho	OneYearDaysInpt	Correlation Coefficient	-.184	.113
		Sig. (2-tailed)	.058	.247
		N	107	107
	OneYeaDaysOutpt	Correlation Coefficient	-.024	.132
		Sig. (2-tailed)	.810	.176
		N	107	107
	OneYearDaysTx	Correlation Coefficient	-.236*	.106
		Sig. (2-tailed)	.014	.278
		N	107	107
	OneYearDaysSlfHlp	Correlation Coefficient	-.021	.137
		Sig. (2-tailed)	.830	.157
		N	108	108
	OneYearDaysMHHosp	Correlation Coefficient	.091	.131
		Sig. (2-tailed)	.343	.170
		N	111	111
	OneYearDaysMHOP	Correlation Coefficient	.038	.158
		Sig. (2-tailed)	.693	.103
		N	108	108
	OneYearDaysTxMH	Correlation Coefficient	.051	.159
		Sig. (2-tailed)	.602	.101
		N	108	108
	TRTXdays	Correlation Coefficient	-.087	-.022
		Sig. (2-tailed)	.380	.823
		N	103	103
	TXepisodes	Correlation Coefficient	-.045	.082
		Sig. (2-tailed)	.657	.418
		N	100	100

*. Correlation is significant at the 0.05 level (2-tailed).

It is interesting and somewhat surprising to note that none of the treatment measures were significantly associated with symptoms of general mental distress at the year-one follow-up, including mental health treatment. In addition, only overall days of substance abuse treatment showed significant association with days of substance use at the year-one follow-up point ($r = -.236$, $p = .014$). This relationship was in the expected direction (i.e., more substance abuse treatment was related to less days of substance use).

Spearman's rho non-parametric correlations are listed below for associations between annual summed days of drug testing, probation, and detention and these same outcomes of interest (i.e., days of substance use and symptoms of mental distress):

Table 45. Correlations Between Amount of Drug Testing/ Probation/ Incarceration and Days of Any Substance Use

Correlations			
			Daysofuse
Spearman's rho	OneYearDaysDrgTst	Correlation Coefficient	-.132
		Sig. (2-tailed)	.173
		N	108
	DaysProbationYR	Correlation Coefficient	-.258(**)
		Sig. (2-tailed)	.007
		N	108
	DaysDetJailYR	Correlation Coefficient	-.132
		Sig. (2-tailed)	.173
		N	108

** Correlation is significant at the 0.01 level (2-tailed).

Overall, only days on probation showed significant correlation with days of use at the year-one follow-up ($r = -.258$, $p = .007$). Again, this relationship was in the expected direction, with greater days of probation being associated with less days of substance use.

Given that overall days of substance abuse treatment and overall days of probation were the only variables to show significant correlations with days of use, they were the only two variables included for the negative binomial regression of days of substance use at year-one. As noted earlier, all of the variables of interest violate assumptions of normality and homoscedasticity, necessitating the use of a negative binomial regression approach.

Table 46. Negative Binomial Regression – Days of Use

Number of observations	=	107				
LR chi2(2)	=	4.71				
Prob > chi2	=	0.095				
Pseudo R2	=	0.037				
Dispersion	=	mean				
Log likelihood	=	-61.216				
<u>daysofuse</u>	<u>Coef.</u>	<u>Std. Err.</u>	<u>z</u>	<u>P> z </u>	<u>[95% Conf. Interval]</u>	
oneyrdaysSATx	-.007	.005	-1.48	0.139	-.017	.002
oneyrdaysprobation	-.002	.002	-1.19	0.233	-.005	.001
constant	-.654	.335	-1.96	0.051	-1.310	.001

By themselves, overall days of substance abuse treatment and overall days of probation were not significant predictors of days of use at the year-one follow-up. Although the two variables approach significance together, they account for less than 4% of variance in days of use.

Spearman's rho non-parametric correlations are listed below for associations between annual summed treatment/services amounts and the other outcomes of interest (i.e., amount of conduct disorder symptoms and criminal offending behaviors):

Table 47. Correlations Between Days of Treatment/Services and Mean Number of Conduct Disorder Symptoms and Criminal Behaviors

		Correlations			
			cdsum	cdsumx	crimesum
Spearman's rho	OneYearDaysInpt	Correlation Coefficient	.064	.066	.022
		Sig. (2-tailed)	.515	.498	.825
		N	107	107	107
	OneYeaDaysOutpt	Correlation Coefficient	.303*	.286*	.038
		Sig. (2-tailed)	.002	.003	.700
		N	107	107	107
	OneYearDaysTx	Correlation Coefficient	.124	.117	-.076
		Sig. (2-tailed)	.204	.231	.438
		N	107	107	107
	OneYearDaysSlfHlp	Correlation Coefficient	.186	.155	.089
		Sig. (2-tailed)	.054	.110	.362
		N	108	108	108
	OneYearDaysMHHosp	Correlation Coefficient	.125	.113	.028
		Sig. (2-tailed)	.192	.239	.770
		N	111	111	111
	OneYearDaysMHOP	Correlation Coefficient	.155	.192*	.113
		Sig. (2-tailed)	.110	.047	.244
		N	108	108	108
	OneYearDaysTxMH	Correlation Coefficient	.166	.201*	.127
		Sig. (2-tailed)	.087	.037	.192
		N	108	108	108
	TRTXdays	Correlation Coefficient	.085	.069	.003
		Sig. (2-tailed)	.392	.486	.977
		N	103	103	103
	TXepisodes	Correlation Coefficient	.299*	.296*	.131
		Sig. (2-tailed)	.002	.003	.193
		N	100	100	100

**· Correlation is significant at the 0.01 level (2-tailed).

*· Correlation is significant at the 0.05 level (2-tailed).

Overall, days of outpatient substance abuse treatment was significantly correlated with sum of conduct disorder symptoms (CDsum) at the year-one follow-up, ($r = .303$, $p = .002$), but not in the expected direction (i.e., greater amount of treatment was associated with more conduct problems). Furthermore, overall days of peer self-help group meetings just missed significant correlation ($r = .186$, $p = .054$) with CDsum.

Both days of outpatient substance abuse treatment and days of any mental health treatment showed significant association with CDsumX ($r = .201$, $p = .037$) which counted current symptoms of truancy and curfew violations regardless of age of initiation. Again, these correlations were not in the expected direction (i.e., greater treatment was associated with more behavioral problems). The positive nature of the relationship between greater treatment and greater behavioral problems may be a product of families being motivated to get their teens additional treatment when youth are evidencing more overt behavioral issues. Notably, mental health treatment was only significantly correlated with conduct disordered behaviors when all engagement in truancy and curfew violations was included, two behaviors that parents are likely to be aware of and motivated to address.

Spearman's rho non-parametric correlations are listed below for associations between annual summed days of drug testing, probation, and detention and these same outcomes of interest (i.e., conduct disorder symptoms and criminal offending behaviors):

Table 48. Correlations Between Amount of Drug Testing/
Probation/Incarceration And Mean Number of
Conduct Disorder Symptoms and Criminal Behaviors

Correlations					
			cdsum	cdsumx	crimesum
Spearman's rho	OneYearDaysDrgTst	Correlation Coefficient	.290*	.285*	-.034
		Sig. (2-tailed)	.002	.003	.727
		N	108	108	108
	DaysProbationYR	Correlation Coefficient	.175	.163	.044
		Sig. (2-tailed)	.070	.092	.650
		N	108	108	108
	DaysDetJailYR	Correlation Coefficient	.074	.067	.054
		Sig. (2-tailed)	.444	.488	.580
		N	108	108	108

**. Correlation is significant at the 0.01 level (2-tailed).

Somewhat surprisingly, days of probation and days of detention/jail failed to be significantly correlated with behavioral problems, either in terms of conduct disorder symptoms or criminal offending behaviors. Annual days of drug testing demonstrated significant correlation with conduct disorder symptoms, but this was again in a positive and unexpected direction (i.e., more drug testing was associated with more conduct disordered behavior). It is notable that none of the treatment/services variables were significantly associated with criminal behavior at year-one (including days of probation), but as noted earlier, criminal offending is increasingly uncommon by the 12-month follow-up.

In terms of treatment received, only days of outpatient substance abuse treatment and days of self-help attendance showed significant correlation with conduct disorder symptoms. These variables were therefore selected for the negative binomial regression of CDsum (i.e., current truancy and curfew violations counted only if behavior was manifest before age 13). Similarly,

overall days of outpatient substance abuse treatment and overall days of any mental health treatment were selected for negative binomial regression of CDsumX (current truancy and curfew violations counted regardless of age of initial age of initiation). Results of the negative binomial regressions for CDsum and CDsumX are shown below:

Table 49. Negative Binomial Regression – CDsum

Number of observations	=	107				
LR chi2(2)	=	7.04				
Prob > chi2	=	0.030				
Pseudo R2	=	0.019				
Dispersion	=	mean				
Log likelihood	=	-184.850				
cdsum		Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
oneyrdaysSAoutpt		.009	.006	1.68	0.092	-.002 .020
oneyrdayselfhelp		.003	.003	1.22	0.223	-.002 .008
cons		-.017	.241	-0.07	0.944	-.490 .456

Results indicated that neither days of outpatient substance abuse treatment nor days of self-help group meetings significantly predicted conduct disorder symptoms (CDsum) at year-one.

Table 50. Negative Binomial Regression – CDsumX

Number of observations	=	107				
LR chi2(2)	=	7.09				
Prob > chi2	=	0.029				
Pseudo R2	=	0.018				
Dispersion	=	mean				
Log likelihood	=	-199.696				
<u>cdsumx</u>	<u>Coef.</u>	<u>Std. Err.</u>	<u>z</u>	<u>P> z </u>	<u>[95% Conf. Interval]</u>	
oneyrdaysSAoutpt	.010	.005	2.13	0.033	.001	.020
oneyrdaysMHtx	.005	.004	1.43	0.154	-.002	.013
constant	.220	.209	1.05	0.293	-.190	.630

Results indicated that days of mental health treatment did not significantly predict conduct symptoms of conduct disorder. Days of outpatient substance abuse treatment did significantly predict conduct disorder symptoms (CDsumX) at the year-one follow-up but the model accounts for less than 2% of the variance.

In general, the results of the correlations and regressions showed that the nature or amount of treatment received failed to predict or account for differences in the outcomes of interest (i.e., substance use, mental distress, and behavioral problems) at the year-one follow-up point. This may be due in part to the fact that the majority of adolescents received a considerable amount and variety of treatment over the course of the year. Although the standard deviations noted earlier demonstrate the high variability in the days of treatment received, even median values indicate 30 days of inpatient substance abuse treatment, 18 days of outpatient substance abuse treatment (often representing over 4-months of weekly outpatient sessions), and 58 peer self-help meetings. This is in addition to a median of 13 days of mental health services (again often representing

approximately 3 months of weekly outpatient mental health sessions). In addition, sums for variables such as conduct disorder symptoms and criminal offending behavior were relatively low and restricted in range by the year-one follow-up.

CHAPTER IV

DISCUSSION

The current study was designed to examine how relationships between substance abuse and behavioral problems change for adolescents over time. Within the research literature, terminology for adolescent behavioral problems usually takes the form of either “delinquency” or “conduct disorder.” Delinquency is often broadly defined as antisocial and/or illegal behavior among juveniles. Antisocial and/or illegal behaviors also make up the core of what constitutes conduct disorder. Conduct disorder can be broadly defined as the violation of the basic rights of others or violation of major age-appropriate societal norms or rules. Conduct disorder behaviors include aggression to people or animals, destruction of property, deceitfulness or theft, and/or serious rule violations (e.g., truancy, curfew violations, running away). Thus, delinquent and conduct disorder behaviors are analogous in that they both connote the same types of behaviors among youth, but diagnosis of conduct disorder requires that individuals meet the specific thresholds (i.e., presence of at least 3 conduct disorder symptoms) outlined in the criteria from the DSM-IV-TR (American Psychiatric Association, 2000).

Research findings have been inconsistent in terms of finding associations between substance use and delinquency among adolescents. Paradise and Cauce (2003) have suggested that the lack of consistent research findings for associations between substance abuse and delinquency may be a result of different base rates of substance use and behavior problems between conventional

samples (e.g., community and high school) and “at-risk” populations. The authors have added that if there is a dependable relationship between substance use and delinquent behavior for adolescents, it will be more likely found in “at-risk” populations that include youth who consistently use substances and get into legal trouble, exactly the young people who are least likely to appear in representative high school samples. Mason and Windle (2002) have highlighted the need for more research to examine potential connections between more serious manifestations of substance abuse (e.g., hard drug use) and offending behavior (e.g., crimes involving confrontation with a victim such as assault or armed robbery). Mason and Windle have also stressed that more multi-wave, longitudinal studies are needed to examine changing relationships between substance use and delinquency during adolescence.

