

2008

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A Group-Based Approach to Examining the Association among Risky Sexual Behavior,
Drug Use, and Criminal Involvement in a Sample of Newly Arrested Juvenile Offenders

by

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A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
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Date of Approval:
November 17, 2008

Keywords: substance use, juvenile delinquency, sexual practices, problem behavior
syndrome, structural equation modeling, group-based modeling

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Dedication

This project is dedicated to two extraordinary people. To Gary, who walked into my life ten years ago and supported me ever since. Thank you for your unwavering support, love, and belief in me. You have taught me so much. And, to my amazing mother, Cheryl, who is my best friend, greatest cheerleader, helpful copy editor, and constant inspiration. The strength and perseverance that you have exemplified over the years has made this journey possible for me. Witnessing the joy and passion that both of you have experienced in your careers has inspired me to find this within my career. I could not have asked for better role models.

Acknowledgements

This project could not have been accomplished without the assistance of many talented people. First, my sincerest thank you to my mentor, Dr. Richard Dembo. You have extended me tremendous opportunities for which word cannot express my gratitude. Your patience, kindness, and wisdom are a gift to any student who is fortunate to work with you. Most importantly, it is your dedication to the field and sincere desire to improve the lives of adolescents that is an inspiration. Also, my sincerest thank you to Dr. John Cochran. No matter how busy you were, you always took the time to listen and provide your honest advice – whether it was about which classes to take as a Masters student, my panic attacks when the word “comp” was mentioned, or when to go on the market as a doctoral candidate. Over the past five years, you have taught me so much. Also, thanks to Dr. Steven Belenko for allowing me to be a part of the STI/HIV research project, as well as your insightful commentary and meaningful suggestions throughout this project. I am also deeply indebted to Dr. Christopher Sullivan for his expertise and friendship over the past three years. The time and effort you have put into making this project a success is truly appreciated. You are an amazing role model and good friend. I would also like to thank Dr. Paul Greenbaum. Your wisdom and willingness to help is greatly appreciated. Additionally, I would like to thank Dr. Michael Lynch, Dr. Jennifer Wareham, and Dr. Shane Jones for their critical commentary, as well their overwhelming support, throughout my graduate school experience. Whenever I needed to talk out an idea, you opened your door, listened, and talked it out with me. Finally, I would like to thank Laura Gulledge, Melissa Brownrigg, Danielle Roda, Holly Haenel, Sarah Pasant, Melissa Cogswell, Raleigh Blasdell, and Gena Givens for their friendship and support.

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A Group-Based Approach to Examining the Association among Risky Sexual Behavior, Drug Use, and Criminal Involvement in a Sample of Newly Arrested Juvenile Offenders

Kristina K. Childs

ABSTRACT

This study focuses on the interrelationships between risky sexual practices, substance use, and arrest history. The sample consists of 948 newly arrested juvenile offenders processed at a centralized intake facility in 2006. A series of confirmatory factor analysis and structural equation modeling techniques are used to 1) determine if risky sexual behavior, marijuana and cocaine use, and arrest history form a unidimensional latent factor, 2) examine the direct effect of age on the latent factor, and 3) compare the factor structure, as well as the effect of age on the latent factor, across four demographic subgroups based on race and gender. Results provide moderate support for all three research objectives. Important similarities, as well as differences, in the factor structure across the four groups were found. The prevention and intervention implications of the findings, limitations of the current study, and directions for future research are discussed.

Chapter 1

Introduction

For decades, researchers and practitioners have attempted to identify which adolescents are most at-risk for engaging in deviant behavior. This endeavor is fueled by the need to develop effective prevention and intervention strategies that are able to address the needs of these adolescents. Based on this research, a variety of problem behaviors have been found to be quite frequent among at-risk adolescents. These behaviors include substance use, skipping school, vandalism, fighting, risky sexual behavior, reckless driving, and delinquent activity. This study focuses on three of the more common problem behaviors found among adolescents: delinquency, drug use, and risky sexual behavior. It has been consistently documented that the occurrence of these three behaviors is considerably high during the adolescent years. Therefore, the main objective of this study is to examine the interrelationship between these risk behaviors among newly arrested juvenile offenders and to determine if these relationships are consistent across individual-level factors.

It is well established that juvenile offenders display a wide range of antisocial problems including poor academic performance (Dembo, Williams, Schmeidler, & Howitt, 1991), low self-control (Gottfredson & Hirschi, 1990), negative peer relations (Warr, 2002), poor decision-making (Farrington, 1993; see Piquero & Tibbets, 2002), and strained family relations (Dembo & Schmeidler, 2002). Furthermore, research

consistently documents that juvenile offenders are also disproportionately involved in a variety of adolescent problem behaviors. Compared to adolescent nonoffenders, studies document substantially higher levels of truancy (Gottfredson, 2001; Hallfors, Cho, & Brodish, 2006), reckless driving (Junger et al., 1995; Tremblay et al., 1995), gambling (Welte, Barnes, & Hoffman, 2004), running away from home (Chapple, Johnson, & Whitbeck, 2004), breaking curfew (Farrington et al., 1988), unsupervised time spent with peers (Osgood & Anderson, 2004) and, most notably, substance use (Elliott et al., 1989) among adolescent offenders. In regard to drug use, the higher levels found among juvenile offenders has been considered a critical problem for well over 25 years (Huizinga, Loeber, Thornberry, & Cothorn, 2000).

Public health research has also suggested that juvenile offenders are engaging in risky sexual behaviors at a substantially higher rate than nonoffenders (Barthlow, Horan, DiClemente, & Lanier, 1995; Teplin, Mericle, McClelland, & Abram, 2003), which has resulted in disproportionately higher rates of sexually transmitted diseases (STDs) among this population (Joesoef, Kahn, & Weinstock, 2006; Kahn et al., 2005). For example, Kingree, Braithwaite, and Woodring (2000) estimate that 15% of male and 30% of female juvenile detainees are infected with an STD at any given time. This critical public health issue has been relatively overlooked and understudied in both the criminological literature and juvenile justice prevention and treatment services. However, risky sexual behaviors, most notably STD infection, are serious public health problems that require the attention of both disciplines. Not only do these behaviors pose significant risks to the health and well-being of juvenile offenders, but they also pose harmful risk to the community by allowing the spread of these diseases.

Studies also show that drug use and risky sexual behavior are interrelated phenomena. Youth who report substance use are substantially more likely to report risky sexual behavior (Bryan & Stallings, 2002; Harwell, Trino, Rudy, Yorkman, & Gollub, 1999) and adolescents are more likely to report engaging in risky sexual behavior while they are high on drugs or alcohol (Castrucci & Martin, 2002; Tolou-Shams, Brown, Gordon, & Fernandez, 2007). These findings, coupled with the higher rates of both drug use and risky sexual behaviors found among juvenile offenders, suggest that delinquent behavior, drug use, and risky sexual practices may be part of a general syndrome of deviance. Several researchers have suggested that the tendency to engage in any one form of deviant behavior is part of a general syndrome towards deviance. That is, engaging in a particular form of deviant behavior is actually one symptom of the larger “general syndrome” of deviance, commonly referred to as problem behavior syndrome (Jessor & Jessor, 1977). Overall, research has provided support for this argument (for a review, see LeBlanc & Bouthillier, 2003). Adolescents who report engaging in a specific form of deviant behavior (i.e., offending, drug use) are significantly more likely to report engaging in other deviant behaviors.

Drawing on this work, it is critical that juvenile justice system prevention and treatment services are able to target all three of these behaviors in an integrated program. The first step toward the development of such services is identifying the characteristics associated with this general syndrome. Research suggests that individual factors are important predictors of all three forms of deviant behaviors, and therefore, should be considered when examining problem behavior syndrome. In particular, a wealth of research has documented marked variations in the sexual practices and substance use of

juvenile offenders across race, gender, and age. Therefore, identifying variations in the interrelationships among these three forms of behavior is crucial to obtaining an accurate understanding of the nature of problem behavior syndrome.

Accordingly, examining the interrelationship between drug use, risky sexual behavior, and criminal involvement is the focus of this study. In particular, a series of confirmatory factor analysis and structural equation models (Muthèn & Muthèn, 2007) involving data on 948 recently arrested juvenile offenders are used to: 1) examine the covariation in drug use, criminal involvement, and risky sexual behaviors, 2) assess the effect of age on this relationship, and 3) determine whether the strength of the relationship among these behaviors, as well as the effect of age, varies across demographic subgroups of offenders.

This study will add to the existing body of research in several important ways. First, the findings are expected to have important criminological and public health implications. The identification of different demographic subgroups of offenders based on their criminal involvement, drug use, and risky sexual behavior, will highlight the need for these disciplines to come together in an effort to improve the well-being of adolescent offenders. These three forms of problem behaviors have long been considered both criminological and public health priorities.

Second, the large majority of research that has been conducted on juvenile offenders is based on either general adolescent samples consisting of a relatively low number of serious juvenile offenders, or, on incarcerated adolescent samples characterized by the most high-risk adolescents. Although these samples have provided very important information regarding risk behaviors, they are unable to provide an

adequate representation of the extent of these behaviors across the juvenile offender population, as a whole. This study addresses this limitation by examining risk behavior among recently arrested juvenile offenders, which includes adolescents ranging from first-time offenders to more serious, chronic offenders.

Most importantly, the findings of this study will aid in the development of effective juvenile justice system prevention and intervention services in two important ways. First, the examination of the covariation in risk behaviors will provide information regarding which areas of treatment (e.g., substance abuse services) may benefit from including services related to additional risk behaviors (e.g., sex education). Secondly, examining the variation in the strength of the association among risky sexual behavior, criminal involvement, and substance use across demographic characteristics will provide valuable information regarding the similarities and differences in the service needs of at-risk adolescents.

Toward this end, Chapter 2 begins with a descriptive summary of the research that has examined drug use among community samples of adolescents, and more specifically, juvenile offenders. Then, differences in substance use among juvenile offenders are reported. Specifically, variations in substance use by age, gender, and race are discussed. This discussion provides support for examining the variation in these behaviors across demographic categories, rather than examining these behaviors across the entire sample.

Chapter 3 involves a summary of the literature examining the prevalence of STDs and risky sexual behaviors among the general adolescent population, as well as juvenile offenders. A discussion of the differences in these behaviors across age, gender, and race

is also provided. Similar to Chapter 2, this discussion further supports the use of group-based modeling.

Chapter 4 explores the interrelationship between drug use and risky sexual practices. The co-occurrence of substance use and risky sexual behaviors among adolescent offenders across demographic characteristics is also addressed.

Chapter 5 discusses common explanations for the strong association among risky sexual practices, substance use, and delinquency. This discussion draws from research regarding the causes of adolescent risk-taking behavior, in general. Then, possible explanations are supported with studies that have been conducted on risky sexual behavior, delinquency, and drug use. The goal of this chapter is to highlight the commonality in risk factors for all three forms of problem behavior which supports the basic notion that engaging in multiple forms of risk behaviors represents a general syndrome of problem behavior.

Chapter 6 presents a discussion and literature review of the concept of problem behavior syndrome. This review summarizes the evidence in support of generality, as well as the evidence against this concept. The major limitations of this body of research follow. Based on these limitations, it is argued that the examination of the differences in the covariation in problem behaviors across demographic subgroups of adolescent offenders is needed. The research questions guiding this study conclude this chapter.

Chapter 7 consists of an overview of the methods used for the current study. The sample consists of 948 newly arrested juvenile offenders processed at an intake screening facility in Hillsborough County, FL. The data collection procedure, sample characteristics, description of the variables, and analytic plan are presented.

Chapter 8 summarizes the results of the current study. The analyses discussed in this chapter include a number of hypothesis tests examining the bivariate relationships among each of the problem behaviors and the bivariate relationships among each of the problem behaviors and individual-level factors. In addition, a series of confirmatory factor analysis and structural equations models are reported.

Chapter 9 includes a summary of the main findings of the study. Then, a detailed discussion of the treatment and theoretical implications of the results follows. The contributions, as well as the limitations, of the current study are also highlighted. Finally, suggestions for future research conclude this chapter.

Chapter 2

Substance Use and Adolescent Offending

The period of adolescence appears to be a crucial time frame for the emergence of several problem behaviors, most notably delinquency and drug use (Loeber, Stouthamer-Loeber, & White, 1999). Studies suggest that adolescence is the period when initiation into alcohol, tobacco, and marijuana use is most likely to occur (Johnston, O'Malley, Bachman, & Schulenberg, 2007; Kosterman, Hawkins, Guo, Catalano, Abbott, 2000; Tubman et al., 2005) and when regular use of such substances is solidified (Kandel & Logan, 1984; Office of the National Drug Control Policy, 2004). Furthermore, regular use of substances in adolescence is an important step toward the escalation to substance abuse and substance dependence later in life (Ellickson, Hays, & Bell, 1992).

Turning to delinquency, adolescence is also the most critical time period for the onset of criminal behavior (Loeber & Farrington, 1998; Moffitt, 1993). Age of onset and the level of offending during adolescence are both strong and consistent predictors of adult criminality (Nagin & Farrington, 1992; Tracy & Kempf, 1996). Furthermore, the co-occurrence of these problem behaviors during adolescence is quite prevalent and the negative consequences of engaging in both of these behaviors, compared to only one or none, are substantially greater (Barnes, Welte, & Hoffman, 2002; Dembo, Pacheco, Schmeidler, Fisher, & Cooper, 1997; Ellickson & McGuigan, 2000; Huizinga, Loeber, &

Thornberry, 1994; OAS, 2004; OAS, 2003; Menard, Mihalic, & Huizinga, 2001; Tubman, Gill, & Wagner, 2004).

Therefore, over the past two and a half decades, a wealth of research examining has been conducted on adolescent drug use and delinquency. This research consists of surveys on general adolescent samples (CDC, 2006; Huizinga, Loeber, & Thornberry, 1993; Johnson, O'Malley, Bachman, & Schulenburg, 2007; Prinz & Kerns, 2003), justice involved or incarcerated youth (Abrantes, Hoffman, & Anton, 2005; Lebeau-Craven et al., 2003; Dembo et al., 1991; Dembo, Wareham, & Schmeidler, 2006; Helstrom, Bryan, Hutchinson, Riggs, & Blechman, 2004; National Institute of Justice, 1999; Robertson, Dill, Husain, & Undesser, 2004; Teplin, Abram, McClelland, & Dulcan, 2002; Timmons-Mitchell et al., 1997; Vaughn, Wallace, Davis, & Fernandes, 2007; Winters, Weller, & Meland, 1993), youth in drug treatment facilities (Steven, Estrada, Murphy, McKnight, & Tim, 2004), and official statistics on drug abuse violations (Snyder, 2006). The bulk of these empirical studies focus on: 1) the prevalence of drug use among criminal and noncriminal adolescents, 2) variations in drug use and delinquency among different demographic and offending subgroups, 3) identifying and comparing the risk factors for these behaviors, and 4) examining the causal linkages and/or temporal ordering of these behaviors. Across these studies, a rather robust and enduring relationship between delinquency and substance use has emerged. This chapter provides a detailed review of this body of research including community samples of adolescents, as well as adolescent offenders.

Drug Use among the Adolescent Population

Recent estimates suggest that drug use among the general adolescent population is declining (NIDA, 2007). According to the Monitoring the Future (MTF) study, which consists of a nationally representative sample of 48,025 middle and high school students, past year use of any substance has declined 32% among eighth graders, 25% among tenth graders, and 13% among twelfth graders over the past five years (Johnson et al., 2007). In particular, since the peak in usage in 1996, marijuana rates have declined 18.3% among eighth graders, 25% among tenth graders, and 14% among twelfth graders. Significant declines in the reported use of cocaine, alcohol, methamphetamines, inhalants, and tobacco were also found in the 2007 MTF study.

Despite recent declines, substance use among adolescents continues to remain relatively high (Dembo, Wareham, & Schmeidler, 2007a). According to the 2007 MTF lifetime prevalence rates, 19% of eighth graders, 36% of 10th graders, and 47% of 12th graders reported the use of any illicit substance (Johnson et al., 2007). When broken down by specific drug category, lifetime prevalence rates for marijuana use were 14.2% of 8th graders, 31% of 10th graders, and 42% of 12th graders. Furthermore, 7.8% of 12th graders reported the use of cocaine, 6.5% reported lifetime use of MDMA, 3.0% reported lifetime use of methamphetamines, and 11.4% reported lifetime use of amphetamines. Alcohol was the most common substance used by adolescents in the study. Of the sample, 39% of 8th graders, 62% of 10th graders, and 72% of 12th graders reported using alcohol at least once in their lifetime, and; 18% of 8th graders, 41% of 10th graders, and 55% of 12th graders reported they had been drunk in their lifetime.

The National Youth Risk Behavior Survey (YRBSS) revealed similar results. This survey collects data from a nationally representative sample of 9th through 12th graders every two years (CDC, 2006). Drug use trends obtained from the YRBSS also suggest that substance use among adolescents is declining. For example, from 2001 to 2005, the YRBSS reported declining rates of past 30 day use of alcohol, marijuana, cocaine, and tobacco.

According to the 2005 YRBSS results, based on a sample of 13,953 high school students, 74.3% of the students reported lifetime use of alcohol, 43.3% reported drinking alcohol in the past month, and 25.5% had five or more drinks in one setting in the past month (CDC, 2006). Nationwide marijuana prevalence rates were as follows: 38.4% reported lifetime use and 20.2% reported use in the past month. Cocaine prevalence rates were much lower, with 7.6% reporting lifetime use and 3.4% reporting past month use. Furthermore, 12.4% of the sample reported lifetime inhalant use, 4.0% reported lifetime steroid use, 8.5% reported lifetime hallucinogen use, 2.4% reported lifetime heroin use, 6.2% reported lifetime methamphetamine use, and 6.3% reported lifetime ecstasy use.

According to the 2003 National Survey on Drug Use and Health (NSDUH), nearly 8.6 million adolescents aged 12 to 17, or 34.3% of the adolescent population, had used alcohol in the past year (OAS, 2004), with roughly 2 million engaging in binge drinking.¹ The same survey in 2002 estimated that 4 million youth (16%) aged 12 to 17 had used marijuana in the past year. Of these marijuana users, 38% used marijuana one to eleven days out of the year, 21% used 21 to 49 days, 23% used 100-299 days, and 9% used marijuana 300 or more days in the past year (OAS, 2003).

¹ Based on the NSDUH estimates, there were approximately 25 million adolescents under the age of 17 in 2003 (OAS, 2004).

Taken together, these nationally representative studies highlight the relatively high levels of drug and alcohol use occurring among the adolescent population. In particular, all three of these studies indicate that roughly three-quarters of school aged children have used alcohol in their lifetime and 30 to 50% have used marijuana. These numbers are quite alarming, given the bulk of empirical evidence that suggests that adolescents who use alcohol and/or marijuana are substantially more likely to initiate other, more serious, forms of drug use (Fergusson & Horwood, 1997; Fergusson & Horwood, 2000; Kandel & Logan, 1984; Kandel, Yamaguchi, & Chen, 1992; Kosterman, et al., 2000; Lessem et al., 2006; Menard et al., 2001) and to continue substance use into adulthood (Gfroerer, Wu, & Penne, 2002; Office of the National Drug Council, 2004).

Furthermore, it is well established that substance use in adolescence places individuals at risk for a wide range of physical and social problems, including negative family relations, poor academic performance, negative peer relations, mental health problems, and most notably, involvement in delinquent behavior. In particular, the prevalence of substance use is extremely high among adolescent offenders (Dembo, Wareham, Poythress, Cook, & Schmeidler, 2006; Dembo et al., 2007a; Huizinga & Jakob-Chien, 1998; Huizinga, Loeber, Thornberry, Cothorn, 2000; Neff & Waite, 2007; Teplin, Mericle, McClelland, & Abram, 2003; Welte, Barnes, Hoffman, & Dintcheff, 1999). As such, an overview of the large body of research regarding the substance use-delinquency link is provided below.

Drug Use and Adolescent Offending

In 2005, over 2.1 million juvenile arrests were made. Of these arrests, 191,800 (9%) were for drug abuse violations. Over the past ten years, alcohol and drug related arrests have steadily declined (Puzzanchera, Adams, Snyder, & Kang, 2007). For instance, in 1997, 715 per 100,000 youth aged 10-17 were arrested for a drug use violation and 578 per 100,000 youth were arrested for an alcohol related incident (i.e., driving under the influence, liquor law violation). In 2005, 570 per 100,000 youth aged 10-17 were arrested for a drug abuse violation and 476 per 100,000 youth were arrested for an alcohol related incident. However, as can be seen, even with these steady declines the prevalence of substance use among juvenile offenders continues to remain extremely high.