The current study utilized a sample of adolescents who required substance abuse treatment at the inpatient level. Admissions criteria for such programs generally include adolescents who are at the higher end of the continuum for substance abuse, as well as for behavioral problems. The study had a number of other potential advantages, most notably multi-wave data collected over a relatively long, two-year follow-up period with very good retention rates. This format allowed for the examination of the persistence of substance abuse/dependence, substance-related problems, mental distress, sexual behavior, antisocial and/or illegal behaviors, and conduct disorder over the two-years following exposure to inpatient substance abuse treatment.

The formal conduct disorder diagnosis has been shown to be applicable to the majority of adolescents in inpatient substance abuse treatment. Despite high comorbidity rates between substance abuse and conduct disorder among youth presenting for treatment, many substance abuse programs, including the facility used for the study, focus little attention on treatments specifically designed for conduct disorder. These programs instead subscribe to a “spill over” philosophy in which abstinence from substance use will hopefully result in a subsequent cessation of behavioral problems. This is due, in part, to the assumption that substance use “drives” behavioral problems like theft, deceitfulness, truancy, curfew violations, and running away. However, intensive targeted interventions may be needed for adolescents who demonstrate more severe (i.e., persistent and diverse) delinquent behaviors (Myers, Stewart, & Brown, 1998).

Nature and Frequency of Substance Use Across Time

The current study was able to examine the nature and frequency of substance use among teens in the sample, both prior to their entry into an inpatient substance abuse treatment program and in the months and years after treatment exposure. The study was also able to account for any time spent in “controlled” environments (e.g., juvenile detention, inpatient treatment) so that any reductions in substance use should not have been attributable to enforced abstinence or lack of accessibility.

For many analyses, multilevel negative binomial regressions were used to provide estimated values that reflect adjustments made for variables that were highly skewed. For example, the frequency of substance use variable was highly

skewed towards the higher end of the continuum (i.e., more frequent use), particularly at treatment intake. Multilevel negative binomial regression has become the preferred method for testing repeated measures in longitudinal data analysis and the estimated values that are generated by this approach are preferable to simple means

Initial analyses for change over time focused on the ways in which substance use changed for adolescents from treatment entry through the 3-, 6-, 9-, 12-, and 24-month follow-up points. Results indicated that estimated days of any substance use appeared to change significantly over time. Estimated days of any substance use dropped significantly from more than 70% of days at treatment intake to slightly more than 20% of days at the first 3-month follow-up. Estimated days of any substance use steadily increased from the 3-month follow-up point to the follow-up at year two. While estimated days of any substance use never again achieved pre-treatment levels, days of any substance use approached half of all days at the year-two follow-up.

The majority of substance use reported among the sample involved alcohol and marijuana use, with 94% of the sample endorsing recent use of both of these substances in the 90-days before treatment entry. In normative samples (MTF; Johnston et al., 2011), alcohol and marijuana remain the most common substances that adolescents endorse as recently (i.e., past-month) used, albeit at much lower rates (27% and 15% respectively) than the clinical sample used in the study.

Although marijuana use may not be normative within the overall population, it is worth noting norms within the sub-culture of people in the general community who partake in marijuana use. For example, results from the National Survey of Drug Use and Health (SAMHSA, 2011) indicated that 40% of all current marijuana users (ages 12 and up) reported using marijuana at least two-thirds of all days (i.e., 20 or more of the past 30 days). In other words, frequent marijuana use appears to typify a substantial proportion of all marijuana users in the general community.

Consumption of substances besides alcohol and marijuana was not unusual among the sample, especially prior to treatment. Nearly half of the sample (49%) reported hallucinogen use at baseline, followed closely by use of amphetamines or other stimulants (44%). In addition, approximately one-fifth of the sample also reported use of opiates/pain killers (20%) or cocaine (19%) prior to treatment entry. By the year-two follow-up, past-90-day endorsement rates for any use of hallucinogens (22%), amphetamines/other stimulants (18%), opiates/pain killers (17%), and cocaine (15%) were substantial, but all considerably lower than baseline. Past-90-day rates for use of tranquilizers, crack, sedatives/downers, inhalants, heroin, and PCP were all relatively uncommon (less than 10% endorsement) from baseline onwards.

Although poly-substance use is standard among adolescents in substance abuse treatment, it is particularly noteworthy how common hallucinogen and amphetamine use were among the sample, especially at baseline (49% and 44% respectively). Among adolescents in normative samples (MTF; Johnston et al.,

2011), endorsement rates for recent use of amphetamines are only 3%, while rates for recent use of hallucinogens are only 2%. It should be noted that although amphetamine use is fairly uncommon in normative samples, this class of drugs does represent the most commonly used “illicit” drug among adolescents, following behind only alcohol, marijuana, and inhalants in terms of lifetime use. In fact, results from the 2010 MTF study (Johnston et al., 2011) indicated that 9% of all high school students reported some “non-medical” use of amphetamines in their lifetime. The widespread recent use of hallucinogens in the sample may have been somewhat an artifact of the region (i.e., Northern California) from which the sample was taken. The Bay Area, with San Francisco in particular, has been historically associated with psychedelics. Furthermore, perceived accessibility of ecstasy was around its historical high at the time the sample was collected (around 60% of high school seniors claimed that ecstasy would be easy to obtain), much higher than the current national rate (around 36% of high school seniors claimed ecstasy would be easy to obtain).

In terms of frequency of “other” drug use (i.e., use of drugs besides alcohol and marijuana), adolescents in the sample reported using drugs besides alcohol and marijuana an average of nearly one-fifth of all days (19%; Median = .08) prior to the start of treatment. Over the 3-, 6-, 9-, and 12-month follow-ups, proportional days of “other” drug use averaged 5-10% of all days. However, the median value for days of “other” drug use was zero across all of these follow-up points.

In order to look at poly-substance use from another angle, days of “other” drug use was divided by days of any substance use for each respondent. Group means at the 3-, 6-, 9-, and 12-month follow-ups indicated that roughly one-quarter (23%-29%) of using days involved drug use besides use of alcohol and marijuana. In other words, about one in every four drug use experiences involved consumption of drugs besides alcohol and marijuana.

It is worth noting that while recent use of alcohol and marijuana appeared equally likely among the sample at baseline (94%), recent use of alcohol (71%) exceeded recent use of marijuana (60%) at the year-two follow-up. Alcohol and marijuana may have remained the drugs of preference for a number of reasons. In particular, alcohol and marijuana are often described as more affordable or easily accessible than other drugs (e.g., cocaine or heroin). These potential differences in drug accessibility may dictate that frequency of “other” drug use is based more on situational opportunity (e.g., parties), whereas alcohol and/or marijuana are actively sought out for regular use. Alcohol and marijuana are also considered by many to be more socially acceptable than “hard drugs,” especially in terms of regular use. Finally, drugs such as hallucinogens, which were the most popular type of substances after alcohol and marijuana, may be less conducive to frequent or “everyday” use given that their effects can be particularly unpredictable and can span 10 to 12 hours or more.

The lower follow-up rates for drugs besides alcohol and marijuana suggested that few if any adolescents were continuing to diversify their drug use or graduating to “harder” drugs like cocaine or heroin/opiates. There is some

anecdotal evidence of teens in drug treatment adjusting their substance use based on drug test detection windows. For example, marijuana is detectable in urine screens up to one week after a single use and up to two months after prolonged use. In contrast, stimulants like cocaine are only detectable in urine up to 3 days after a single use and up to 4 days after prolonged use. In addition, opiates like heroin are only detectable in urine up to two days (Baer, Paulson, & Williams 2009-2010). It does not appear that substance use among the sample changed due to ease of detection, at least in terms of abandonment of marijuana or adoption of stimulant or opiate use. However, it is worth noting that alcohol is detectable in urine screens for less than even one day, possibly accounting for some of the alcohol use within the sample.

Prevalence of Conduct Disorder

As mentioned previously, rates of conduct disorder among clinical samples of adolescents in substance abuse treatment are generally quite high (e.g., upwards of 95% in some studies), especially among the 20% of teens involved in substance abuse services who meet eligibility for treatment at an inpatient or residential level. The sample used for the current study was no exception, with 83% of adolescents falling into the conduct disorder category at baseline when adhering to DSM-IV criteria. As noted, according to DSM-IV criteria, truancy and curfew violations differentiate those youth with conduct disorder only if these behaviors are manifest prior to age thirteen. However, given that adolescents in the sample reported lifetime averages of well over one hundred incidents of skipping school and violating curfew, supplemental analyses were conducted

which included these current behaviors regardless of age of initiation. Notably, an overwhelming 95% of the sample fell into the conduct disorder category when counting truancy and staying out late regardless of whether these behaviors were initiated before the teen years.

Given consistent findings that suggest males are more likely to exhibit overt behavioral problems than their female counterparts, independent samples t-tests were used to examine any gender differences in conduct disorder symptomatology. Although results indicated that male and female study participants differed significantly for the mean number of conduct disorder symptoms at treatment entry, both males and females reported an average number of conduct disorder symptoms exceeding the 3 required for conduct disorder diagnosis. More specifically, males reported an average of 6.36 symptoms of conduct disorder, while their female peers reported an average of 4.57 symptoms. These averages were even higher (7.42 symptoms for males, and 5.61 symptoms for females) when including truancy and staying out late regardless of whether these behaviors started before the teen years. It is noteworthy that at baseline, males in the sample endorsed an average (1.48 symptoms) for severe conduct disorder symptoms greater than the one symptom required of diagnosis of severe conduct disorder. In contrast, females in the sample endorsed an average of less than one severe conduct disorder symptom even at treatment entry (mean severe symptoms = .57). In general, results suggested that prior to treatment entry, males were more willing or predisposed to display symptoms of conduct disorder, including engagement in acts causing considerable harm to others.

Notably, no significant differences were demonstrated between males and females at the year-one and year-two follow-ups, with the lone exception of symptoms of severe conduct disorder behavior at year-one. It is important to note that the averages for number of severe conduct disorder symptoms were very low by the one-year follow-up, representing fractions of one single symptom for both males and females (.81 symptoms versus .37 symptoms respectively).

Persistence of Conduct Disorder Over Time

One of the main goals of the current study was to examine whether qualitatively different groups existed within the broad conduct disorder diagnosis applicable to the majority of adolescents entering inpatient substance abuse treatment. More specifically, the study attempted to look at whether adolescents with severe conduct disorder (i.e., those engaging in behaviors causing considerable harm to others) followed different trajectories than their mild/moderate counterparts. This inquiry was predicated largely on research that suggests two pathways for delinquent behavior based on the onset and persistence of behavioral problems. One of the pathways, postulated within this framework, is typified by life-course persistent offenders who demonstrate a stable history of deviant behavior from childhood, a wide range of antisocial behavior across multiple and diverse settings, and failure to alter behavior despite opportunities to desist. The contrasting pathway is typified by adolescence-limited offenders who exhibit a later-onset of delinquent behavior, less severe offending, and involvement in offending that lasts for a relatively short period of time.

Using the entire sample, sub-groups were created to try to discriminate between adolescents who met criteria for conduct disorder (i.e., endorsement of at least 3 DSM-IV symptoms of conduct disorder), but whose activities did not cause considerable harm to others (i.e., mild/moderate sub group) and those who met criteria for conduct disorder, but endorsed at least one “severe” symptom (e.g., physical cruelty, breaking and entering, taking things from others by force, using weapons in fights, etc.). The intention was to then examine whether adolescents with severe conduct disorder followed different trajectories and displayed greater persistence of behavioral problems over time as compared to their mild/moderate counterparts.

Despite the high levels of conduct disorder at baseline, conduct disorder did not persist over time for most of the sample, regardless of initial sub-groupings. As mentioned, the majority (83%) of the sample met DSM-IV criteria for conduct disorder at treatment entry. Moreover, of those meeting DSM-IV criteria for conduct disorder at baseline, more than two-thirds (69%) fell into the severe conduct disorder category by virtue of endorsing at least one severe conduct disorder symptom prior to treatment. Despite the high rates of conduct disorder at treatment entry (i.e., 83%), overall rates for conduct disorder (i.e., combining both the mild/moderate and severe groups) were down to 30% at year-one and 22% at the year-two. Furthermore, rates for severe conduct disorder were down to 17% at year-one and 11% at year-two. Only one-quarter (25%) of those who were in the severe conduct disorder category at baseline remained in this group at the year-one follow-up. In comparison, about 5% of those in the

mild/moderate and no conduct disorder groups at baseline fell into the severe category at year-one. A very small and similar percentage (10%-11%) of each baseline grouping (i.e., no conduct disorder, mild/moderate, and severe) fell into the severe conduct disorder category at year-two, suggesting that diagnosis at treatment entry did not predict presence of severe conduct disorder two years later.

Results of multilevel negative binomial regression indicated that estimated number of conduct disorder symptoms changed significantly over time. At treatment entry, estimates for average number of symptoms of conduct disorder approximated six. By the first follow-up point (in this case, 6-months) the estimated number of conduct disorder symptoms was less than the three required for diagnosis of conduct disorder. By the year-two follow-up, estimated values for number of conduct disorder symptoms approached only one symptom, most commonly lying or conning.