National statistics suggest that the prevalence of drug and alcohol use among adolescent offenders is a persistent and serious problem. For instance, the National Center on Addiction and Substance Abuse (2004) estimates that 78.4% of youth involved in the juvenile justice system are under the influence of alcohol or drugs while committing their crimes, test positive for drugs, are arrested for committing an alcohol or drug offense, admit to having substance abuse problems or share some combination of these characteristics. Such estimates highlight a critical social problem, considering the negative consequences of substance use among adolescent offenders (Stice, Myers, & Brown, 1998). Not only is involvement with drugs or alcohol associated with an increased likelihood of continued and serious contact with the juvenile justice system (National Center on Addiction and Substance Abuse, 2002), it is also related to higher rates of offending, more serious offending, and a longer duration of a criminal career

(Greenwood, 1992; Huizinga et al., 1994; Huizinga & Jacobs-Chien, 1998; Loeber, Green, Lahey, Frick, & McBurnett, 2000; Sealock, Gottfredson & Gallagher, 1997). Furthermore, longitudinal research has demonstrated considerable continuity in the relationships between substance use and delinquency (Le Blanc & Loeber, 1998; Loeber et al., 1999). These studies suggest that delinquency and substance use have contemporaneous relationships (Dembo et al., 2007a; Fagan, Weis, & Cheng, 1990; Horney, Osgood, & Marshall, 1995; Welte, Barnes, Hoffman, Wieczorek, & Zhang, 2005; White et al., 1999), even when controlling for important personality, family, and peer characteristics. To add to this, studies also suggest that delinquency and drug use are two of the most treatment resistant forms of problem behavior found in adolescence (Huizinga et al., 1994; Mann, 2003).

In general, an extensive body of research, spanning several decades, consistently reveals higher levels of substance use among juvenile offenders, compared to non-offenders (Beachy, Peterson, & Pearson, 1979; Elliott, Huizinga, & Menard, 1989; Huizinga et al., 1993; Johnson, Wish, Schmeidler, & Huizinga, 1991; OAS, 2003; OAS, 2004). Results from the 2002 NSDUH revealed that the percentage of youth reporting delinquent behavior was higher among marijuana users than non-drug users, and the percentage of youth engaging in delinquent behavior rose with increasing frequency of past marijuana use (OAS, 2003). For example, 2.9% of youth who reported no past year drug use stole something worth more than \$50, whereas, 31.7% of youth reporting a high frequency of marijuana use (i.e., more than 300 times) admitted to the offense.

Johnson et al. (1991) examined the relationships between different typologies of substance users and delinquent offenders using cross-sectional data from the 1979

National Youth Survey (NYS). This study involves a nationally representative sample of 1,539 youth aged 14-20. On average, multiple index offenders who reported no substance use engaged in 5 delinquent acts, alcohol only users engaged in 57 delinquent acts, marijuana users reported 89 delinquent acts, and cocaine users reported 290 delinquent acts in one year. Among minor, non-serious offenders, delinquency rates were over three times greater for cocaine users than nondrug users. Substance users comprised 30% of the NYS sample and accounted for over 85% of the delinquent acts reported.

Elliot et al. (1989) examined the relationship between drug use and delinquency using three waves of data from the NYS (1976, 1980, and 1983). When the sample was broken down into drug use categories, results revealed a clear ordering of delinquency rates that increased from nonusers, to alcohol users, to marijuana users, and then to polydrug users (i.e., amphetamines, barbiturates, cocaine, heroin, hallucinogens). For example, in 1983, 2% of nondrug users were involved in index offenses, while 6% of alcohol users, 12.5% of marijuana users, and 23.5% of polydrug users engaged in index offenses. When the authors broke down the sample according to offending severity, similar results emerged; as severity in offending increased, so did the prevalence rates for substance use. In 1980, 32.7% of nonoffenders were marijuana users compared to 72.2% of nonserious offenders and 85.1% of serious offenders. In regard to serious drugs, 8% of nonoffenders, 47.5% of nonserious offenders, and 55.2% of serious offenders reported use.

More recently, Huizinga & Jakob-Chien (1998) reviewed the findings from the 1990 Denver Youth Study which is comprised of 1,184 adolescents aged 11-17. Overall,

serious juvenile offenders displayed the highest prevalence rates, frequency, and abuse patterns for alcohol and marijuana and these rates declined as seriousness of offending declined. Similar results were obtained from the 1990 Pittsburgh Youth Study (n = 1,157) and the 1990 Rochester Youth Study (n = 1000) (Huizinga et al., 1993). These relationships were consistent across age, gender, and race (Huizinga, Loeber, & Thornberry, 1995; Thornberry, Huizinga, & Loeber, 1995).

A number of additional studies have found a strong relationship between violence and substance use during adolescence (Derzon & Lipsey, 1999; Farrington, 1998; Fergusson, Lynskey, & Horwood, 1996; Loeber et al., 1999; Wagner, 1996; White, 1997). These studies highlight the notion that, not only are drug use and delinquency related, but the extent of involvement in one behavior is strongly related to the extent of involvement in the other.

Additional general population studies on the relationship between substance use and delinquency have found that: 1) the earlier the initiation of alcohol (Barnes et al., 2002; Lo, 2000; Newcomb & McGee, 1989) and marijuana (Van Kammen, Loeber, & Stouthamer-Loeber, 1991) involvement, the greater chances of involvement in delinquent behavior, 2) being high on alcohol or drugs increases the odds of engaging in delinquent behavior, most notably violent behavior (Fergusson et al., 1996; Wagner, 1996; Zhang, Wieczorek, & Welte, 1997), 3) initiation of crime generally proceeds initiation of substance use (Bui, Ellickson, & Bell, 2000; Chaiken & Chaiken, 1990; Elliott et al., 1989; Huizinga & Jakob-Chien, 1998; Loeber et al., 1999; Menard et al., 2001), and 4) the substance use-delinquency association persists throughout adolescence (Elliott et al., 1989; Loeber et al., 1999; Menard et al., 2001).

As can be seen, these studies highlight a strong and consistent relationship between adolescent offending and drug use. However, a major limitation of research based on the general adolescent population is the small number of offenders, particularly serious offenders, included in the samples. As a result, the variability in adolescent offending, as well as additional problem behaviors that are common among juvenile offenders, is somewhat low which inhibits the amount of detail on the behavior of juvenile offenders that can be obtained. As such, it is also important to consider the prevalence of substance use among samples comprised of only juvenile offenders. To date, the majority of research that examines substance use among juvenile offender populations is based on detained adolescents. These studies are also important because they provide information regarding the prevalence of substance use among juveniles at the back-end of the juvenile justice system, who tend to be more serious juvenile offenders.

Drug Use among Juvenile Offenders

Research involving justice-involved adolescents also demonstrates a strong and consistent association between substance use and delinquent behavior (Belenko & Logan, 2003; Dembo et al., 1987; Dembo et al., 1991; Dembo, Williams, Fagan & Schmeidler, 1993; Dembo, Williams, Wothke, & Schmeidler, 1994; Dembo, Wareham et al., 2006; Inciardi, Pottieger, Forney, Chitwood, & McBride, 1991; Potter & Jenson, 2003; Vaughn, Freedenthal, Jenson, & Howard, 2007; Winter et al., 1993). One of the most well-known trend studies of incarcerated offenders, the Arrestee Drug Abuse Monitoring Program (ADAM), provided self-reported data and drug test results on incarcerated juvenile offenders in nine cities across the United States (National Institute of Justice, 2000).

Using the ADAM data collected in 1997, Belenko, Spratt, & Peterson (2004) reported that 75% of arrested adolescents reported a history of involvement with alcohol or other drugs. The 1999 results of this study indicated that the percentage of juveniles, across the nine cities that tested positive for any one drug ranged from 38% to 69% (NIJ, 2000). Marijuana was the most commonly used drug and cocaine was the second most commonly used drug. Across the nine cities, the median value for the percent of detainees who tested marijuana positive was 53% for males and 38% for females.

Another well known study, the Northwestern Juvenile Project, has also provided information regarding the prevalence of substance use and substance use disorders (SUD) among incarcerated adolescents (Abram, Teplin, McClelland, & Dulcan, 2003; Teplin et al., 2005; Teplin et al., 2003). This longitudinal study involved 1,829 juveniles detained in Cook County, IL between 1995 and 1998. McClelland, Teplin, & Abram (2004) reported that 77% of the youth included in the sample reported using alcohol or other drugs in the past 6 months. Nearly half of the detainees in this study met diagnostic criteria for one or more SUDs and over 20% met diagnostic criteria for two or more SUDs in the past six months (McClelland, Elkington, Teplin, & Abram, 2004). Based on a portion of the original sample, Teplin et al. (2003) reported substance use prevalence rates among 800 of the detainees arrested between 1997 and 1998. Over 90% of the sample reported ever using marijuana; 60.7% of females and 68.9% of males reported using marijuana more than three times in the past three months, and; 21% of females and 14.6% of males reported ever using “other” substances in their lifetime.

In a study of 278 juvenile offenders participating in a longitudinal research project, Dembo and associates also found high prevalence rates of substance use. Of the

sample, 61% of youth reported ever using marijuana and 21% reported using the drug more than 100 times (Dembo et al., 2007a). Furthermore, youth who reported higher frequencies of delinquent behavior also reported higher frequencies of drug use. In another study, Dembo et al. (2007b) reported the prevalence of cocaine use. Based on both self-reported and/or hair test results, over 30% of the sample were cocaine involved at some point during their lifetime.

Taken together, the bulk of empirical research indicates that the association between substance use and juvenile offending is quite robust. In sum, this body of research suggests that 1) juvenile offenders are substantially more likely to engage in substance use compared to nonoffenders, 2) higher levels of involvement in delinquent behavior is associated with higher levels of substance use, and 3) this association tends to persist throughout adolescence. Yet, variations in the strength of these associations across important demographic factors including age, gender, and race have also been documented (Barnes et al., 2002; Belenko et al., 2004; Dembo et al., 2007a; Elliott et al., 1989; Huizinga & Jakob-Chien, 1998; Teplin et al., 2005). As such, it is important to consider the variation in drug use among juvenile offenders across these demographic groups.

Variations in the Substance Use-Delinquency Link

Gender. On average, nationally representative studies indicate that male adolescents engage in substance use at a higher rate than female adolescents (CDC, 2006). However, research suggests that the prevalence and pattern of substance use among juvenile offenders vary across gender groups (Helstrom et al., 2004; Huizinga & Jakob-Chien, 1998; Timmon-Mitchell et al., 1997). In regard to alcohol use, studies

reveal similar prevalence rates across male and female juvenile offenders. Belenko et al. (2004) reported that 33% of females and 34% of males were alcohol involved; Teplin et al. (2003) reported 48% of males and 46.2% of females reported alcohol use more than three times in the past three months and Neff and Waite (2007) reported nearly identical rates of alcohol use across gender groups. However, these studies also indicate that females tend to initiate alcohol use earlier than their male counterparts.

Gender differences in illicit drug use are somewhat complex. On average, the majority of studies suggest that male juvenile offenders report higher levels of marijuana use (Barnes et al., 2002; Dembo et al. 2007a; Elliott et al., 1999; Johnston, et al., 2007; Steven et al., 2003). For example, Belenko et al. (2004) reported that 21% of arrested girls and 41% of arrested boys included in the ADAM project tested positive for marijuana and 73% of girls and 83% of boys reported ever trying the drug. Wei, Makkai, & McGregor (2003) found higher marijuana positive rates in their sample of 493 juvenile detainees. In particular, 40% of female and 50% of male detainees tested marijuana positive. Teplin et al. (2003) found that 78% of males detainees, compared to 68% of female detainees, reported past month use of marijuana. However, Neff and Waite (2007) reported similar rates of marijuana use across gender groups and Helstrom et al. (2004) and Boyle et al. (1992) reported higher rates of marijuana use among female juvenile offenders.

Typically, female juvenile offenders are found to report earlier initiation and higher levels of serious drug involvement, such as cocaine and other polydrug use (Inciardi et al., 1991; Kim & Fendrich, 2002; Neff & Waite, 2007; Wei et al., 2003). For example, Belenko et al. (2004) reported that girls were significantly more likely to have

tried cocaine, crack, amphetamines, and inhalants. In the Northwestern Juvenile Project, 21% of females and 14.6% of males reported lifetime use of “other drugs” (i.e., serious drugs other than marijuana) and 1.8% of females, compared to 0.8% of males, reported initiation of serious drug use prior to the age of 13 (Teplin et al., 2003). Stevens et al. (2003) found that males reported significantly higher levels of marijuana use whereas females reported significantly higher levels of cocaine, heroin, and methamphetamine use. Females juvenile detainees also tend to display SUDs at a substantially higher rate than male detainees (Abrantes et al., 2005; Teplin et al., 2002; Timmon-Mitchell et al., 1997; Winters et al., 1993).

The Office of Juvenile Justice Delinquency Prevention (OJJDP) also reported important gender differences in trends of arrests for drug abuse violations (Snyder, 2006). From 1995 – 2004, the number of males arrested for drug abuse violations declined 8% but arrests for drug abuse violations increased 29% for females. However, females accounted for 27.2% of the overall cases heard in juvenile courts, but only 19.1% of drug-related cases (Puzzanchera & Kang, 2007) which means that female juvenile offenders continue to be underrepresented in drug abuse court cases.

As can be seen, several discrepancies in substance use among juvenile offenders exist across gender groups. On one hand, male juvenile offenders typically reveal higher levels of marijuana use and greater numbers of drug abuse violations, however, females typically reveal higher levels of serious drug involvement and tend to initiate substance use at an earlier age. Thus, based on these inconsistencies, it is important to account for gender effects when examining substance use among juvenile offenders. Failing to do so could mask important gender-specific differences in the association between drug use and

delinquency, which in turn, could result in an inaccurate understanding of the nature of this association.

Race. Interestingly, racial differences in substance use tend to be in contrast to racial differences found in criminal offending. On one hand, African American adolescents tend to report the highest rates of delinquent behavior (Huizinga et al., 1994; Vaughn et al., 2007), most notably serious delinquent behavior (Elliott, 1994; Elliott et al., 1989; Hawkins, Laub, Lauritsen, & Cothran, 2000; Loeber & Farrington, 1998). On the other hand, white adolescents, on average, are more likely to engage in substance use (Barnes et al., 2002; Elliott et al., 1989; Johnston et al., 2007).

Studies examining racial differences in substance use among justice involved populations provide inconclusive results. According to the 1997 ADAM data, African American arrestees were more likely to test drug positive than white arrestees. Yet, whites self-reported substantially higher rates of lifetime prevalence of marijuana, cocaine, crack, amphetamines, and inhalants (Belenko et al., 2004). Dembo et al. (2007a) found that, compared to white offenders, African American offenders reported lower levels of alcohol and marijuana use, however, they did not find any significant differences in cocaine use (see Dembo, et al., 2007b). Stenmark, Wackwitz, Peffrey, and Dougherty (1974) found white juvenile drug offenders to be heavier substance users on all types of drugs including alcohol, marijuana, and “other” illicit drugs; and Teplin et al. (2005) and Vaughn et al. (2007) found that white detainees were more likely to have substance-related problems, including SUDs, blacking out, and earlier age of onset.

In regards to official data, African American offenders make up a disproportionate amount of drug related arrests. For example, in 2004 African American

adolescents comprised 17% of the total population of adolescents under the age of 18, but accounted for 27% of juvenile arrests for drug abuse violations (Snyder, 2006).

Interestingly, examination of arrests for drug abuse violations from 1980 to 2004 reveal quite different trends. For white juvenile drug abuse violations, arrests peaked in 1997 and have continuously declined, by 9%, since that time. For African American drug abuse violations, arrests peaked in 1995 and have declined 44% since then. It is quite possible that the inconsistencies found between self-reported drug use and official drug violation arrest statistics are due to racial bias in arrest procedures. However, other possible reasons may be related to 1) the willingness of African American adolescents to report drug use (Rosay, Najaka, & Herz, 2007), or 2) drug use and drug use violations represent different phenomena (e.g., drug use versus drug sales). Regardless of the nature and direction of the disparity in substance use among racial groups, it is apparent that important racial differences in the association among drug use and delinquency exist. Thus, it is imperative that racial characteristics are accounted for when examining substance use patterns among juvenile offenders.

Age. The bulk of empirical evidence suggests that age influences the substance use-delinquency link in several ways. First, studies on both adolescent populations and juvenile offenders suggest that, as an individual moves through adolescence, the likelihood of engaging in substance use and delinquency increases (Elliott et al., 1989; Kelley, Huizinga, Thornberry, & Loeber, 1997; LeBlanc & Loeber, 1998; Menard et al., 2001; White et al., 1999). For example, in a sample of 5,045 students, Tubman et al. (2004) found that the proportion of students reporting both delinquency and substance use increased four fold from early to late adolescence. Second, the earlier the age of

initiation into substance use, the greater the likelihood of severe and persistent drug use (Office of the National Drug Control Policy, 2004; Prinz & Kerns, 2003; Potter & Jenson, 2003). Third, youth who initiate delinquent behavior at an early age are more likely to use substances throughout adolescence (Farrington, 1995; Menard et al., 2001; Van Kammen & Loeber, 1994).

Research conducted on juvenile offender populations highlights a positive linear relationship between substance use and age (Loeber et al., 1999; McClelland et al., 2004; Teplin et al., 2003). For instance, Dembo et al. (2007a) reported higher levels of heavy drinking and marijuana use among the older justice-involved youth in their study. In addition, arrests for drug abuse violations also fit this linear relationship. In 2004, youth aged 12 and under accounted for 2.7% of drug abuse violations, youth aged 15 -17 accounted for 39.8% and youth 16 and older accounted for 57.5% (Snyder, 2006).

As can be seen, variations in the substance use-delinquency link are complex and somewhat inconsistent across studies. On average, female offenders (compared to male offenders), white offenders (compared to minority offenders), and older adolescent offenders tend to report more serious use of substances. Although these relationships are far from conclusive, it is quite clear that these socio-demographic characteristics need to be accounted for when considering the association among substance use and delinquent behavior. Failing to account for these characteristics has the potential to lead to an inaccurate understanding of the co-occurrence of the behaviors among juvenile offenders, in turn, leading to the assumption that the needs of juvenile offenders are similar across demographic categories, when in fact, they may be substantially different. Indeed, a large body of research highlights racial and gender differences in cultural expectations,

socialization practices, and cognitive development that could potentially lead to variations in problem behaviors across these demographic characteristics (Bennett, Farrington, & Huesmann, 2005; Kotchick et al., 2001; Morash & Chesney-Lind, 1991).

Possible Explanations for the Substance Use-Delinquency Link

Even with the extensive body of research conducted on the substance use-delinquency link, the cause and direction of this association remains unanswered (Wagner, 1996). Currently, three main explanations for the strong and consistent relationship found between drug use and delinquency have been discussed in the literature: 1) substance use causes crime, 2) crime causes substance use, and 3) the relationship between substance use and crime is spurious (Jessor & Jessor, 1977; Jessor et al., 1991; Menard et al., 2001; White, 1990). Reviews of the research on drug use and delinquency conclude that there is little evidence that substance use causes crime (White et al., 1999; White, 1997). In fact, most longitudinal studies find that delinquency developmentally precedes the initiation into substance use (Chaiken & Chaiken, 1990; Elliot et al., 1989; Menard et al., 2001). Although this finding provides preliminary support for the second explanation, it does not prove that delinquency causes substance use. Most research indicates that the relationship does not prove to be this simplistic, given that all juvenile offenders do not use drugs (Dembo et al., 2007a; Huizinga & Jakob-Chien, 1998).

Those who support a spurious model of the substance use-delinquency link suggest that both behaviors are predicted by the same set of common risk factors or that drug use and delinquent behavior cluster together as part of a general problem behavior syndrome (Dembo et al., 1992; Elliot et al., 1989; Jessor & Jessor, 1977; Neff & Waite,

2007; Menard et al., 2001; Osgood, Johnston, O'Malley & Bachman, 1988). This explanation is supported by a large amount of evidence that highlights common risk factors for both drug use and delinquency. Furthermore, the same factors that are able to predict age of onset of delinquency, serious delinquency, and persistent delinquency have also been shown to predict initiation of substance use, serious substance use, and persistent substance use into adulthood (Elliott et al., 1989; Hawkins, Catalano, & Miller, 1992; Stice et al., 1998; White, 1997; Zhang et al., 1997). These risk factors include poor family relations, negative peer influences, educational difficulties, community disadvantage, and personality characteristics (Dembo et al., 2007b; Dembo et al., 2006; Hawkins et al., 1992; Jessor, Donovan, & Costa, 1991; Jessor & Jessor, 1977; Neff & Waite, 2007; White et al., 1999).

Understanding the exact nature of the substance use-delinquency link is beyond the scope of this study. However, based on the strong empirical evidence highlighting shared risk factors for both drug use and delinquency, in addition to the high prevalence of substance use among juvenile offenders, it seems reasonable to examine the co-occurrence of these behaviors, as well as additional problem behaviors discussed in Chapter 3, among juvenile offenders. Furthermore, the empirical evidence that highlights marked variation in the substance use-delinquency link across race, gender, and age highlight the need to examine the co-occurrence of these behaviors across these demographic subgroups in an effort to obtain the most accurate knowledge of this relationship.