These finding seems to be in contrast to those of researchers like Myers, Stewart, and Brown (1998) who found that 61% of a treatment sample of adolescent substance abusers with comorbid conduct disorder subsequently met criteria for antisocial personality disorder four years after drug treatment. However, it is worth noting that Myers, Stewart, and Brown used separate interviews with a resource person (usually a parent) to provide corroborative information on behaviors indicative of conduct disorder and antisocial personality disorder. The current study was completely reliant upon adolescent self-report

and may have benefitted from corroborative reports from parents or other outside resources.

Persistence of Criminal Activity Over Time

Results of multilevel negative binomial regression analysis for the General Crime Index (GCI) were similar to those of the Conduct Disorder Index (CDI). Estimates for involvement in number of different criminal activities exceeded five at baseline, but dropped to around two at the first (i.e., 6 month) follow-up. Estimated values for involvement in any criminal behavior fell below one activity by the year-two follow-up (most commonly shoplifting). This similarity was not surprising given the considerable overlap in content between the CDI and CGI. The GCI was utilized largely because it contained items not expressly included in the DSM-IV-based conduct disorder criteria making up the CDI, but that were nonetheless representative of serious behavioral problems. Items unique to the GCI included drug dealing, driving under the influence (DUI), taking cars without permission, gang membership, prostitution, and involvement in murder.

Although engagement in drug dealing and driving under the influence were commonly reported prior to treatment entry (57% and 43% respectively), both of these activities were only reported by approximately 17% of the sample at year-one and only 11% of the sample at year- two. Taking cars and gang membership were endorsed by a comparatively small number adolescents at baseline (28% and 15% respectively), and only less than 4% of the sample endorsed these behaviors at the annual follow-ups. Prostitution and involvement

in murder were exceedingly rare at baseline (less than 3%) and non-existent by the two year follow-up.

Sexual Activity Over Time

Number of sex partners was also examined as a potential measure of problematic behavior among the adolescents presenting for substance abuse treatment. This included partners with whom adolescents had any type of sexual contact (i.e., vaginal, oral, and anal sex). As mentioned, sexually precocious or promiscuous behavior is often considered to be part of a constellation of problem behaviors associated with substance abuse and conduct disorder or delinquency (Elliot et al., 1989; Farrel et al, 1992; McGee & Newcomb, 1992). In addition, numerous research studies have shown positive associations between alcohol and marijuana use and early onset of sexual intercourse, engagement in unprotected sex, and having multiple sexual partners (Corbin & Fromme, 2002; Marlow, Devieux, Jennings, Lucenko, & Kalichman, 2001; Parkes, Wright, Henderson, & Hart. 2007; St. Lawrence, Crosby, Brasfield, & O'Bannon, 2002; Stueve & O'Donnell, 2005). It was of particular interest whether reductions in substance use were associated with reductions in sexual activity.

Results of the multilevel negative binomial regression indicated that the estimated number of sexual partners during the past-90-days did not change significantly over time. From treatment entry through the year-two follow-up, adolescents averaged less than two sex partners during the previous 90-days, with a median of one partner. It is interesting to note that roughly one-quarter or more of the sample reported no sexual partners at any given follow-up. A little less

than a tenth (9%) of the sample reported no sex partners throughout the first year after treatment entry.

At the one-year follow-up, adolescents averaged 17-years-old. The 91% endorsement rate for annual sexual activity among the sample is considerably higher than rates found in the general population. For large normative samples of adolescents aged 15- to 19-years-old, a little more than half (53%) of both males and females report being sexually active during the past year (Mosher, Chandra, & Jones, 2005).

Summing the number of sex partners reported for the 3-, 6-, 9-, and 12-month follow-ups yielded an average of a little more than 6 sex partners, with a median of 5 partners. Again, these averages are considerably higher than the number of sex partners reported in the general population. In normative samples, a little more than one-fifth of males (23%) and females (21%) between the ages of 15- and 19-years-old, report more than one annual sex partner. Furthermore, only slightly more than one-tenth (11%) of 15- to 19-year-old males and females report 3 or more sexual partners in a given year (Mosher, Chandra, & Jones, 2005). It should be noted, however, that the items measuring sex partners did not allow the ability to discriminate whether the partners counted during these follow-up windows were unique. In other words, an adolescent in a single monogamous relationship over the year could report one partner at the 3-, 6-, 9-, and 12-month follow-up, which would yield a sum of four.

Overall, there was no significant correlation between frequency of substance use and number of sexual partners. Thus, number of sexual partners for

adolescents in the sample appeared to be largely independent of substance use, although it is possible that substance use compromised sexual decision-making (e.g., safer sex practices) in some other fashion. However, results measuring whether respondents were sexually active, as well as their average number of annual sexual partners, suggested that adolescents in the sample were more sexually active or precocious than their normative peers.

Potential Explanations for Reductions in Conduct Disorder Symptoms and Criminal Activity

At baseline, adolescents in the sample averaged 16-years-old, yet they were demonstrating diverse and significant behavioral problems in the months leading up to treatment. At treatment entry, the vast majority of adolescent (84%) in the sample admitted that they were skipping school and violating curfew, with the average for lifetime incidents of truancy and curfew violations exceeding 120 occasions. At treatment entry, more than half of the sample admitted to shoplifting (69%), stealing (62%), drug dealing (57%), vandalism (55%), and physical fights (54%). As mentioned, adolescents in the sample also appeared to be more sexually active than their normative peers.

Despite the relatively early and diverse engagement in deviant behaviors, adolescents in the sample appeared to largely disengage from these behaviors quickly, with the notable exception of substance use. It is important to emphasize that reductions in reported symptoms of antisocial or illegal behavior are unlikely to be explained by changes in willingness to endorse illicit activity, especially since the respondents were still reporting plenty of substance use.

These post-treatment reductions in deviant or criminal behaviors are consistent with other research findings. For example, Farabee and colleagues (2001) examined a pooled substance abuse treatment sample of 1,167 adolescents and found about two-thirds (68%) of criminal justice-supervised youth and about half (49%) of non-supervised youth reported engagement in criminal acts to obtain drugs or to obtain money to get drugs prior to treatment entry. Results indicated that both groups significantly reduced their engagement in drug-related crime following treatment exposure, with only 27% of criminal justice-supervised youth and 22% of non-supervised youth reporting engagement in drug-related crime in the year following treatment entry. In addition, Jainchill, Hawk, & Messina (2005) examined a sample of 282 adolescents from a residential, therapeutic-community-based substance abuse treatment program. At treatment entry, 68% of the sample reported a history of engagement in property crime and 49% admitted to involvement in serious violent crime. Results indicated that only 30% of the sample endorsed any engagement in violent acts over the 5-years following treatment, with only around one-fifth admitting to property crimes (21%) or weapons offenses (18%) over this same extended time period.

These findings are somewhat in contrast to age-crime trends based on official records which show that rates for offending behaviors (i.e., arrests and convictions) tend to escalate into young adulthood. However, authors such as Moffitt (1993) have noted that the “age-crime curve” can look different depending on whether or not studies utilize arrest data versus other measures (e.g., self-report) of antisocial behavior. Moffitt highlights findings based on

official police data suggesting that although prevalence rates for new offenders peak around age 16, incidence rates for arrests continue to increase into early adulthood. The author suggests that this may be due in part to the persistence and escalation of around 5% of offenders who go on to account for about 50% of all known crimes. Moffitt states that subsequent developmental research on childhood conduct disorder has suggested that there is a steep incline in anti-social behavior from age 7 to age 17, before a steep decline in this behavior between ages 17 and 30.

The dramatic decline in deviant and criminal behavior demonstrated by adolescents in the current sample may be largely attributable to processes of natural maturation. Normative maturation is often offered as a likely explanation for the traditional “age-crime curve” in which offending declines following a peak in late-adolescence (Murray & Farrington, 2010). Recent studies have documented that over the course of adolescence and early adulthood, both males and females show normative growth in planning (Albert et al., 2009), preference for delayed rather than immediate rewards (Steinberg et al., 2009), attentiveness to the salience of costs versus rewards (Cauffman et al., 2010), impulse control (Steinberg et al., 2008), and resistance to peer influence (Steinberg & Monahan, 2007).

Research findings have shown that even “serious” delinquent youth become increasingly less likely to associate with deviant peers over time, as well as increasingly less susceptible to the negative influence of those deviant peers with whom they continue to associate (Chassin et al., 2010). Monahan, Steinberg,

and Cauffman (2009) note that the decline in susceptibility to peer influence between middle adolescence and young adulthood has been attributed to identity development and behavioral autonomy occurring in later adolescence. Chassin and colleagues (2010) add that youth may become less deviant over time because the other members of their peer group become less antisocial as they all go through the same process of normative maturation.

Furthermore, recent findings by Chassin and colleagues (2010) suggest that reductions in marijuana may be positively related growth in psychosocial maturity among delinquent youth. The authors found that among a sample of 1,170 serious male juvenile offenders, those youth who decreased their marijuana use in the three years following adjudication showed significant growth in psychosocial maturity. This finding remained true even among those youth who reduced marijuana use, but continued to display elevated levels of alcohol use.

The fact that the vast majority of adolescents in the sample appeared to demonstrate a pattern of antisocial and/or illegal behavior that is consistent with the adolescence-limited (versus life-course persistent) pathway described earlier may also be attributed to the less severe nature of the behavioral problems they endorsed. Overall, inclusion into the severe conduct disorder category at baseline was mostly attributable to the endorsement of an average of approximately one severe conduct disorder symptom. The most commonly endorsed severe conduct disorder symptom across all interviews was physical cruelty. Physical cruelty was reported by 42% of the sample at baseline, which happens to be the same percentage of the sample who endorsed bullying. Notably, percentage of

adolescents who endorsed physical cruelty dropped to 11% at the year-one follow-up and 6% at the year-two follow-up. No examples were given for the item asking adolescents whether they had been physically cruel to other people, so it is difficult to ascertain what behaviors respondents considered cruel (i.e., what constituted physical cruelty). It is interesting to note that a related item on the General Crime Index yielded somewhat smaller endorsements among the sample. More specifically, the item measuring whether adolescents had “hurt someone badly enough that they needed bandages or a doctor” was endorsed by 31% of the sample at baseline (versus the 42% endorsement rate for physical cruelty), 8% at the year-one follow-up, and 4% at the year-two follow-up. In addition, the context of physically cruel behavior was also unclear (e.g., actions potentially taken in self-defense).

The second most commonly endorsed severe conduct disorder symptom was breaking and entering. This item was endorsed by 30% of the sample at baseline, but only 4% at year-one and 2% at year-two. The breaking and entering item was actually taken from the General Crime Index and added to the Conduct Disorder Index given that breaking and entering is listed in the DSM-IV as an example for the type of behavior that distinguishes those individuals who fit into the severe conduct disorder category. Although the more extreme nature of breaking and entering may distinguish adolescents with severe behavioral issues, it can be argued that this behavior is not of the same nature as those that cause considerable harm to others.

In terms of other actions that cause considerable harm to others, it is notable that even at baseline, less than one-fifth of the sample reported taking things by force (19%) or using weapons in fights (17%). Cruelty to animals (7%) and forced sex (1%) were even more rarely endorsed by adolescents at treatment entry. Furthermore, taking things by force, using weapons in fights, cruelty to animals, and forced sex were all reported by less than 5% of the sample at year-one and less than 2% of the sample at year-two.

The authors of the DSM-IV-TR (American Psychiatric Association, 2000) have noted that onset of conduct disorder can be present as early as 5 or 6 years old. DSM-IV-TR authors also specify two subtypes of conduct disorder based on age-of-initiation. More specifically, a childhood-onset (versus adolescent-onset) subtype of conduct disorder is used to differentiate those youth for whom conduct disorder symptoms are present before the age of 10-years-old. Loeber, Burke, and Pardini (2009) highlight numerous research findings suggesting that childhood-onset conduct disorder is particularly associated with a more persistent and severe trajectory of antisocial behavior throughout adolescence and beyond. Although, adolescents in the sample appeared to be somewhat “early out of the gate” in terms of engagement in precocious and illicit behaviors, only about one-third of the sample indicated that they were skipping school and staying out late before they reached their teens (i.e., before age 13).

Even given these potential explanations for the decline in deviant and criminal behaviors (i.e., maturation, relatively limited engagement in actions causing significant harm, minority of those showing childhood-onset of antisocial

behavior), it is still somewhat remarkable how quickly the change in behavioral problems appeared to take place (i.e., largely within one-year of treatment entry). At the year-one follow-up, respondents were only averaging 17-years-old, an age at which elevated “delinquent” behavior is still relatively normative.

It is likely that adolescents in the sample changed their criminal behavior due, at least in part, to increasing sanctions for “repeat” offenders (e.g., potential incarceration for violations of probation conditions). Although only 11% of the sample were referred to the treatment facility by the criminal justice system, nearly half (48%) of the adolescents in the study reported being on probation at some point in the year following treatment entry. In addition, 30% of the sample reported being on probation at least 200 days of the year following treatment.

Furthermore, it is highly probable that adolescents who wished to continue using substances recognized that they could do so with much greater impunity if they stopped drawing unwanted attention from authorities (i.e., parents, criminal justice system, etc.) through overtly aggressive, illicit, or destructive behaviors. In other words, many adolescents may have been strongly motivated to change behavior in order to placate authorities, which in turn, allowed them to operate “under the radar” and pursue their ultimate goal of unencumbered substance use.

Changes in Symptoms of Mental Distress

In addition to a focus on antisocial and/or illegal behavior, the current study also looked at symptoms of mental distress (i.e., symptoms of anxiety, depression, somatization, etc.) over time, both prior to entering into inpatient substance abuse treatment and over the two-years after treatment exposure.

Results from multilevel negative binomial regression indicated that estimated symptoms of general mental distress declined significantly over time in a linear fashion. At baseline, most adolescents reported substantial issues related to mental distress, endorsing an average of approximately 9 symptoms. At treatment entry, more than half of the sample reported irritability/temper (75%); feeling misunderstood (68%); getting into lots of arguments (62%); feeling very trapped, depressed, or hopeless about the future (61%); impaired memory, concentration, or decision making (61%); sleep disturbance (60%); loss of energy or interest (57%); and repetitive thoughts and actions (51%). These symptoms were closely followed by feeling very shy, self-conscious or uneasy (48%) and feeling very anxious, tense, or scared (46%). A sizable minority of the sample (38%) also endorsed thoughts of ending their life or committing suicide, further demonstrating the acute psychological disturbance exhibited by many of the adolescents entering treatment. Somatic complaints, paranoia, specific phobias, agoraphobia, and hallucinations were considerably less common at treatment intake.

Although adolescents reported significantly fewer symptoms of mental distress over time, a fair number of symptoms remained common. Problems with irritability/anger, loss of energy or interest (i.e., anhedonia), sleep disturbance, and impaired memory, concentration, or decision-making remained particularly common at the year-one and year-two follow-up points (43%-71%). These symptoms are largely consistent with side effects that have been linked to habitual marijuana use, including amotivational syndrome, impaired memory or problem

solving, sleep disturbance, and irritability or agitation (Hubbard, Franco, & Onaivi, 1999; Looby & Earlywine, 2007). There is also some evidence linking these types of symptoms with habitual alcohol use (Weiss et al., 2006).

In general, adolescents appeared to experience substantial reductions in mental distress throughout the two-years following substance abuse treatment. For example, rates of endorsement for suicidal ideation were much lower at the year-one (8%) and year-two (6%) follow-ups, as compared to the 38% of adolescents reporting suicidal ideation at treatment entry. Despite these overall reductions in reports of mental distress, the persistence of symptoms such as diminished interest in work or school (49% of adolescents at year-two), as well as impaired memory or problem solving (43% of adolescents at year-two), may have ultimately exacerbated problems in educational achievement and employment. As noted, baseline results showed that nearly half (48%) of the sample reported some history of receiving some special educational services, with 84% of adolescents in the sample endorsing a pattern of repeated truancy prior to treatment.

By the year-two follow-up, study participants averaged 18-years-old, yet less than half of the sample had earned their high school diploma (30%) or GED (15%). Overall, only 31% of the sample reported that they were attending school full time at the year-two follow-up, while 27% reported working full time. It is worth noting that half of those 17 years or younger (28% of the sample) were still going to school full-time at the year-two follow-up, whereas only around one-quarter of those 18 or older were attending school. Two-years following

treatment, more than one-fifth of the sample (22%) reported being unemployed, while 14% reported part-time work. The remaining 6% of the sample indicated that they were in jail at the two-year follow-up.

Persistence of Substance-Related Problems

The current study was also interested in looking at the extent to which adolescent clients continued to identify and endorse problems associated with their substance use. Results from multilevel negative binomial regression of past-month symptoms from the Substance Problem Index (SPI) indicated a significant change in substance-related problems from baseline to the 3-month follow-up. Estimates for number of substance-related problems exceeded ten symptoms at baseline. However, estimates for past-month substance-related symptoms remained around three symptoms from the 3-month follow-up point onwards. Estimates for a subset of past-month symptoms that are specific to substance dependence showed a similar change, averaging nearly four symptoms at baseline, but approximating only one symptom (most commonly, spending lots of time acquiring, using, and/or recovering from effects of substances) from the 3-month follow-up onwards.

It is important to note, however, that the degree to which problems seemed to be reduced may have been partly a function of the measure itself. The SPI differed from most of the other scales used for the study in that it did not ask adolescents to report whether or not a symptom or problem was present during the past-90-days. Instead the scale asked respondents to indicate the last time a

symptom was present using the following response options: “in the past month,” “2-12 months ago,” “1 or more years ago,” or “never” (see Appendix B).

Many of the symptoms of the SPI continued to be commonly endorsed by the sample at follow-up points, but endorsement shifted from symptoms being present in the past month to being present “2-12 months ago.” For example, at the year-one and year-two follow-ups, roughly half or more (48%-64%) of the sample endorsed symptoms such as tolerance, using more substances than intended, and substance use resulting in unsafe situations during the past year. However, only around one-fifth (18%-21%) of the sample endorsed these symptoms as having been present during the past month.

It is not surprising that adolescents were most acutely symptomatic immediately prior to treatment entry, as evidenced by the average endorsement of more than 10 substance-related problems at baseline. Results from the National Survey on Drug Use and Health (SAMHSA, 2011) suggest that only 8% of all adolescents who meet criteria for substance abuse/dependence, actually receive any specialized substance abuse services. Furthermore, only about 20% of those adolescents who actually receive specialized substance abuse service do so the inpatient or residential (versus outpatient) level (Dennis et al., 2003; Hser et al., 2001). In order to be eligible for inpatient services, clients need to demonstrate that they are inappropriate for less restrictive levels of care either due to factors such as major behavioral problems, previous unsuccessful outpatient treatment experiences, or unstable living arrangements. Thus, some of the post-treatment

reduction in past-month substance-related problems may be a result of a natural “regression to the mean” from the extreme baseline values.

Adolescents entering inpatient substance abuse treatment are also likely to regard their substance-related problems as especially salient and contemporary (i.e., present in the past-month). In follow-up interviews, adolescents in the sample appeared to acknowledge continued problems related to their substance use, but they also seemed to associate these problems as either infrequent or somewhat unconnected to their most current use. For example, many adolescents readily indicate that they had historically needed more of a substance to get the same effect or that the same amount of a substance no longer yielded the same effect (i.e., tolerance). However, many adolescents attributed their increase in tolerance as having taken place outside of the previous month.

Persistence of Substance Use Disorder Categorization

In addition to looking at change in continuous number of overall substance-related symptoms, the study also examined the continuity of substance use disorders categorization across time. As mentioned, membership in the substance dependence category was based on endorsement of at least 3 of 7 DSM-IV symptoms of substance dependence, whereas the substance abuse category required endorsement of only 1 of 4 DSM-IV symptoms of substance abuse. Membership in the no substance use disorder (SUD) category required that adolescents reported no symptoms of substance abuse or substance dependence.

At baseline, the vast majority of the sample (90%) endorsed enough past-year symptoms to fall into the substance dependence category, not entirely

surprising given that all study participants met admission criteria for inpatient substance abuse treatment. The remaining adolescents in the sample fell into the substance abuse category (9%), with the exception of one client (1%) who failed to endorse any symptoms of abuse or dependence as present in the year before treatment.

At treatment intake, every one of the 11 past-year DSM-IV symptoms of substance abuse/dependence showed endorsement by roughly half or more of the sample (see Appendix J). In fact, at treatment entry more than two-thirds of the sample reported past-year symptoms of spending lots of time acquiring, using, and/or recovering from the effects of substances (94%); using more than intended (80%), continued use despite interference with responsibilities (76%); continued use despite potential fights or problems with the law (75%); giving up important activities due to substance use (71%), and tolerance (67%).

At the year-one follow-up, two-thirds (66%) of the sample endorsed enough symptoms to fall into the substance dependence category, whereas 13% fell into the substance abuse category and 21% fell into the no substance use disorder category. At the year-one follow-up point, 9 of 11 past-year DSM-IV substance abuse/dependence symptoms were still endorsed by roughly half or more of the sample.

By the year-two follow-up, half (50%) of the sample endorsed enough symptoms to fall into the substance dependence group, while roughly one-quarter of the sample fell into either the substance abuse (23%) category or no substance use disorder (27%).category. At the year-two follow-up point, only 4 of 11 DSM-

IV symptoms were endorsed by roughly half or more of the sample. These four most common symptoms remained spending a lot of time acquiring, using, and/or recovering from the effects of substances (57%); tolerance (50%); substance use resulting in unsafe situations (49%); and using more than intended (48%).

Withdrawal problems (28%) and repeated substance-related legal problems (26%) remained the least common past-year symptoms at year-two, which is a trend that persisted from treatment entry onwards.

Overall, fewer substance-related problems were reported at each successive follow-up period despite the fact that frequency of substance use increased steadily from the 3-month follow-up (averaging 19% of days) to the year-two follow-up point (averaging 46% of days). Even given this seeming contradiction, three-quarters (76%) of the sample still endorsed symptoms indicative of substance use disorders (substance abuse or substance dependence) two-years after entering treatment, with half (50%) of adolescents reporting enough symptoms to fall into the substance dependence category at year-two.

As noted, one-fifth (21%) of the sample fell into the no substance use disorder (SUD) group at year-one, and about one-quarter (27%) of the sample fell into the no substance use disorder category at the year-two follow-up point. These values, however, included those adolescents who were abstinent. When looking exclusively at those reporting any substance use, 13% of active users reported no problems related to their substance use at the year-one, while 19% of active users reported no problems associated with their use at year-two. In other

words, nearly one-fifth of adolescents in the sample reported “non-problem” substance use at the two-year follow-up.

It is worth noting that continued endorsement of problems related to substance use may have actually represented a positive treatment effect in some cases. More specifically, adolescents in substance abuse treatment are ideally taught to “connect the dots” and better understand the repercussions or consequence of alcohol and other drug use. For example, programs encourage adolescents to examine how drug use might cause interference with responsibilities or result in abandonment of important activities, as well as the ways that use might contribute to emotional or physical problems. Conversely, limited endorsement of problems related to substance use may have represented minimization of the potential consequences associated with habitual drug use, rather than reflecting healthier functioning.

Minimization of potential problems may help to account for the finding that although 83% of the sample endorsed substance use at the year-two follow-up point, less than half of the sample (45%) endorsed an item about continued use despite knowledge of potential fights or legal problems. Given that the average age of the sample at year-two was 18 years, all alcohol consumption constituted underage drinking which has obvious legal implications, not to mention the widespread use of more illicit substances like marijuana.

It is possible that the reductions for symptoms such as continued use despite interference with responsibilities (76% at baseline versus 37% at year-two) and giving up important activities due to substance use (71% at baseline

versus 36% at year-two) may be attributable to a re-engagement in former activities and re-commitment to social responsibilities. However, it is also possible that some adolescents failed to report interference with important activities or responsibilities (e.g., sports teams, clubs, hobbies) since these things have long since been absent from their lives (i.e., abandonment of these activities was not considered relevant because the activities had been absent since before the past-year reporting window.). Furthermore, reports for symptoms like inability to cut down or stop use (63% at baseline and 36% at year-two) may have been influenced by the possibility that many adolescents had no intention of trying to limit or stop their use, and thus do not see themselves as unable to adhere to such goals or intentions. In addition, although most adolescents failed to demonstrate adherence to minimal use, the fact that they had partially curbed their consumption (e.g., stopped using every day) may have fortified their confidence in their ability to “cut down” on their use.

Prevalence of “Minimal” Use Over Time

As mentioned, most drug treatment programs are 12-step and abstinence based, including the facility used for the current study. Many of these programs view treatment effectiveness in terms of the percentage of their former clients that remain completely free of alcohol and other drugs. Furthermore, many drug treatment outcome studies focus primarily or exclusively on measuring abstinence as an indicator of treatment success. In contrast, the current study sought to also examine the feasibility of minimal substance use over time. Minimal substance use was defined in the study as using 10% or less of days. This cut-off point was

used to create 3 groupings, those reporting no use in the past 90 days (i.e., abstinent group), those who reported using 10% or less of the past-90-days (i.e., minimal use group), and those who reported using more than 10% of the past 90 days (i.e., frequent use group).

Focusing solely on abstinence, results of the 3-month follow-up interview seemed to strongly support the idea of rapid-relapse following exposure to treatment. Nearly three-quarters (74%) of the sample reported engaging in some substance use prior to the first (i.e., 3 month) follow-up point. Again, it is worth noting that the 3-month follow-up interview was conducted around 2 months after participants completed their roughly average one-month inpatient stay. These results are consistent with other research findings which generally estimate that between two-thirds and four-fifths of adolescents (and adults) return to substance use within 6-months of treatment exposure (Ramo & Brown, 2008). In addition, numerous studies measuring mean or median days to relapse have shown that the majority of adolescents return to substance use between one- and three-months after substance abuse treatment (Cornelius et al., 2003; Maisto et al., 2001; Pollock et al., 2001; Ramo & Brown, 2008; Tomlinson, Brown, & Abrantes, 2004).