Chapter 3

Risky Sexual Behavior and Adolescent Offending

Adolescence is also an important time period for the development of risky sexual behavior (e.g., high number of partners, inconsistent condom use, sex while using drugs or alcohol).² Specifically, several researchers have suggested that adolescence is the most critical time period for initiation into sexual behavior, the progression into positive or negative sexual practices, and the development of perceptions regarding the risks and consequences of sexual behavior (Malow, Devieux, Jennings, Lucenko, & Kalichman, 2001; St. Lawrence, 1993; Tapert, Aarons, Sedlar, & Brown, 2001). As such, a wealth of studies indicates that the teen years tend to be the time period when individuals are the most vulnerable to engaging in risky sexual behavior (Ericksen & Trocki, 1992). For example, national survey data suggest that 20 to 47% of sexually active fifteen to seventeen year old high-school students report having four or more partners in their lifetime (Santelli, Lindberg, Abma, McNeely & Resnick, 2000), and recent data indicate that nearly one-third of sexually active teens use contraception inconsistently (National Campaign to Prevent Teen Pregnancy, 2000).

Because of these relatively high rates of risky sexual practices, adolescents have been found to be at high risk for many negative health consequences related to unsafe

² It should be noted that the use of substances prior to or during sex is also considered a risky sexual behavior. However, discussion of the link between substance use and risky sexual behavior is the topic of Chapter 4.

sexual practices (Kotchick, Shaffer, Forehand, & Miller, 2001). For example, in 2006, the Centers for Disease Control and Prevention (CDC) indicated that youth aged 10-19 accounted for 35% of reported Chlamydia and 28% of reported gonorrhea infections (CDC, 2007). Compared to adults, this age range accounted for the highest proportion of new infections. To make matters worse, individuals infected with sexually transmitted diseases (STDs) are 3 to 5 times more likely to be infected with the Human Immunodeficiency Virus (HIV) (CDC, 1998) and other long-lasting sexually transmitted diseases (i.e., syphilis, herpes) (CDC, 2007). For females, infections can also cause reproductive problems including infertility, pelvic inflammatory disease (PID), and unintended pregnancy (CDC, 2007; Chacko, Barnes, Weiman, & Smith, 2004). The CDC (2007) indicates that females under the age of 25 are the most likely age group to develop PID from an untreated STD.

Given the significant negative health consequences associated with risky sexual behavior, a large body of public health research has been conducted on sexual behaviors among adolescents. This body of research is based on community adolescent samples (Elliott & Morse, 1989; Evans et al., 2004; Malow et al., 2001; Morrison et al., 2003; Tolou-Shams, Brown, Gordon, & Fernandez, 2007; Warren et al., 1997), youth in substance abuse treatment programs (Bryan & Stallings, 2002; Deas-Nesmith, Brady, White, & Campbell, 1999; Gordon, Kinlock, & Battjes, 2004; Mezzich et al., 1997; Tapert, Aarons, Sedlar, & Brown, 2001), and incarcerated adolescent offenders (Barthlow, Horan, DiClemente, & Lanier, 1995; Canterbury et al., 1995; Joesof, Kahn, & Weinstock, 2006; Kahn et al., 2005; Kingree, Braithwaite, & Woodring, 2000; Mertz, Voigt, Hutchins, & Levine, 2002; Morris, Baker, Valentine, & Pennisi, 1998; Oh et al.,

1998; Pack, DiClemente, Hook, & Oh, 2000; Robertson, Thomas, St. Lawrence, & Pack, 2005; Teplin et al., 2005). Across these studies, three important findings have emerged: 1) risky sexual behavior among the adolescent population is quite prevalent (CDC, 2007; Kotchick et al., 2001; Malow et al., 2001), 2) youth who engage in risky sexual behaviors are substantially more likely to be infected with a sexually transmitted disease (Castrucci & Martin, 2002; Pack et al., 2000; Roberston et al., 2005), and 3) compared to nonoffenders, adolescent offenders are substantially more likely to engage in risky sexual behaviors and to test positive for a sexually transmitted disease (Barthlow, Horan, DiClemente, & Lanier, 1995; Canterbury et al., 1995; Joesof et al., 2006; Kahn et al., 2005; Pack et al. 2000, Teplin, Mericle, McClelland, & Abram, 2003).³ This chapter explores the existing research on risky sexual practices and the prevalence of STDs among adolescents, most notably, juvenile offenders.

Risky Sexual Behaviors and STDs among the Adolescent Population

Risky sexual behaviors. Nationally representative studies suggest that adolescents are engaging in risky sexual behaviors at alarming rates (Santelli et al., 2000). For instance, nearly half of the 13,953 high school students included in the 2005 National Youth Risk Behavior Survey (YRBSS) reported ever engaging in sexual intercourse. Of the respondents who reported a sexual experience, 34% were sexually active at the time of the survey (i.e., 2005), 37% reported sex without a condom, and 14% reported sexual intercourse with more than four partners (CDC, 2006). Furthermore, the examination of

³ Research also highlights a strong relationship between risky sexual behavior and substance use. However, a discussion regarding this association is not included in this chapter because Chapter 4 is devoted solely to this topic.

trends over time suggests that these estimates have remained stable over the past five years.

The 1995 (Wave 1) data from The National Longitudinal Survey of Adolescent Health (Add Health) reported similar results. Based on a sample of 14,151 students in grades 7-12, 39% reported that they had ever had sex. Among those who reported ever having sex (n = 6,887), 35% did not use contraception at first sexual experience and 32% did not use contraception at the most recent sexual experience (Cubin, Santelli, Brindis, & Braveman, 2005).

The National Survey of Youth Knowledge and Attitudes on Sexual Health Issues, funded by the Kaiser Family Foundation, was designed to examine the attitudes and behavior of sexually active adolescents and young adults (Hoff, Greene, & Davis, 2003). Of the 483 respondents aged 15 to 17, 29% reported feeling pressure to engage in sexual activity, 10% believed “it is not that big of a deal to have sex without a condom,” and 37% reported ever having sexual intercourse. Of the sexually active respondents, 38% reported having sex without a condom, 39% reported more than two partners in their lifetime, 33% reported being in a sexual relationship where they felt things were moving too fast, and 14% felt that it was a possibility that they were STD positive.

In a sample of 571 sexually active female adolescents, 33% reported their first sexual experience prior to the age of 14, 18% reported two or more partners in the past two months, 38% reported four or more partners in their lifetime, 42% reported never using condoms with new partners, and 20% tested STD positive (Millstein & Moscicki, 1995). Likewise, using information collected from the daily diaries of 112 sexually experienced adolescents, Morrison et al. (2003) found that 38% of respondents engaged

in anal sex, 22% reported a history of an STD, and 37% reported rarely or never using a condom. Additional studies indicate that only a small proportion, approximately 10-20% of sexually active adolescents, report consistent use of condoms (DiClemente et al., 1992; Kahn et al., 1995; Seidman & Reider, 1994).

Furthermore, youth who engage in one form of risky behavior are also substantially more likely to engage in other forms of risky sexual behavior (Biglan et al., 1990; Gillmore, Butler, Lohr, & Gilchrist, 1992). For example, DiClemente et al. (1996) found that the frequency of sexual intercourse was inversely related to condom use and Richter, Valois, McKeown, and Vincent (1993) found a strong correlation between the number of lifetime partners and the failure to use condoms. Research also highlights the strong association between risky sexual behavior and sexually transmitted diseases. Put simply, the greater the level of risky sexual behavior, the greater the likelihood of contracting a sexually transmitted disease (Castrucci & Martin, 2002; Hoff et al., 2003; Millstein & Moscicki, 1997; Pack et al., 2000; Roberston et al., 2005).

Sexually transmitted diseases. Data from the CDC (2007) indicates that adolescents and young adults represent the highest risk group for sexually transmitted diseases. In particular, it is estimated that young people, ages 15 to 24, account for nearly half of all new infections. According to the 2006 estimates, 65 per 100,000 youth aged 10-14 and 1,674 per 100,000 youth aged 15-19 tested positive for Chlamydia and 20 per 100,000 youth aged 10-14 and 459 per 100,000 youth aged 15-19 tested positive for gonorrhea. In addition, the latest available data (i.e., 2006 estimates) suggest that Chlamydia and gonorrhea rates are increasing for the adolescent population. Although these statistics seem alarming, it must be noted that these figures are based on reported

cases, and therefore, represent only a small proportion of the national STD estimates. The CDC estimates that a substantial number of cases of treatable STDs go undetected, untreated, and unreported (CDC, 2007), which means that the prevalence rates for these diseases are actually much higher among the adolescent population.

Furthermore, the CDC (2000) recently estimated that nearly 50% of new HIV infections are under the age of 25. Overall, national estimates suggest that the number of new HIV infections is decreasing (CDC, 2007). However, new HIV infections for 13-14 year olds seem to be stabilizing while new infections for 15-19 year olds have steadily increased. To add to this, the World Health Organization (WHO) estimates that half of the 14 million people infected with HIV worldwide were infected between the ages of 15 and 24 (Goldsmith, 1993). Statistics such as these underscore the fact that the consequences of sexual risk-taking during adolescence can have long-lasting effects.

Given that juvenile offenders tend to experience lower access to health care services, fewer institutional resources, and inadequate sexual education services (Dembo & Schmeidler, 2003), the adolescent offending population appears to be at heightened risk for engaging in risky sexual behaviors, and in turn, contracting and spreading sexually transmitted diseases (Joesof et al., 2006). As such, sexual behavior among juvenile offenders has recently begun to receive attention in the public health field. This research has provided overwhelming support for the link between juvenile offending and risky sexual behavior.

Risky Sexual Behaviors and Adolescent Offending

Research comparing the sexual behavior of delinquents to non-delinquents suggests that criminally involved adolescents are substantially more likely to report risky

sexual behavior (DiClemente, Lanier, Horan & Lodico, 1991; Gordon et al., 2004; Mezzich et al., 1997; Robertson & Levin, 1999; Rowe, Rodgers, Meseck-Bushey, & St. John, 1989; Rodgers & Rowe, 1990; Scaramella, Conger, Simons, & Whitbeck, 1998; Stouthamer-Loeber and Wei, 1998; St. Lawrence, Crosby, & O'Bannon, 1999; Timmermans, Van Lier, & Koot, 2007). For example, compared to high school students, detained adolescents display much higher rates of sexual intercourse, nearly double the STD incidence rate, and are substantially less likely to report the use of condoms (Morris et al. 1995; Schafer et al., 1993). One recent study conducted by Crosby, DiClemente, Wingood, Rose, & Levine (2003) found that adolescents with a history of adjudication were significantly more likely to engage in sexual risk behaviors, including early initiation, multiple partners, sex with an infected partner, and the use of drugs or alcohol during sex, compared to those who did not have a history of adjudication.