Rates of engagement in substance use were similarly high at the year-one follow-up, where 72% of the sample reported some substance use in the previous 90-days. It is important to note, however, that roughly half or more of the sample were abstinent or using minimally at the 3-month (57%) and 12-month (48%) follow-up interviews. At the year-two follow-up, the vast majority of the sample

(83%) reported active substance use (i.e., combining minimal and frequent users) in the past-90-days, but 30% of the sample were abstinent or using minimally. That said, minimal use appeared increasingly less common over time. At the 3-month follow-up, 41% of the adolescents who reported active substance use were doing so 10% or less of days (i.e., minimal use). In contrast, only about one-quarter (28%) of active users were using minimally at year-one, and only around one in six (16%) active users were using minimally at year-two.

It is interesting to note that for those in the abstinent group at the 3-month follow-up, half (8/16) of those using actively at year-two reported doing so minimally. Conversely, for those in the minimal-use group at the 3-month follow-up, only 13% (3/23) of the active users at year-two were using minimally. Finally, for those in the frequent-use group at the 3-month follow-up, only 3% (1/35) of active users at year-two were using minimally. Although the numbers are small, results support the idea that future minimal use was most associated with periods of sustained abstinence following treatment. Arguably, the adolescents who did not achieve short-term abstinence after treatment may have been more prone to compulsive use, either due to a stronger predisposition towards addiction or due to being further along in the progression of chemical dependency. Nonetheless, from a harm reduction perspective, it might be valuable to validate some period of prolonged abstinence as a potential avenue to more controlled or minimal use in the future.

Many youth with whom the author has worked in drug treatment express a desire to use in the future, but also convey openness to or interest in “cutting

back” or learning how to use in moderation. Unfortunately, these same adolescents often relate intentions to quickly resume use in order to “practice” using differently once their abstinence is no longer enforced by external circumstances (e.g. inpatient hospitalization). Extended abstinence has a number of potential benefits even for adolescent clients who don’t have intentions of remaining “sober for good.” In particular, prolonged abstinence allows for reengagement with non-using peers (or at least peers with whom to engage in “sober” activities), reconnection to social structures such as school, and development of new coping mechanisms. Although it would be complicated to test, given the prevailing treatment culture, it would be interesting to see whether youth would be more apt to sustain abstinence for a finite period (e.g., 6 months), if the explicit treatment goal was to pursue controlled and minimal use afterwards.

On a related note, it bears mentioning that the floor-staff of the facility used for the study was comprised mostly of “non-professionals” conversant with 12-step recovery principles, usually through their own personal involvement in the 12-step program. Treatment strongly emphasized “step-work” and adolescents were expected to complete work on the several of the initial 12-steps prior to discharge from treatment, including the admission of powerlessness over alcohol and other drugs, and the identification of a higher-power. Furthermore, each adolescent was required to establish a relationship with a 12-step sponsor outside the treatment program prior to discharge. Consequently, much of the mentorship or instruction that adolescents received through treatment related to step-work and promoted the ultimate goal of life-long abstinence.

There are questions about the utility of using 12-step-based treatment approaches with adolescents, particularly the emphasis on or assumption of the primary causative role of the substances of abuse in the clinical presentation (Kelly, Myers, & Brown, 2000). In addition, attendance at 12-step meetings appears to be associated with better outcomes by enhancing or reflecting motivation to remain abstinent among adolescents, rather than through acquisition of coping skills (Kelly, Myers, & Brown, 2000).

It is worth noting other potential disconnects between adolescents and the general 12-step community. First, the average A.A. member is 47 years old and only 2% of all members in A.A. are under the age of 21-years-old (A.A World Services, Inc., 2008). Second, research findings by Chan, Dennis, and Funk (2008) have suggested that among substance abuse treatment samples, adults aged 26 and older are much more likely to present for addiction to cocaine (~ 60%), alcohol (~ 40%), and opioids (~ 20%), with only around 10% of those over 26-years-old endorsing problems with marijuana. Presumably, adolescents in substance abuse treatment, who overwhelmingly report primary problems with marijuana and alcohol, may have some trouble identifying with adult mentors who have different “using histories,” at least in terms of primary “drugs of choice.” From the author’s experience, the majority of adolescents in the treatment facility who primarily used marijuana expressed a strong preference for Marijuana Anonymous (M.A.) meetings (versus Alcoholics Anonymous or Narcotics Anonymous). This preference was often explained as being due to better identification with M.A. members, as well as the ability to hear first-hand

accounts of people whose lives had been significantly compromised by protracted abuse/dependence on marijuana specifically. Accounts shared in M.A. sometimes stood in contrast to examples of “slippery slope” stories shared at Narcotics Anonymous meetings in which people might describe marijuana use as primarily precarious or dangerous because it created disinhibition that increased the likelihood of escalation to substances like cocaine (e.g., “every time I smoked a joint, it would always lead to doing a couple lines”).

Annual Treatment Service Utilization and Behavioral Functioning at Year-One

Finally, it is important to note that many states, including the one in which the current treatment program was based, deliver substance abuse and mental health services separately. By nature of the sample, each adolescent received a minimum of one-week of inpatient substance abuse treatment with the overall average for length of inpatient stay approximating one-month. However, adolescents in the sample varied in terms of whether they received other services (i.e., aftercare, mental health treatment, self-help meetings, etc.) afterwards. Consequently, the study sought to examine the nature and duration of services that adolescents received throughout the year following their admission to inpatient substance abuse treatment. Analyses were then made to examine how the amount (i.e., number of days) and/or nature (i.e., inpatient vs. outpatient, substance abuse vs. mental health, etc.) of services received in the year following treatment admission were associated with functioning one-year after initial intake. More specifically, analyses were conducted to examine the ways in which treatment focus, setting, and/or duration were associated with days of any

substance use, number of conduct disorder symptoms, number of criminal behaviors, and number of symptoms of mental distress at the year-one follow-up point. The hope was to see whether supplemental services were associated with different (i.e., better) outcomes, and whether the specific nature or focus of services was related to subsequent functioning in particular areas. For example, it was of interest whether presence and/or duration of mental health treatment would be related to subsequent reductions in general mental distress.

Overall, little to no association was demonstrated between the measures for amount and/or nature of treatment received and subsequent measures of substance use, conduct disorder symptoms, criminal behavior, and general mental distress. Surprisingly, none of the measures of treatment were significantly correlated with symptoms of general mental distress at the year-one follow-up, including mental health treatment.

In terms of alcohol and other drug use, only overall days of substance abuse treatment (i.e., combined days of inpatient and outpatient substance abuse treatment for the year, including initial treatment exposure) and total days of probation were significantly correlated with days of any substance use at year-one. This relationship was in the expected direction with greater days of treatment and probation being associated with fewer days of any substance use at year-one. However, once these significantly correlated variables (i.e., overall days of substance abuse treatment and total days of probation) were included in negative binomial regression analysis, neither total days of substance abuse

treatment nor total days of probation showed to be significant predictors of days of substance use at the year-one follow-up, either individually or in combination.

While total days of outpatient substance abuse treatment and total days of outpatient mental health treatment, as well as total days of drug testing, demonstrated significant correlation with conduct disorder symptoms, these relationships were not in the expected direction (i.e., more treatment or testing was associated with more behavioral problems). Ultimately, results of negative binomial regression analyses using these significantly correlated variables yielded only one statistically significant finding. At the one-year follow-up, only total days of outpatient substance abuse treatment remained a significant predictor of conduct disorder and only when the conduct disorder grouping included truancy and staying out late regardless of age of initiation (CDSumX). Again, the relationship suggested that greater amounts of outpatient substance abuse treatment predicted greater symptoms of conduct disorder. However, this treatment variable accounted for only 2% of the variance in conduct disorder symptoms.

It is important to note that limited reporting of behavioral problems (i.e., conduct disorder behavior and criminal offending) at the year-one follow-up resulted in a restriction in range and variance for these outcome variables. As mentioned, adolescents in the sample reported an average of less than three symptoms of conduct disorder at the year-one follow-up. This restriction in range and variance may have significantly reduced the ability to detect associations between the variables of interest (e.g., days of treatment) and the selected

outcomes (e.g., conduct disorder symptoms). However, year-one outcomes such as symptoms of mental distress and days of any substance use did not demonstrate the same restriction in range seen for conduct disorder (i.e., adolescents continued to endorse a wider range of values for days of substance use and number of symptoms of general mental distress at year-one), and the results remained similarly insignificant (i.e., no significant associations were found between treatment and these less restricted outcomes).

The overall lack of association between treatment and outcomes may be due, in part, to the fact that the majority of adolescents received a considerable amount and variety of treatment services. In fact, baseline results indicated that 61% of the adolescents in the sample had already received previous substance abuse services before entering the inpatient program, with 20% of the sample reporting 2 or more previous substance abuse treatment episodes. This is likely due to the fact that previous, unsuccessful treatment experiences at lower levels (i.e., outpatient) of care are often required before insurance companies authorize the expense of inpatient services.

As mentioned, there was high variability in the days of treatment received by adolescents in the sample over the year following admission to inpatient substance abuse treatment. For example, adolescents in the sample reported an annual average of 67.29 days of total substance abuse treatment (including initial inpatient stay), with a standard deviation of 45.33 days. However, even median values for services received in the year since treatment entry indicated 30 days of inpatient substance abuse treatment, 18 days of outpatient substance abuse

treatment (often representing over 4-months of weekly outpatient sessions), and 58 peer self-help meetings (usually Alcoholics Anonymous, Narcotics Anonymous, or Marijuana Anonymous). This is in addition to a median of 13 days of mental health services (again often representing approximately 3-months of weekly outpatient mental health sessions).

In addition, the positive relationship between greater treatment and greater behavioral problems may be a product of families being motivated to get their teens additional treatment when youth are displaying more overt behavioral issues. This directional bias may obscure treatment benefits because although adolescents who receive more services may be comparatively better off for having had the treatment, they may look “worse” or similar to peers who are not receiving comparable services since these peers do not have the same mental health issues or they are not as acutely symptomatic.

It is also important to note that although the facility used for the current study provided little or no treatment specifically for conduct disorder or behavioral problems, it did pursue explicit treatment goals of addressing destabilizing influences within each client’s family system. Therefore, the treatment facility emphasized and often required family participation and extensive parent education. For example, the treatment program helped develop family contracts explicitly outlining behavioral contingencies, as well as facilitating comprehensive continuing-care contracts. The facility also encouraged participation in outside parenting groups such as Tough Love, as well as support groups like Al-Anon. It is likely that reductions in behavioral

problems may have been due, in part, to increased parental monitoring and supervision, as well as increased sanctions or consequences related to misbehavior. Research has demonstrated that parental supervision is the strongest and most replicable predictor of delinquency among all child-rearing factors (Murray & Farrington, 2010). Furthermore, 91% of adolescents in the sample reported some history of alcohol or other drug abuse in their families, often in the form of active substance abuse/dependence by primary caregivers. The treatment program actively promoted and facilitated referrals to chemical dependency services for family members whenever indicated.

Study Limitations and Areas For Future Research

As mentioned previously, it is difficult to ascertain the exact mechanism of behavioral change for the adolescents in this sample given that the overall cessation of self-reported behavioral problems seemed to take place in the face of continued and often frequent substance use. While frequency of substance use climbed steadily from a low of around one-fifth of days at the 3-month follow-up to reach nearly half of all days at the year-two follow-up, average symptoms of conduct disorder dropped from around 3 to only 1 symptom in the corresponding time frame. It is possible that although adolescents were using on a frequent basis, some may have made changes in terms of level of consumption (e.g., how much adolescents drank or smoked per occasion). Future research would benefit from the utilization of measures of consumption (e.g., average and highest amounts), in addition to measures of frequency.

Even though the adolescents in the current study appeared to have far fewer behavioral problems following their participation in an inpatient substance abuse program, there is no way to determine whether these changes can be attributed to effects of treatment. Ideally, future research would include a similarly matched non-treatment comparison group to see whether substance abusing adolescents without exposure to drug treatment have more persistent behavioral problems over time. Regardless, the results of the current study do not seem to suggest a need for interventions specifically targeting conduct disorder, at least among populations similar to the current sample who demonstrate limited engagement in activities causing significant harm to others.

The generalizability of the study findings may be limited given that the treatment program used for the study provides services at an inpatient level of care, as well as the potential for regional differences based on the program's west coast and urban location in Oakland, California. In addition, adolescents in the sample received much more substantial services than the majority of their substance abusing peers. Future research may benefit from analyses to evaluate the cost-effectiveness of follow-up care given that supplemental services did appear to be related to better outcomes in this particular study.