Based on a community sample of 1,400 at-risk adolescents, Tolou-Shams et al. (2007) compared self-reported drug use and risky sexual behavior among youth with a history of arrest to youth without a history of arrest. Youth with a criminal history reported significantly higher frequencies of unprotected sex, a history of an STD, poor attitudes toward safe sex practices, and substance use during sex compared to youth without a criminal past. Similarly, Devine, Long, and Forehand (1993) found that general delinquency was related to a greater number of sexual partners. Using the Add Health data, Armour and Haynie (2007) compared each respondent's age of sexual debut (only respondents who were virgins at Wave 1) to the mean age of sexual onset for the respondent's school. They found that experiencing early sexual initiation, measured by comparing the age of sexual onset of the respondent to the mean age of sexual onset of

the respondent's school, was associated with a 20% increase in later delinquency compared to initiating sex on time. On the other hand, youth who reported late initiation of sexual intercourse were 50% less likely to engage in delinquency compared to youth who initiated on time.

Using the NYS, Elliott and Morse (1989) compared the sexual behavior of all non-married respondents across different levels of offending. In 1976, when the respondents were 11-17 years old, 43% of serious offenders were sexually active; however, only 6% of the nonoffenders were sexually active. In 1980, when respondents ranged from 15-21 years of age, 83% of serious offenders were sexually active while only 36% of nonoffenders were sexually active. Furthermore, approximately 7% of the "patterned offenders" aged 11-14 in their sample reported more than six partners, whereas 1-3% of "exploratory" offenders and less than one percent of nonoffenders reported more than six partners. Among respondents aged 15-17, 17-27% of "patterned" offenders, 8-11% of "exploratory" offenders, and 3-7% of nonoffenders reported more than six lifetime partners.

Research conducted on the general adolescent population provides important insight into the prevalence of risky sexual behaviors, and STDs, among both delinquent and nondelinquent adolescents by allowing the direct comparison of these behaviors across delinquent categories. However, similar to studies examining substance use, these survey techniques only provide information on a small number of offenders within the larger adolescent population. Therefore, it is also important to consider the prevalence of risk behaviors found among adolescent offender populations. Since it has been established that juvenile offenders are disproportionately more likely to engage in risky

sexual practices, the studies are able to provide a more in-depth understanding of the prevalence and severity of risky sexual practices among adolescent offenders. To date, this body of research is based, in large part, on incarcerated adolescents.

Two decades ago, Bell and colleagues suggested that “adolescent detainees may be disproportionately important as core-group transmitters of STDs” (1985: 33). A number of subsequent studies on incarcerated adolescents indicate this statement is true. Therefore, the next two sections are devoted to this body of research. In particular, a detailed discussion of the public health research conducted on juvenile offenders and risky sexual behaviors, including variations in this association across socio-demographic characteristics is provided.

Risky Sexual Behaviors and STDs among Incarcerated Adolescents

Risky sexual behaviors. Research suggests that adolescent offenders tend to initiate sex earlier, report higher numbers of partners, a history of an STD, use condoms less often, and are substantially more likely to test positive for Chlamydia and/or gonorrhea (Barthlow et al., 1995; Castrucci & Martin, 2002; Kingree & Phan, 2001; Rickman et al., 1994). For instance, Canterbury et al. (1995) found that 76% of the detainees in their study reported having three or more sex partners in their lifetime, 20% reported never using a condom, and 22% reported a past history of an STD. In a sample of 6,581 juvenile detainees, Morris et al. (1998) found that 96% of the sample was sexually active. Of this subgroup, 71% reported never using a condom and only 5% reported using a condom all of the time.

Teplin et al. (2003) studied STD risky behaviors in a sample of 800 adolescents incarcerated at the Cook County Juvenile Temporary Detention Center. Ninety-one

percent of the youth reported being sexually active: 35% reported having unprotected sex in the past month, 90% reported engaging in at least three risky sexual behaviors, and 65% reported engaging in 10 or more. Pack et al. (2000) found similar results based on the behavior of 284 African American male detainees. Among their sample, the average age of sexual debut was 11.9 and the mean number of sexual partners was 11. Of the sexually active youth (98%), only 37% reported using condoms consistently, 20% reported using condoms more than half of the time, and 14% reported never using condoms. In regard to sexually transmitted diseases, 19.7% reported a history of an STD and 18% tested positive for Chlamydia, gonorrhea, or both.

Research also suggests that chronic juvenile offenders are substantially more likely to engage in risky sexual behavior compared to nonserious juvenile offenders and/or nonoffenders (Timmermans, Van Lier, & Koot, 2007; Tolou-Shams et al., 2007; Robertson & Levin, 1999). For instance, Harwell, Trino, Bret, Yorkman, and Gollub (1999) compared the sexual behavior of youth on their first admission to juvenile detention to youth with multiple admissions to juvenile detention. Multiple admissions youth were significantly more likely to initiate sex before age 13, report eight or more lifetime partners, exchanged sex for drugs or money, and to use condoms inconsistently.

Taken together, these studies highlight the troubling rates of risky sexual behavior among adolescent offenders. Across the studies reviewed above, over 90% of adolescent offenders were sexually active, while only 30-50% of the adolescents in the community samples were sexually active. Of the sexually active offenders, over three-fourths reported multiple partners, whereas 14-40% of the community samples reported sex with

multiple partners. Inconsistent condom use ranged from 60 to 95% among sexually active offenders and from 25 to 42% among sexually active community adolescents.

Sexually transmitted diseases. Table 1 provides a summary of previous studies that report the prevalence of STDs among incarcerated adolescents in the United States. As can be seen, a disproportionate number of juvenile offenders are infected with Chlamydia and/or gonorrhea. To add to this, Mertz et al. (2002) reported data in five different detention centers across the United States. The median positivity rate for Chlamydia infections was 15.6% for females and 7.6% for males and the median positivity for gonorrhea infections was 5.2% for females and 0.9% for males.

Table 1. *STD Prevalence Rates from Studies of Incarcerated Adolescents in the US.*

Authors	Sample	+ Chlamydia	+ Gonorrhea
Broussard et al. (2002)	Males (<i>n</i> = 5029)	12.9%	4.3%
	Females (<i>n</i> = 529)	32.5%	13.6%
Canterbury et al. (1995)	Males (<i>n</i> = 1068)	8.6%	0.6%
	Females (<i>n</i> = 147)	9.5%	5.4%
Lofy et al. (2006)	Females (<i>n</i> = 3,593)	13.7%	--
Kahn et al. (2005)	Males (<i>n</i> = 98,296)	5.9%	1.3%
	Females (<i>n</i> = 33,619)	15.6%	5.1%
Katz et al. (2004)	Females (<i>n</i> = 101)	13.9%	5.9%
Oh et al. (1998)	Males (<i>n</i> = 217)	8.8%	2.8%
	Females (<i>n</i> = 46)	28.3%	13.1%
Pack et al. (2000)	Males (<i>n</i> = 297)	14.4%	6.7%
Risser et al. (2001)	Males (<i>n</i> = 450)	9.6%	6.7%
	Females (<i>n</i> = 139)	28.1%	23.4%
Robertson et al. (2005)	Males (<i>n</i> = 400)	8.1%	1.5%
	Females (<i>n</i> = 218)	24.7%	7.3%
Shafer et al. (1993)	Males (<i>n</i> = 269)	10.7%	6.6%

To compare these estimates to the general population, the CDC (2006b) recently reported a 6.3% median state STD positive rate for females aged 15 to 24 tested at family clinics, whereas the median percent positive rate for females tested in juvenile correctional facilities was 14.2%. Moreover, Chlamydia and gonorrhea rates among male adolescent detainees have been found to be 152 times greater than the general population in the same age range (CDC, 1996).

These figures are quite disturbing given that the large majority of Chlamydia and gonorrhea infections are asymptomatic (CDC, 2006b; Kahn et al., 2005). For example, in a sample of 263 juvenile detainees, 37 (14%) tested STD positive and all but one were asymptomatic. Based on a sample of 284 incarcerated minority males, Pack et al. (2000) found that 84% of the STD positive youth (18% of the sample) self-reported no symptoms.

As mentioned above, juvenile offenders are substantially less likely to have access to health care services (Dembo & Schmeidler, 2002), which puts them at heightened risk for undetected and untreated disease. Thus, a large portion of risk-taking, sexually active juvenile offenders in our communities continue to unknowingly spread STDs. Therefore, reducing risky sexual behavior among this population, in addition to providing STD screening and treatment to justice involved adolescents, is critical. The juvenile justice system has the potential to serve as an important avenue for providing much needed public health services to youth at-risk for experiencing the negative consequences of risky sexual behavior and reducing the spread of disease.

As the research reviewed above indicates, a very strong and consistent relationship exists between risky sexual behavior and adolescent offending. These

studies concur that adolescent offenders are at heightened risk for engaging in risky sexual behavior and contracting STDs. However, several important socio-demographic differences in the risky sexual behavior-delinquency link have also been revealed. In particular, important variations in the tendency to engage in risky sexual behavior and STD prevalence rates have been found across gender, race, and age. Therefore, it is important to consider these differences when examining the risky sexual behavior-delinquency link.

Variations in the Risky Sexual Behavior-Delinquency Link

Gender. Research on community samples of adolescents tends to suggest that males are more likely to report engaging in risky sexual behaviors including early initiation and multiple partners, and females tend to report higher levels of inconsistent condom use (CDC, 2006; Luster & Small, 1994; Reitman et al., 1996; Shrier et al., 1996; Tubman et al., 1996; Warren et al., 1997). However, comparison of risky sexual behaviors among male and female detainees reveals inconsistent patterns. Teplin et al. (2003) found that males were more likely to report being sexually active, multiple partners, and sex while drunk or high. However, female detainees reported higher levels of unprotected sex in the past month, sex with high risk partners, unprotected sex while drunk or high, and trading sex for money. Canterbury et al. (1995) failed to find significant gender differences in the number of sex partners or use of condoms, but a significantly higher percentage of females (44%), versus males (19%), reported a history of an STD. Kingree et al. (2000) found that females were significantly more likely to have sex without a condom than males, whereas, Morris et al. (1998) found that male detainees were more likely to report never using a condom, higher numbers of partners,

and engaging in bisexual behaviors. Finally, Castrucci and Martin (2002) failed to find any significant gender differences in number of partners or condom use.

Despite the unresolved relationship between gender and risky sexual behaviors, empirical research has consistently documented that female juvenile offenders have substantially higher prevalence rates of STD infection than males (see Table 1). Furthermore, in a review of articles reporting STD prevalence rates among incarcerated adolescents published between 2004 and 2005, Joesof et al. (2006) concluded that Chlamydia rates range from 15.6 to 28.3% for females and from 5.2 to 14.4% for males; Gonorrhea rates ranged from 4.5 to 7.3% for females and 0.9 to 1.5% for males.

As can be seen, significant gender differences exist in regard to risky sexual behavior and STD infection. In addition, Robertson et al. (2005) found that predictors of STD positivity differed by gender. For male offenders, condom use was an important predictor of positivity, however, for female offenders, number of partners and sexual activity in conjunction with alcohol use predicted positivity. Thus, it is important to consider gender differences in risky sexual behavior and STD prevalence rates among juvenile offenders to accurately represent the sexual behavior-delinquency link across male and female offenders. Given this body of research highlighting gender differences, ignoring such demographic differences could lead to inaccurate generalizations regarding the nature and strength of the association.

Race. Similar to studies on the general adolescent population, studies suggest that minority juvenile offenders engage in risky sexual behaviors at a higher rate than white juvenile offenders (Canterbury et al., 1995; Kahn et al., 2005; Lofy, Hofmann, Mosure, Fine, & Marrazzo, 2006; Morris et al., 1995; Risser, Risser, Geftter, Brandsetter, &

Cromwell, 2001). For example, Canterbury et al. (1995) found that African American detainees reported higher numbers of sexual partners, less use of condoms, a history of STD infections, and a current STD. DiClemente (1991) found that non-Black juvenile detainees were significantly more likely to report consistent condom use. However, Morris et al. (1998) found that white detainees were more likely to use condoms with a steady partner, but were less likely to use condoms with a casual partner. In regard to STDs, Lofy et al. (2006), Mertz et al. (2002), and Kahn et al. (2005) reported higher STD rates for minority detainees compared to white detainees, but, Risser et al. (2001) failed to find significant racial differences in STD test result. Thus, although the evidence tends to reveal higher risky behavior among minority offenders, results remain somewhat inconclusive.

Age. Studies that focus on age differences in the sexual behaviors of adolescent offenders are relatively rare (Teplin et al. 2003). The handful of studies that do exist, in addition to studies based on community samples, suggest that older adolescents report higher levels of risky sexual behaviors (Morris et al., 1998; Kingree et al., 2000; Shafer et al., 1993). That is, a positive linear relationship between age and risky sexual practices is typically revealed. For instance, Teplin et al. (2003) found that, compared to detainees under the age of fourteen, older adolescent detainees (14 and older) were more likely to report unprotected sex in the past 30 days, sex while drunk or high, unprotected sex while drunk or high, trading sex for money, and having more than three partners in the past three months.

Results for variation in STD infection across age are mixed (see Lofy et al., 2006; Kingree & Phan, 2001). For example, Mertz et al. (2002) found that male detainees aged

15-19 were more likely to test positive for Chlamydia and gonorrhea, whereas, female detainees aged 10-14 were more likely to test positive for gonorrhea but less likely to test positive for Chlamydia. Kahn et al. (2005) found that older male detainees were significantly more likely to test positive for Chlamydia. However, tests for Chlamydia among the female detainees did not reveal significant age differences. Furthermore, there were no significant age differences in gonorrhea positivity, but younger adolescents were significantly more likely to test positive for both diseases (i.e., Chlamydia and gonorrhea). On the other hand, Risser et al. (2001) and Robertson et al. (2005) found higher prevalence rates of STD infection among older incarcerated adolescents. Taken together, it seems that older adolescents are slightly more likely to be at risk for risky sexual practices and STD infection.

Indeed, these studies underscore the importance of accounting for demographic factors when examining the occurrence of risky sexual practices among adolescent offenders. Taken together, African-American and older adolescents tend to report higher levels of risky sexual practices. Female offenders are substantially more likely to test STD positive; however, variation in risky sexual practices across gender is rather mixed. Similar to substance use, the research above suggests that failing to account for such variation may lead to an imprecise understanding of the strength and direction of the risky sexual behavior-delinquency association across different offender groups, and in turn, lead to the assumption that the sexual health service needs are similar across race, gender, and/or age.

Nevertheless, it is clear that risky sexual behavior is quite common among adolescent offenders; therefore, this behavior should be a top priority for prevention and

intervention services. One additional factor that has been shown to play an important role in the relationship between risky sexual practices and delinquent behavior is substance use. Apart from the strong associations found among substance use and delinquent behavior (discussed in Chapter 2) and risky sexual behavior and delinquency (discussed throughout the current chapter), a strong and consistent association among all three forms of problem behaviors is also documented in the literature. As such, Chapter 4 explores the interrelationships between sexual risk-taking, substance use, and delinquent behavior and provides further support for the need to examine these behaviors simultaneously.

Chapter 4

Substance Use, Risky Sexual Behavior, and Adolescent Offending

In addition to the well established relationships found among drug use and delinquency, and risky sexual behavior and delinquency, a strong correlation between risky sexual behavior and substance use is also consistently documented by public health research. In general, researchers have relied on two types of methods for assessing the link between risky sexual behavior and substance use. The first method, global association, is routinely employed to determine whether substance users are more likely than non-substance users to engage in risky sexual practices over a specified period of time (Kingree et al., 2000). One example of a global association study would be to compare the reported number of sexual partners in the past three months of marijuana users to nonmarijuana users. These types of studies provide insight into which types of substances (i.e., alcohol, marijuana, or other serious drugs) and which types of users (e.g., heavy users versus occasional users) are more likely to engage in risky sexual practices.

The second method commonly used to assess the risky sexual behavior-substance use link is situational association. This method assesses the influence of substance use during sexual episodes. An example of a situational study would be one that examined whether or not individuals who reported the use of marijuana prior to or during sexual intercourse were more likely to report unprotected sex. These types of studies provide

insight into the types of substances and level of use that influences risky sexual practices during sexual contexts (Kingree et al., 2000).

Based on both types of observational methods, it has been well established that: 1) youth who report using alcohol, marijuana, and other illegal drugs (i.e., cocaine, crack) are substantially more likely to report engaging in risky sexual behavior (i.e., higher number of partners, inconsistent condom use) compared to youth who do not use substances, 2) youth who report using alcohol or drugs before or during sex are substantially more likely to engage in sexual risk-taking, 3) the more serious the substance use, the greater the likelihood of risky sexual behavior, 4) the co-occurrence of risky sexual practices and substance use significantly increases the likelihood of contracting an STD, compared to engaging in only one or none of these behaviors, and 5) compared to nonoffenders, juvenile offenders are substantially more likely to report the co-occurrence of sexual risk-taking and substance use.

Based on these findings, examining the interrelationships between risky sexual behavior, substance use, and delinquency during adolescence seems crucial to both researchers and practitioners. Not only can this endeavor offer important insight into the nature of these relationships, it will also help to improve prevention and treatment services aimed at any one of these behaviors. Accordingly, this chapter is devoted to exploring the interrelationship among these risk behaviors. First, an overview of the substance use-risky sexual behavior link among the general adolescent population is presented. Then, a detailed discussion of the link between sexual risk-taking, delinquent behavior, and substance use is provided. Taken as a whole, the body of research

summarized in this chapter suggests that further investigation of the co-occurrence of these behaviors is warranted.

Substance Use and Risky Sexual Behavior among the Adolescents

Substance users and risky sexual behaviors. National data indicate that risky sexual practices are more prevalent among youth who use substances, including alcohol, marijuana, cocaine, and stimulants (Lowry et al., 1994). For example, results from the 2003 National Youth Risk Behavior Survey indicated that 71% of adolescents who reported lifetime use of marijuana reported noncondom use at last sexual experience and 77% of marijuana users reported having multiple partners in the past three months. Of the respondents who did not use marijuana, 30% reported the failure to use condoms at last sexual experience and 23% reported having multiple partners (Yan, Yu-Wen, Stoesen, & Wang, 2007).

The two most common forms of risky sexual behaviors examined in previous research that compares substance users to non-substance users are: 1) the failure to use condoms and 2) having multiple partners in a given time period. A wealth of studies has revealed a negative correlation between substance use and condom use. These studies suggest that adolescents who report the use of specific substances such as alcohol, marijuana, or cocaine, or score higher on a “substance use” index, are significantly more likely to report unprotected sexual intercourse (Bachanas et al., 2002; Brown, DiClemente, & Park 1992; Boyer, Tschann, & Shafer, 1999; Copper, Peirce, & Huselid, 1994; Fergusson & Lynskey, 1996; Fullilove et al., 1993; Hingson, Strunin, Berlin, & Heeren, 1990; Lowry et al., 1994; Luster & Small, 1994; Millstein & Moscicki, 1995; Strunin & Hingson, 1992). For instance, Bailey, Camlet, & Ennett (1998) found that

marijuana users were 1.4 times more likely to report noncondom use. Likewise, Yan et al. (2007) reported that marijuana users were 1.4 and cocaine users were 1.8 times more likely to report unprotected sex. Baskin-Sommers & Sommers (2006) found that the odds of inconsistent condom use were 7.2 times higher for alcohol users and 15.9 times higher for methamphetamine users.

Studies also consistently find that adolescent substance users are considerably more likely to report having multiple partners compared to their non-substance using counterparts (Bachanas et al., 2002; Devine et al., 1993; Duncan, Strycker, & Duncan, 1999; Fullilove et al., 1993; Fergusson & Lynskey, 1996; Koniak-Griffin & Brecht, 1995; Ramisetty-Mikler, Caetano, Goebert, & Nishimura, 2004; Tubman, Windle, & Windle, 1996). Shrier, Emans, Woods, & DuRant (1997), for example, examined the association between drug use and number of lifetime partners in a sample of 1,078 students in Massachusetts. Respondents who reported a greater frequency and severity of lifetime drug use were significantly more likely to report a greater number of lifetime partners compared to non-drug users.

National data also indicate that adolescent substance users are more likely to report risky sexual behavior. Using data from the 2003 National Youth Risky Behavior Survey, Yan et al. (2007) found that marijuana users were 1.8 and cocaine users were 2.5 times more likely to report having multiple partners in the past three months. The National Youth Survey found a positive linear relationship between seriousness of drug use and the percentage of youth reporting more than six partners. Of the youth aged 11-14, less than 2% of non-drug users reported more than six partners, compared to more than 12% of illicit drug users; among respondents aged 15-17, less than 8% of the non-

drug users reported more than six partners compared to over 20% of the illicit drug users (Elliott and Morse, 1989).