Mason and Windle (2002) have advocated for the use of self-report measures based on prior research demonstrating that self-reports of substance use and delinquency can be highly valid, particularly when collected in an appropriate setting that ensures confidentiality of responses (e.g., Windle, 1996; Winters, Stichfield, Henly, & Schwartz, 1991). Kinlock, Battjes, and Gordon (2004) have

also emphasized research documenting that among research participants with histories of substance abuse, as little as 1% of all offenses that are committed actually result in arrest. Furthermore, Murray and Farrington (2010) stress that the prevalence rates for conduct disorder/delinquency appear to be much higher according to self-reports than based on any other sources (e.g., official records, parental reports). Nonetheless, it is important to note that the study was completely reliant on self-report measures, without any corroborating outside sources. Self-report measures are subject to both under-reporting and exaggeration. A reporting bias was especially likely for scales measuring substance use, conduct disorder behavior, and criminal behavior. This potential bias can often be a function of social desirability (i.e., “faking good”). In addition, despite assurances of confidentiality, adolescents may have adjusted responses based on concerns about potential repercussions for illicit behavior. It is possible that some adolescents may have been more forthcoming at the baseline interviews which took place shortly after being admitted into inpatient substance abuse treatment since they had already received the “consequence” of admission to month-long inpatient program, as well as probation in many cases. This may be in contrast to follow-up interviews where adolescents were largely operating “freely” in the general community.

Responses at baseline may have also been somewhat elevated for scales such as the Conduct Disorder Index (CDI), General Crime Index (GCI), and General Mental Distress Index (GMDI) where the reporting window for behavioral problems was during “the past year,” versus the window of “the past

90 days” that was used for follow-up interviews. Many analyses were limited by extreme skewness in the variables of interest. In particular, outcome variables like conduct disorder and criminal behavior were highly restricted in range and variance given the low rates of endorsement by the annual follow-up points. As noted, this restriction may have limited the ability to detect associations between treatment received and subsequent behavioral problems.

It is also important to note that the current study did not explicitly examine the ways in which individual background factors, most notably socioeconomic status, might relate to outcomes of interest such as substance use or criminal activity. Future research might benefit from analyses that look at factors such as SES, family structure, active substance abuse by primary caregivers, and special education designation, among others.

Finally, surveys of private substance abuse treatment centers have shown that upwards of 90% of programs base their treatment on the 12-step principles of Alcoholics Anonymous (A.A.) or variations of this model (Roman & Blum, 1998). The program from which the study sample was drawn is no exception in that it is primarily rooted in the 12-step model of recovery which promotes the goal of complete abstinence and views chemical dependency as a disease that needs to be managed throughout an individual’s life. Twelve-step participation was required of teens during the treatment program, including “step-work,” meeting attendance, and the attainment of a “sponsor” before discharge. Although positive relationships have been demonstrated between teen 12-step meeting attendance and motivation to attain sobriety, 12-step participation does

not appear to be related to the acquisition of coping skills (Kelly, Myers, & Brown, 2000). Adolescents also tend to express difficulty relating to many other A.A. members due to general group composition. Notably, the average A.A. member is 47 years-old and less than 2% of A.A. membership is under the age of 21. Furthermore, A.A. membership is overwhelmingly Caucasian (85%) and male (67%) (A.A. World Services, Inc., 2008). Given this strong bias towards the 12-step model, future research may benefit from the inclusion of treatment programs that are not 12-step-based.

In addition, adolescents in treatment have been shown to differ from their adult counterparts in terms of their expressed desire to stop using alcohol and other drugs (Kelly, Myers, & Brown, 2000). In other words, most teens entering treatment state that they are being coerced into services and that they do not want to give up alcohol or other drugs. Authors such as Schwebel (2004) have argued that most programs make the mistake of trying to teach teens to be drug free before these young people have made the decision to stop using. The author states that many problems are associated with the collective “mad rush” for immediate abstinence for teenagers in treatment. Consequently, Schwebel has developed the Seven Challenges program of which the current author is a strong proponent. The Seven Challenges program is largely based on motivational enhancement strategies and stages of change theory. The program has some empirical support (e.g., Stevens, Schwebel, & Ruiz, 2007), but it has not been the focus of many studies. The Seven Challenges program serves an example of the very kind of developmentally appropriate and adolescent specific, not to mention

non-12-step-based, program that the current author would like to see examined much more in future research.

CHAPTER V

SUMMARY

A number of authors (e.g., Mason & Windle, 2002) have stressed the need for more multi-wave, longitudinal studies to examine changing relationships between substance use and delinquency during adolescence. The current study was able to examine a young treatment sample at multiple points in the two years following exposure to an inpatient substance abuse program with the benefit of very good retention rates (96% at year-one and 75% at year-two).

Looking solely at abstinence, or lack thereof, roughly three-quarters (74%) of the sample resumed substance use within 3-months of treatment entry. Furthermore, 83% of the sample reported active substance use at the two-year follow-up.

Minimal use, defined in the study as 10% or less of days, appeared increasingly less common over time. At the 3-month follow-up, 41% of the adolescents who reported active substance use were doing so minimally. In contrast, only about one-quarter (28%) of active users were using minimally at year-one, and only around one in six (16%) active users were using minimally at year-two.

Overall, fewer substance-related problems were reported at each successive follow-up period despite the fact that frequency of substance use increased steadily from the around one-fifth of days at 3-months to nearly half of all days at year-two follow-up point. Among active users, 13% reported no problems related

to their substance use at the year-one, while nearly one-fifth (19%) of active users reported no substance-related problems at year-two.

Even given this seeming contradiction, three-quarters (76%) of the sample still endorsed symptoms indicative of substance use disorders (substance abuse or substance dependence) two-years after entering treatment, with half (50%) of adolescents reporting enough symptoms to fall into the substance dependence category at year-two.

Negative Binomial Regression results indicated that symptoms of general mental distress declined significantly over time, dropping from an average of 9 symptoms at baseline, to an average of 5 symptoms at year-two. Results suggested a -.25 symptom decrease for each one month increase in time.

The study was particularly interested in whether adolescents with severe conduct disorder followed different trajectories and displayed greater persistence of behavioral problems over time as compared to their mild/moderate counterparts. The vast majority (83%) of the sample endorsed conduct disorder criteria at baseline. Notably, rates for conduct disorder number were 95% when current curfew violations and truancy were included regardless of whether these behaviors were present before age 13. Furthermore, of those endorsing conduct disorder criteria at baseline, 69% met severe conduct disorder categorization by virtue of endorsement of at least one symptom representing engagement in behavior posing considerable harm to others.

Despite the fact that many respondents reported engagement in diverse and often severe anti-social behavior, the vast majority of the sample appeared to

desist from these behaviors over the two years following treatment admission. Again, these reductions were often in the face of continued and frequent substance use.

Only about one-fifth of adolescents endorsed 3 or more conduct disorder symptoms at the year-two follow-up, with only a very small and similar percentage (10%-11%) of each baseline grouping (i.e., no conduct disorder, mild/moderate, and severe) falling into the severe conduct disorder category at year-two. These findings suggest that conduct disorder categorization at treatment entry did not predict presence of severe conduct disorder two years later.

Although results indicated that male and female study participants demonstrated statistically significant differences for the mean number of conduct disorder symptoms at treatment entry, both males and females reported an average number of conduct disorder symptoms in excess of the 3 required for conduct disorder diagnosis (6.36 and 4.57 symptoms respectively). No statistically significant gender differences were demonstrated in behavioral problems at the annual follow-ups, with the exception of severe conduct disorder symptoms at year-one, but this difference represented only a fraction of a single symptom (.81 and .37 symptoms respectively).

It is important to note that reductions in reported symptoms of antisocial or illegal behavior are unlikely to be explained by changes in willingness to endorse illicit activity, especially since the respondents were still reporting plenty of substance use. However, there are many other potential explanations for these

reductions in behavioral problems, including small numbers for childhood-onset conduct disorder, natural maturation, improved family stability and parental executive functioning, increasing legal sanctions for “repeat offenders”, and placation by adolescents in order to continue drug use more “under the radar. Unfortunately, the lack of a non-treatment comparison group makes it difficult to attribute whether these behavioral changes appear to be the effects of treatment. Future research would benefit greatly from the inclusion of such a comparison group.

Finally, the study sought to examine relationships between the nature (e.g., inpatient vs. outpatient, substance abuse vs. mental health) and/or amount of follow-up treatment and the main outcomes of interest (i.e., substance use, mental distress, and behavioral problems). In general, the results of the correlations and regressions showed that the nature or amount of treatment received failed to predict or account for differences in the outcomes of interest at the year-one follow-up point. This may be due in part to the fact that the majority of adolescents received a considerable amount and variety of treatment over the course of the year. Median values indicate that over the year following treatment entry adolescents participated in 30 days of inpatient substance abuse treatment, 18 days of outpatient substance abuse treatment, 58 peer self-help meetings, and 13 days of outpatient mental health services.

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APPENDIX A

Substance Frequency Index

S2e. During the past 90 days (3 months), before you got here (this time)

1. How many days did you use any kind of alcohol?..... |__|__| DAYS
- 1a. How many days did you use alcohol to intoxication
(5+ drinks in one setting)?..... |__|__| DAYS
2. What was the most drinks you had in one day?..... |__|__| DRINKS
3. Over how many hours did you have these drinks?..... |__|__| HOURS
4. How many people were you sharing containers of
alcohol with?..... |__|__| PEOPLE

S2f. During the past 90 days (3 months), before you got here (this time) . . .

1. How many days did you use any kind of marijuana
or hashish?..... |__|__| DAYS
2. What was the most joints or pipes or other forms of
marijuana you used in one day?(1 blunt=3 joints; 1 bowl=1joint; |__|__| JOINTS
10 1 hit pipe=1 joint)
3. Over how many hours did you have this marijuana?..... |__|__| HOURS
4. How many people were you sharing this marijuana with?....|__|__| PEOPLE

S2d. During the past 90 days (3 months) DAYS

1. How many days did you use any alcohol, marijuana or
other drugs?..... |__|__|
2. How many days were you drunk or high for most of the day?..... |__|__|
3. How many days did alcohol or drug use problems keep you
from meeting your responsibilities at work, school or home?..... |__|__|
4. What are the most days you have gone in a row without using
alcohol, marijuana or other drugs?..... |__|__|
5. How many days have you been in a jail, hospital or other place
where you could not use alcohol, marijuana or other drugs?..... |__|__|

S2g. During the past 90 days (3 months)...

1. How many days did you use drugs other than alcohol,
marijuana or hashish?..... |__|__| Days
2. What were the most times you used these other drugs in one
day?..... |__|__| Times
3. Over how many hours did you do this?..... |__|__| Hours

APPENDIX B

Substance Problem Index

Next I want to go over a list of problems related to alcohol or drug use. After I read each of the following statements, tell me the last time you had this problem by responding: in the past month, 2-12 months ago, 1 or more years ago, or never.

S9. When was the last time that ...	<u>Past Month</u>	<u>2-12 Months</u>	<u>1+ Years</u>	<u>Never</u>
c. you tried to hide when you were using alcohol or drugs?	3	2	1	0
d. your parents, family, partner, co-workers, classmates or friends complained about your alcohol or drug use?	3	2	1	0
e. you used alcohol or drugs weekly?	3	2	1	0
f. your alcohol or drug use caused you to feel depressed, nervous, suspicious, uninterested in things, reduced your sexual desire or caused other psychological problems?.....	3	2	1	0
g. your alcohol or drug use caused you to have numbness, tingling, shakes, blackouts, hepatitis, TB, sexually transmitted disease or any other health problems?	3	2	1	0
h. you kept using alcohol or drugs even though you knew it was keeping you from meeting your responsibilities at work, school, or home?.....	3	2	1	0
j. you used alcohol or drugs where it made the situation unsafe or dangerous for you, such as when you were driving a car, using a machine, or where you might have been forced into sex or hurt?	3	2	1	0
k. your alcohol or drug use caused you to have (repeated) problems with the law?	3	2	1	0
m. you kept using alcohol or drugs even after you knew it could get you into fights or other kinds of legal trouble?	3	2	1	0
n. you needed more alcohol or drugs to get the same high or found that the same amount did not get you as high as it used to? .	3	2	1	0

S9. When was the last time that ...		<u>Past</u> <u>Month</u>	<u>2-12</u> <u>Months</u>	<u>1+</u> <u>Years</u>	<u>Never</u>
p.	you had withdrawal problems from alcohol or drugs like shaking hands, throwing up, having trouble sitting still or sleeping, or that you used any alcohol or drugs to stop being sick or avoid withdrawal problems?.....	3	2	1	0
q.	you used alcohol or drugs in larger amounts, more often or for a longer time than you meant to?	3	2	1	0
r.	you were unable to cut down or stop using alcohol or drugs?	3	2	1	0
s.	you spent a lot of time either getting alcohol or drugs, using alcohol or drugs, or feeling the effects of alcohol or drugs (high, sick)?	3	2	1	0
t.	your use of alcohol or drugs caused you to give up, reduce or have problems at important activities at work, school, home or social event? ..	3	2	1	0
u.	you kept using alcohol or drugs even after you knew it was causing or adding to medical, psychological or emotional problems you were having?	3	2	1	0
v.	How old were you when you first got drunk or used any drugs? __ __ Age				

APPENDIX C

Conduct Disorder Index

M3b. During the past year, have you done the following things
two or more times?

	<u>Yes</u>	<u>No</u>
1. Been a bully or threatened other people a lot?	1	0
2. Started a lot of fights with other people?	1	0
3. Used a weapon in fights?	1	0
4. Been physically cruel to other people?	1	0
5. Been physically cruel to animals?	1	0
6. Taken a purse, money or other things from another person by force?	1	0
7. Forced someone to have sex with you when they did not want to?	1	0
8. Set fires?	1	0
9. Broken windows or destroyed property?	1	0
10. Taken money or things from a house, building or car? . . .	1	0
11. Lied or conned to get things you wanted or to avoid having to do something?	1	0
12. Taken things from a store or written bad checks to buy things?	1	0
13. Stayed out at night later than your parent or partner wanted?	1	0
14. Run away from home overnight?	1	0
15. Skipped school?	1	0
16. <u>Before you were 13</u> , did you break rules by “skipping” school or “staying out” at night?	1	0

M3c. During the past 90 days, on how many days have you had
any problems paying attention, controlling your behavior
or breaking rules you were supposed to follow? Days

APPENDIX D

General Crime Index

During the past year have you.....

	<u>Yes</u>	<u>No</u>
a. purposely damaged or destroyed property that did not belong to you?	1	0
b. passed bad checks, forged (or altered) a prescription or took money from an employer?	1	0
c. taken something from a store without paying for it?	1	0
d. other than from a store, taken money or property that didn't belong to you?	1	0
e. broken into a house or building to steal something or just to look around?	1	0
f. taken a car that didn't belong to you?	1	0
g. used a weapon, force, or strong-arm methods to get money or things from a person?	1	0
h. hit someone or got into a physical fight?	1	0
j. hurt someone badly enough they needed bandages or a doctor?	1	0
m. made someone have sex with you by force when they did not want to have sex?	1	0
n. been involved in the death or murder of another person (including accidents)?	1	0
p. intentionally set a building, car or other property on fire? ..	1	0
q. driven a vehicle while under the influence of alcohol or illegal drugs?	1	0
r. sold, distributed or helped to make illegal drugs?	1	0
s. traded sex for food, drugs, or money?	1	0
t. been a member of a gang?	1	0

u. done something else (other than drug use) that would have gotten you into trouble with the police if they had known about it? **(Please describe)** 1 0
 v. _____

L3v. During the past 90 days, on how many days were you involved in any activities you thought might get you into trouble or be against the law? |__|__| Days

L3w. During the past 90 days, on how many days did you support yourself financially from activities that you thought might get you into trouble or be against the law? |__|__| Days

L4. In your life time, about how many tickets have you gotten for minor traffic violations (do not include any that led to an arrest)? |__|__| Times

L4a In your lifetime, about how many times have you been picked up by the police for status offenses such as running away or truancy? |__|__| Times

L5. How many times have you been arrested, charged with a crime and booked? Please include all the times this happened, even if you were then released or the charges were dropped |__|__| Times

APPENDIX E

General Mental Distress Index

The next questions are about significant problems that people have. Problems are considered significant when you have them for two or more weeks, they keep coming back, when they keep you from meeting your responsibilities, or when they make you feel you cannot go on.

M1a. During the past year, have you had significant problems with

	<u>Yes</u>	<u>No</u>
8. Headaches, faintness, dizziness, tingling, numbness, sweating or hot or cold spells?.....	1	0
9. Sleep trouble, such as bad dreams, sleeping restlessly, or falling asleep during the day?.....	1	0
10. Having dry mouth, loose bowel movements, constipation, trouble controlling your bladder or related itching?.....	1	0
11. Pain or heavy feeling in your heart, chest, lower back, arms, legs, or other muscles.....	1	0

M1b. During the past year, have you had significant problems with

	<u>Yes</u>	<u>No</u>
1. Feeling very trapped, lonely, sad, blue, depressed, or hopeless about the	1	0
2. Having no energy and losing interest in work, school, friends sex or other things you care about?.....	1	0
3. Remembering, concentrating, making decisions, or having your mind go blank?.....	1	0
4. Feeling very shy, self-conscious or uneasy about what people thought or were saying about you?.....	1	0
5. Thoughts that other people did not understand you or appreciate your situation?.....	1	0
6. Feeling easily annoyed, irritated, or having trouble controlling your temper?.....	1	0

M1c. During the past year, have you.....

	<u>Yes</u>	<u>No</u>
2. Thought about ending your life or committing suicide?.....	1	0

M1d. During the past year, have you had significant problems with

	<u>Yes</u>	<u>No</u>
1. Feeling very anxious, nervous, tense, fearful, scared, panicked, or like something bad was going to happen?.....	1	0
2. Having to repeat an action over and over, or having thoughts that kept running over in your mind?.....	1	0
3. Trembling, having your heart race or feeling so restless that you could not sit still?.....	1	0
4. Getting into a lot of arguments and feeling the urge to shout, throw things, beat, injure, or harm someone?.....	1	0
5. Feeling very afraid of open spaces, leaving your home, having to travel or being in a crowd?.....	1	0
6. Avoiding snakes, the dark, being alone, elevators, or other things because they frightened you?.....	1	0
7. Thoughts that other people were taking advantage of you or out to get you?.....	1	0
8. Thoughts that someone was watching you, following you or out to get you?.....	1	0
9. Seeing or hearing things that no one else could see or hear, or feeling that someone else could read or control your thoughts?.....	1	0
10. Thoughts that you should be punished for thinking about sex or other things too much?.....	1	0

APPENDIX F

Percentages for Items on the Conduct Disorder Index

Conduct Disorder Index – Baseline**Past Year**

- 85%** Stayed out later than your parents or guardian wanted (*before age 13 = 32.6%*)
- 84%** Skipped school (*before age 13 = 31.2%*)
- 83%** Lied or conned to get things you wanted or to avoid having to do something
- 69%** Taken things from a store or written bad checks to get things
- 61%** Taken money or things from a house, building, or car
- 55%** Broken windows or destroyed property
- 48%** Ran away from home overnight
- 42%** Been a bully or threatened people a lot
- 42%** Been physically cruel to other people
- 30%** Broke into a house or building to steal something or just look around
- 25%** Started a lot of fights with other people
- 19%** Taken a purse, money, or other things from another person by force
- 17%** Used a weapon in fights
- 10%** Set fires
- 7%** Been physically cruel to animals
- 1%** Forced someone to have sex when they didn't want to

Conduct Disorder Index – Year-One Follow-Up**Past 90 Days**

- 39%** Lied or conned to get things you wanted or to avoid having to do something
- 37%** Stayed out later than your parents or guardian wanted (*before age 13 = 16.7%*)
- 26%** Taken things from a store or written bad checks to get things
- 22%** Skipped school (*before age 13 = 9.1%*)
- 17%** Taken money or things from a house, building, or car
- 17%** Broken windows or destroyed property
- 14%** Ran away from home overnight
- 13%** Been a bully or threatened people a lot
- 11%** Been physically cruel to other people
- 8%** Started a lot of fights with other people
- 5%** Used a weapon in fights
- 4%** Taken a purse, money, or other things from another person by force
- 4%** Broke into a house or building to steal something or just look around
- 2%** Been physically cruel to animals
- 2%** Set fires
- 0%** Forced someone to have sex when they didn't want to

Conduct Disorder Index – Year-Two Follow-Up**Past 90 Days**

- 24%** Lied or conned to get things you wanted or to avoid having to do something
- 22%** Skipped school (*before age 13 = 11.7%*)
- 19%** Stayed out later than your parents or guardian wanted (*before age 13 = 12.6%*)
- 15%** Taken things from a store or written bad checks to get things
- 13%** Started a lot of fights with other people
- 13%** Taken money or things from a house, building, or car
- 11%** Broken windows or destroyed property
- 10%** Been a bully or threatened people a lot
- 6%** Been physically cruel to other people
- 4%** Ran away from home overnight
- 2%** Used a weapon in fights
- 2%** Taken a purse, money, or other things from another person by force
- 2%** Set fires
- 2%** Broke into a house or building to steal something or just look around
- 1%** Been physically cruel to animals
- 0%** Forced someone to have sex when they didn't want to

APPENDIX G

Percentages for Items on the General Crime Index

General Crime Index – Baseline**Past Year**

- 69%** Took something from a store without paying for it
- 62%** Other than from store, took money or property that didn't belong to you
- 57%** Sold, distributed, or helped to make illegal drugs
- 55%** Purposely damaged or destroyed property that didn't belong to you
- 54%** Hit someone or got into a physical fight
- 43%** Drove a vehicle while under the influence of alcohol or illegal drugs
- 31%** Hurt someone badly enough that they needed bandages or a doctor
- 30%** Broke into a house or building to steal something or just look around
- 28%** Took a car that didn't belong to you
- 19%** Used weapon, force, or strong-arm methods to get money or things from a person
- 17%** Passed bad checks, forged a prescription, or took money from employer
- 15%** Been a member of a gang
- 10%** Intentionally set a building, car, or other property on fire
- 3%** Traded sex for food, drugs, or money
- 1%** Been involved in the death or murder of another person (including accidents)
- 1%** Made someone have sex with you by force when they didn't want to have sex

General Crime Index – Year-One Follow-Up**Past 90 Days**

- 24%** Took something from a store without paying for it
- 18%** Other than from store, took money or property that didn't belong to you
- 18%** Purposely damaged or destroyed property that didn't belong to you
- 18%** Hit someone or got into a physical fight
- 18%** Sold, distributed, or helped to make illegal drugs
- 17%** Drove a vehicle while under the influence of alcohol or illegal drugs
- 8%** Hurt someone badly enough that they needed bandages or a doctor
- 5%** Took a car that didn't belong to you
- 5%** Used weapon, force, or strong-arm methods to get money or things from a person
- 4%** Broke into a house or building to steal something or just look around
- 4%** Been a member of a gang
- 3%** Passed bad checks, forged a prescription, or took money from employer
- 2%** Intentionally set a building, car, or other property on fire
- 2%** Traded sex for food, drugs, or money
- 0%** Made someone have sex with you by force when they didn't want to have sex
- 0%** Been involved in the death or murder of another person (including accidents)

General Crime Index – Year-Two Follow-Up**Past 90 Days**

- 14%** Took something from a store without paying for it
- 13%** Other than from store, took money or property that didn't belong to you
- 12%** Sold, distributed, or helped to make illegal drugs
- 11%** Drove a vehicle while under the influence of alcohol or illegal drugs
- 11%** Purposely damaged or destroyed property that didn't belong to you
- 11%** Hit someone or got into a physical fight
- 4%** Hurt someone badly enough that they needed bandages or a doctor
- 4%** Took a car that didn't belong to you
- 2%** Used weapon, force, or strong-arm methods to get money or things from a person
- 2%** Broke into a house or building to steal something or just look around
- 2%** Intentionally set a building, car, or other property on fire
- 1%** Been a member of a gang
- 0%** Passed bad checks, forged a prescription, or took money from employer
- 0%** Traded sex for food, drugs, or money
- 0%** Made someone have sex with you by force when they didn't want to have sex
- 0%** Been involved in the death or murder of another person (including accidents)

APPENDIX H

Percentages for Items on the General Mental Distress Index

General Mental Distress Index – Baseline**Past Year**

- 75%** Problems feeling easily annoyed, irritated, or having trouble controlling temper
- 68%** Thoughts that other people did not understand you or appreciate your situation
- 62%** Getting into a lot of arguments/feeling the urge to shout, throw things, or harm someone
- 61%** Feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future
- 61%** Problems remembering, concentrating, making decisions, or having mind go blank
- 60%** Sleep trouble, such as bad dreams, sleeping restlessly or falling asleep during day
- 57%** Having no energy & losing interest in work/school/friends/sex or other things cared about
- 51%** Having to repeat an action over & over or thoughts that kept running over in your mind
- 48%** Feeling very shy, self-conscious, or uneasy about what people thought or said about you
- 46%** Feeling very anxious/nervous/tense/scared or that something bad was going to happen
- 42%** Thoughts that people were taking advantage/ not giving you credit/causing you problems
- 40%** Problems trembling, having heart race, or feeling so restless that you could not sit still
- 38%** Pain or heavy feelings in your heart, chest, lower back, arms, legs or other muscles
- 38%** Thoughts about ending life or committing suicide
- 34%** Having dry mouth, loose bowel movements, constipation, or trouble controlling bladder

- 33%** Headaches, faintness, dizziness, tingling, numbness, sweating or hot or cold spells
- 33%** Thoughts that someone was watching you, following you, or out to get you
- 17%** Avoiding snakes, the dark, being alone, or other things because they frightened you
- 15%** Feeling very afraid of open spaces, leaving your home, travel or being in a crowd
- 14%** Seeing/hearing things that no one else could/feeling others could read/control thoughts
- 7%** Thoughts that you should be punished for thinking about sex or other things too much

General Mental Distress Index – Year-One Follow-Up**Past 90 Days**

- 71%** Problems feeling easily annoyed, irritated, or having trouble controlling temper
- 52%** Sleep trouble, such as bad dreams, sleeping restlessly or falling asleep during day
- 49%** Problems remembering, concentrating, making decisions, or having mind go blank
- 48%** Thoughts that other people did not understand you or appreciate your situation
- 42%** Having no energy & losing interest in work/school/friends/sex or other things cared about
- 42%** Having to repeat an action over & over or thoughts that kept running over in your mind
- 38%** Feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future
- 36%** Feeling very anxious/nervous/tense/scared or that something bad was going to happen
- 36%** Pain or heavy feelings in your heart, chest, lower back, arms, legs or other muscles
- 34%** Getting into a lot of arguments/feeling the urge to shout, throw things, or harm someone
- 33%** Feeling very shy, self-conscious, or uneasy about what people thought or said about you
- 32%** Thoughts that people were taking advantage/ not giving you credit/causing you problems
- 29%** Problems trembling, having heart race, or feeling so restless that you could not sit still
- 26%** Headaches, faintness, dizziness, tingling, numbness, sweating or hot or cold spells
- 24%** Having dry mouth, loose bowel movements, constipation, or trouble controlling bladder

- 15%** Thoughts that someone was watching you, following you, or out to get you
- 14%** Avoiding snakes, the dark, being alone, or other things because they frightened you
- 12%** Feeling very afraid of open spaces, leaving your home, travel or being in a crowd
- 12%** Seeing/hearing things that no one else could/feeling others could read/control thoughts
- 10%** Thoughts that you should be punished for thinking about sex or other things too much
- 8%** Thoughts about ending life or committing suicide

General Mental Distress Index – Year-Two Follow-Up**Past 90 Days**

- 51%** Problems feeling easily annoyed, irritated, or having trouble controlling temper
- 49%** Having no energy & losing interest in work/school/friends/sex or other things cared about
- 47%** Sleep trouble, such as bad dreams, sleeping restlessly or falling asleep during day
- 43%** Problems remembering, concentrating, making decisions, or having mind go blank
- 36%** Having to repeat an action over & over or thoughts that kept running over in your mind
- 33%** Thoughts that other people did not understand you or appreciate your situation
- 30%** Feeling very trapped, lonely, sad, blue, depressed, or hopeless about the future
- 28%** Feeling very anxious/nervous/tense/scared or that something bad was going to happen
- 27%** Feeling very shy, self-conscious, or uneasy about what people thought or said about you
- 25%** Pain or heavy feelings in your heart, chest, lower back, arms, legs or other muscles
- 20%** Thoughts that people were taking advantage/ not giving you credit/causing you problems
- 19%** Getting into a lot of arguments/feeling the urge to shout, throw things, or harm someone
- 19%** Problems trembling, having heart race, or feeling so restless that you could not sit still
- 18%** Headaches, faintness, dizziness, tingling, numbness, sweating or hot or cold spells
- 18%** Having dry mouth, loose bowel movements, constipation, or trouble controlling bladder

- 12%** Thoughts that someone was watching you, following you, or out to get you
- 11%** Feeling very afraid of open spaces, leaving your home, travel or being in a crowd
- 10%** Avoiding snakes, the dark, being alone, or other things because they frightened you
- 6%** Thoughts about ending life or committing suicide
- 6%** Seeing/hearing things that no one else could/feeling others could read/control thoughts
- 2%** Thoughts that you should be punished for thinking about sex or other things too much

APPENDIX I

Percentages for Items on the Substance Problems Index – Past Month

Substance Problem Index (SPI) – Baseline**Past Month**

- 84%** Used alcohol or drugs (AOD) weekly (*Issue*)
- 80%** Parents, family, partner, or friends complained about alcohol or drug use (*Issue*)
- 73%** Spent a lot of time getting AOD, using AOD, or feeling effects of AOD (*Dep*)
- 61%** Kept using when knew it kept you from meeting responsibilities at school/home/work (*Abuse*)
- 56%** Kept using AOD knowing it could get you into fights or problems w/ law (*Abuse*)
- 54%** Tried to hide when using alcohol or drugs (*Issue*)
- 51%** AOD use caused you to give up/reduce/have problems at important activities (*Dep*)
- 50%** Used AOD in larger amounts, more often, or for longer time than meant to (*Dep*)
- 49%** Kept using AOD knowing it caused/added to med/psych/emotional problems (*Dep*)
- 49%** AOD use caused you to feel depressed, nervous, suspicious, disinterested, etc. (*Issue*)
- 44%** Needed more AOD to get same high/found same amount didn't get you as high (*Dep*)
- 41%** Used AOD where it made situation unsafe (e.g., DUI, risk of sexual assault) (*Abuse*)
- 39%** Unable to cut down or stop using alcohol or drugs (*Dep*)
- 33%** AOD use caused numbness, tingling, shakes, blackouts, STD, etc. (*Issue*)
- 32%** AOD use caused repeated problems with the law (*Abuse*)
- 31%** Withdrawal problems from AOD (e.g., sleep trouble) or used to avoid withdrawal (*Dep*)

Substance Problem Index (SPI) – Year-One Follow-Up

Past Month

- 37%** Tried to hide when using alcohol or drugs (*Issue*)
- 36%** Used alcohol or drugs (AOD) weekly (*Issue*)
- 32%** Parents, family, partner, or friends complained about alcohol or drug use (*Issue*)
- 26%** Kept using AOD knowing it could get you into fights or problems w/ law (*Abuse*)
- 24%** Spent a lot of time getting AOD, using AOD, or feeling effects of AOD (*Dep*)
- 24%** AOD use caused you to feel depressed, nervous, suspicious, disinterested, etc. (*Issue*)
- 21%** Used AOD in larger amounts, more often, or for longer time than meant to (*Dep*)
- 21%** Used AOD where it made situation unsafe (e.g., DUI, risk of sexual assault) (*Abuse*)
- 20%** Kept using when knew it kept you from meeting responsibilities at school/home/work (*Abuse*)
- 20%** Needed more AOD to get same high/found same amount didn't get you as high (*Dep*)
- 17%** Kept using AOD knowing it caused/added to med/psych/emotional problems (*Dep*)
- 14%** AOD use caused you to give up/reduce/have problems at important activities (*Dep*)
- 14%** Unable to cut down or stop using alcohol or drugs (*Dep*)
- 14%** Withdrawal problems from AOD (e.g., sleep trouble) or used to avoid withdrawal (*Dep*)
- 11%** AOD use caused numbness, tingling, shakes, blackouts, STD, etc. (*Issue*)
- 10%** AOD use caused repeated problems with the law (*Abuse*)

Substance Problem Index (SPI) – Year-Two Follow-Up

Past Month

- 50%** Used alcohol or drugs (AOD) weekly (*Issue*)
- 29%** Tried to hide when using alcohol or drugs (*Issue*)
- 28%** Parents, family, partner, or friends complained about alcohol or drug use (*Issue*)
- 27%** Spent a lot of time getting AOD, using AOD, or feeling effects of AOD (*Dep*)
- 21%** Kept using AOD knowing it could get you into fights or problems w/ law (*Abuse*)
- 20%** AOD use caused you to feel depressed, nervous, suspicious, disinterested, etc. (*Issue*)
- 20%** Used AOD where it made situation unsafe (e.g., DUI, risk of sexual assault) (*Abuse*)
- 18%** Used AOD in larger amounts, more often, or for longer time than meant to (*Dep*)
- 18%** Needed more AOD to get same high/found same amount didn't get you as high (*Dep*)
- 15%** Kept using when knew it kept you from meeting responsibilities at school/home/work (*Abuse*)
- 15%** Unable to cut down or stop using alcohol or drugs (*Dep*)
- 15%** Withdrawal problems from AOD (e.g., sleep trouble) or used to avoid withdrawal (*Dep*)
- 14%** AOD use caused you to give up/reduce/have problems at important activities (*Dep*)
- 14%** Kept using AOD knowing it caused/added to med/psych/emotional problems (*Dep*)
- 11%** AOD use caused numbness, tingling, shakes, blackouts, STD, etc. (*Issue*)
- 7%** AOD use caused repeated problems with the law (*Abuse*)

APPENDIX J

Percentages for Items on the Substance Problems Index – Past Year

Substance Problem Index (SPI) – Baseline

Past Year

- 96%** Used alcohol or drugs (AOD) weekly (*Issue*)
- 94%** Spent a lot of time getting AOD, using AOD, or feeling effects of AOD (*Dep*)
- 91%** Parents, family, partner, or friends complained about alcohol or drug use (*Issue*)
- 80%** Used AOD in larger amounts, more often, or for longer time than meant to (*Dep*)
- 76%** Tried to hide when using alcohol or drugs (*Issue*)
- 76%** Kept using when knew it kept you from meeting responsibilities at school/home/work (*Abuse*)
- 75%** Kept using AOD knowing it could get you into fights or problems w/ law (*Abuse*)
- 71%** AOD use caused you to give up/reduce/have problems at important activities (*Dep*)
- 67%** Needed more AOD to get same high/found same amount didn't get you as high (*Dep*)
- 66%** AOD use caused you to feel depressed, nervous, suspicious, disinterested, etc. (*Issue*)
- 64%** Kept using AOD knowing it caused/added to med/psych/emotional problems (*Dep*)
- 63%** Unable to cut down or stop using alcohol or drugs (*Dep*)
- 57%** Used AOD where it made situation unsafe (e.g., DUI, risk of sexual assault) (*Abuse*)
- 52%** AOD use caused repeated problems with the law (*Abuse*)
- 47%** AOD use caused numbness, tingling, shakes, blackouts, STD, etc. (*Issue*)
- 47%** Withdrawal problems from AOD (e.g., sleep trouble) or used to avoid withdrawal (*Dep*)

Substance Problem Index (SPI) – Year-One Follow-Up**Past Year**

- 77%** Tried to hide when using alcohol or drugs (*Issue*)
- 76%** Used alcohol or drugs (AOD) weekly (*Issue*)
- 68%** Parents, family, partner, or friends complained about alcohol or drug use (*Issue*)
- 64%** Spent a lot of time getting AOD, using AOD, or feeling effects of AOD (*Dep*)
- 61%** Needed more AOD to get same high/found same amount didn't get you as high (*Dep*)
- 61%** Kept using AOD knowing it could get you into fights or problems w/ law (*Abuse*)
- 60%** Used AOD in larger amounts, more often, or for longer time than meant to (*Dep*)
- 58%** Kept using when knew it kept you from meeting responsibilities at school/home/work (*Abuse*)
- 58%** AOD use caused you to feel depressed, nervous, suspicious, disinterested, etc. (*Issue*)
- 55%** AOD use caused you to give up/reduce/have problems at important activities (*Dep*)
- 54%** Unable to cut down or stop using alcohol or drugs (*Dep*)
- 50%** Used AOD where it made situation unsafe (e.g., DUI, risk of sexual assault) (*Abuse*)
- 48%** Kept using AOD knowing it caused/added to med/psych/emotional problems (*Dep*)
- 42%** Withdrawal problems from AOD (e.g., sleep trouble) or used to avoid withdrawal (*Dep*)
- 35%** AOD use caused repeated problems with the law (*Abuse*)
- 34%** AOD use caused numbness, tingling, shakes, blackouts, STD, etc. (*Issue*)

Substance Problem Index (SPI) – Year-Two Follow-Up

Past Year

- 69%** Used alcohol or drugs (AOD) weekly (*Issue*)
- 62%** Tried to hide when using alcohol or drugs (*Issue*)
- 57%** Spent a lot of time getting AOD, using AOD, or feeling effects of AOD (*Dep*)
- 55%** Parents, family, partner, or friends complained about alcohol or drug use (*Issue*)
- 50%** Needed more AOD to get same high/found same amount didn't get you as high (*Dep*)
- 49%** AOD use caused you to feel depressed, nervous, suspicious, disinterested, etc. (*Issue*)
- 49%** Used AOD where it made situation unsafe (e.g., DUI, risk of sexual assault) (*Abuse*)
- 48%** Used AOD in larger amounts, more often, or for longer time than meant to (*Dep*)
- 45%** Kept using AOD knowing it could get you into fights or problems w/ law (*Abuse*)
- 39%** Kept using AOD knowing it caused/added to med/psych/emotional problems (*Dep*)
- 37%** Kept using when knew it kept you from meeting responsibilities at school/home/work (*Abuse*)
- 36%** Unable to cut down or stop using alcohol or drugs (*Dep*)
- 36%** AOD use caused you to give up/reduce/have problems at important activities (*Dep*)
- 28%** Withdrawal problems from AOD (e.g., sleep trouble) or used to avoid withdrawal (*Dep*)
- 26%** AOD use caused repeated problems with the law (*Abuse*)
- 22%** AOD use caused numbness, tingling, shakes, blackouts, STD, etc. (*Issue*)