In addition, early initiation into sexual intercourse (Rosenbaum & Kandel, 1990; Smith, 1997; Rosenthal, Smith, & De Visser, 1999), teenage pregnancy (Gillmore, Butler, Lohr, & Gilchrist, 1992; Yamaguchi & Kandel, 1987), having unprotected sex with a casual partner (Bailey et al., 1998), anal intercourse without a condom (Tapert et al., 2001) and trading sex for money (Bailey et al., 1998) have also been shown to be significantly higher among adolescent substance users compared to non-substance users. At the same time, substance use is also a consistent predictor of a history of an STD (Halpern et al., 2004) and current STD infection (Boyer et al., 2000; De Genna, Cornelius, & Cook, 2007; Millstein & Moscocki, 1995). For example, Boyer et al. (1999) found that adolescents who reported using marijuana more than once per week were 2.3 times more likely to test positive for Chlamydia and/or gonorrhea than youth who did not use marijuana. Of the STD positive youth included in their study, 55% reported the use of marijuana in the past 30 days.

One common approach to examining the global association between risky sexual behavior and drug use has been to compare the sexual behavior of youth with substance use disorders to community adolescents. Such studies also confirm a strong association among these risk behaviors (Malow et al., 2001; Mezzich et al., 1997). Adolescents with substance use disorders are substantially more likely to report risky sexual practices compared to adolescents without substance use disorders. For example, Tapert et al. (2001) compared youth who were involved in substance abuse treatment to a sample of community adolescents. At the two-year follow-up, the treatment group was

significantly more likely to report multiple partners (72% vs. 50%), sex with casual partners in the past six months (46% vs. 25%), and less likely to report condom use (20% vs. 46%). Furthermore, twice as many youth from the treatment group reported a history of STD infection (12% vs. 5%). Deas-Nesmith et al. (1999) also found that youth diagnosed as chemically dependent were significantly more likely to report engaging in sexual intercourse without a condom, anal intercourse without a condom, sex with a prostitute, and intercourse with a stranger, compared to youth diagnosed with non-substance abuse disorders and a community control group.

The majority of research comparing the use of various substances suggests that severity of drug use also influences the severity of risky sexual practices. Lowry et al. (1994) reported a linear relationship between having multiple partners (≥ 4 partners) and substance use and condom use and substance use. For example, among the sexually active teens included in their sample, 4% of non-substance users reported multiple partners, whereas 10% of alcohol users, 30% of marijuana users, and 46% of cocaine and other drug users reported having sex with more than four partners. Adolescents who reported cocaine and other drug use were also substantially more likely to report a combination of risky sexual behaviors. In regard to engaging in both types of sexual risk-taking behaviors, only 3% of non-substance users reported more than four partners and the failure to use a condom at last intercourse, whereas 18% of marijuana-only users and 30% of cocaine and other drug users reported more than four partners and the failure to use a condom at last intercourse. As can be seen, a robust global association between risk sexual practices and substance use has been established. Clearly, substance using

adolescents are at a heightened risk for engaging in sexual risk-taking, and in turn, STD infection.

Using substances before or during sexual activity. National data also indicate that the concurrent use of substances and sexual intercourse is also common among adolescents. For example, of the sexually active teenagers included in the 2005 National Youth Risk Behavior Survey, 23% admitted to using alcohol or drugs before their last sexual intercourse (CDC, 2006). National data also highlight the greater likelihood of sexual risk-taking when adolescents use substances before or during sexual activity. For example, data from the Kaiser Foundation's Youth Knowledge and Attitudes on Sexual Health indicates that 29% of sexually active adolescents feel that alcohol or drugs have "influenced their decisions about sex." In particular, 24% of sexually active 15 to 17 year olds admitted to "doing more" than planned while under the influence, 13% reported having unprotected sex "because they were drinking or using drugs" and 26% have "worried about STDs or pregnancy because of something they did while drinking or using drugs" (Hoff et al., 2003).

The National Center on Addiction and Substance Abuse (1999) also reports that one in five sexually active teens reported alcohol use during last sexual intercourse and up to 18% of adolescents reported drinking during their first sexual experience. For adolescents who have never had vaginal intercourse, use of alcohol or marijuana tripled the likelihood of engaging in unprotected oral sex. A study conducted in 2000 by the National Campaign to Prevent Teen Pregnancy revealed that more than half of the respondents who reported inconsistent condom use said it was because of the influence of alcohol or drugs.

Similar studies regarding the use of specific substances such as alcohol, marijuana, and cocaine, in addition to studies employing an overall substance use index, have documented similar results regarding the use of substances prior to or during sexual encounters (Fullilove et al., 1993; Gillmore et al., 1992; Robertson & Plant, 1988; Ramisetty-Mikler, 2004). Based on a sample of 522 sexually active adolescents, DiClemente et al. (2002) found that use of alcohol during intercourse significantly predicted a history of STD infection. Millstein and Moscicki (1995) found that youth who reported the use of substances (alcohol, marijuana, hallucinogens, or “other drugs”) during any of their last four sexual experiences reported higher numbers of partners and current STD. Jemmott and Jemmott (1993) found that African American male adolescents who reported having “sex while high” were considerably more likely to report unprotected intercourse, a greater number of sexual partners, and a greater number of “risky” sexual partners.

As a whole, these studies suggest that adolescent substance users are more likely to report a range of risky sexual behaviors and sexual risk-taking is more likely to occur when adolescents use substances prior to or during sexual activity. Given that juvenile offenders are disproportionately more likely to engage in both substance use and risky sexual practices, it is not surprising that the co-occurrence of these behaviors is substantially greater among this population. For that reason, examining the substance use-risky sexual behavior link among juvenile offenders is crucial to 1) understanding the significance of this problem among juvenile offenders, 2) exploring the interrelationship between delinquency, drug use, and risky sexual behavior, 3) identifying the risk factors for the co-occurrence of these behaviors, and 4) informing the development of juvenile

justice programs. As such, the rest of this chapter is devoted to reviewing the existing research on the substance use-risky sexual behavior link among adolescent offenders.

Knowledge regarding the co-occurrence of risky sexual practices and substance use among juvenile offenders comes from studies based on the self-reported behaviors of incarcerated adolescents or studies comparing these behaviors across delinquent and nondelinquent adolescents. Overall, the large majority of these studies indicate that those who engage in both delinquent behavior and substance use are substantially more likely to report early initiation of sexual activity (Weber et al., 1989), inconsistent condom use (DiClemente et al., 1991), a higher number of partners (Teplin et al., 2005), a history or current STD (Morris et al., 1995; Oh et al., 1998; Robertson et al., 2005; Shafer et al., 1993), trading sex for drugs or money (Wood & Shoroye, 1993), and anal sex without a condom (Bryan & Stallings, 2002; Teplin et al., 2005), than adolescents who engage in only one or none of these behaviors.

The Substance Use-Risky Sexual Behavior Link across Delinquents and Nondelinquents

Only a small number of studies have compared the co-occurrence of substance use and risky sexual practices across delinquent and nondelinquent adolescents. However, the few studies that have been conducted underscore the heightened risk for the co-occurrence of these behaviors, and in turn, STD infection among juvenile offenders. These studies are valuable because they provide a direct comparison of the risky sexual behavior-substance use link across subgroups, and therefore, provide a vivid picture of the disproportionate number of offenders that are at risk for engaging in these problem behaviors simultaneously.

Substance users and risky sexual behaviors. The handful of studies that compare the substance use-risky sexual behavior association for juvenile delinquents to nondelinquents indicate that adolescent offenders display substantially higher levels of the co-occurrence of these behaviors (DiClemente et al., 1991; Rolf, Nanda, Baldwin, Chandra, & Thompson, 1991; Tolou-Shams et al., 2007). For example, using the National Youth Survey data, Elliott and Morse (1989) found a strong linear relationship between delinquent activity, drug use, and frequency of sexual intercourse. The group of adolescents who were labeled “patterned offenders” and reported the use of multiple substances were the most likely to report more than six sexual experiences in the past year.

More recently, Bryan and Stallings (2002) compared the self-reported substance use and sexual behavior of 200 adolescent males from the community to 200 male juvenile offenders in substance abuse treatment. The juvenile offenders displayed significantly higher frequency of intercourse and inconsistent condom use in the past year. For example, the mean number of sexual experiences without a condom was 7.96 for the offender group and 1.6 for the community group.

Using substances before or during sexual activity. In addition to studies comparing the sexual practices of delinquent substance users to nondelinquent substance users, a handful of studies suggest that juvenile offenders are also more likely to use substances prior to or during sexual intercourse (Morris et al., 1998; Robertson et al., 2005; Tolou-Shams et al., 2007). For instance, Crosby et al. (2003) found that adjudicated delinquents were 2.6 times more likely to report using drugs or alcohol during their last sexual experience. Specifically, 34% of adjudicated delinquents,

compared to 14% of the nondelinquents, reported using drugs or alcohol during their last sexual experience.

Overall, these studies highlight the tendency for 1) substance using juvenile offenders to engage in a range of risky sexual practices including more frequent sexual intercourse, noncondom use, and multiple partners at a substantially higher rate than nonoffenders, and 2) adolescent offenders to report the use of substances prior to or during sexual intercourse at a significantly higher rate than nondelinquent adolescents.

Substance Use and Risky Sexual Behaviors among Incarcerated Adolescents

The large majority of existing knowledge regarding risky sexual practices, STD prevalence rates, and substance use patterns among juvenile offenders is based on incarcerated adolescents. On one hand, the generalizability of these studies is questionable due to the focus on detained adolescents who are typically the most serious juvenile offenders. On the other hand, they are quite valuable because they provide an indication of the severity of these problem behaviors among the most serious offenders. In addition, they also bring attention to the alarmingly high co-occurrence of delinquent behavior, substance use, and risky sexual practices.

Substance users and risky sexual behaviors. A number of studies suggest that substance-using incarcerated adolescents are significantly more likely to report a range of risky sexual practices compared to non-substance using detainees (Otto-Salaj, Gore-Felton, McGarvey, & Canterbury, 2002). For example, in a study of 210 incarcerated adolescents, Castrucci and Martin (2002) found that those who reported regular use (once or more per week during the past thirty days) of two or more substances (i.e., alcohol, marijuana, cocaine, inhalants, and other street drugs) were 11 times more likely to report

having multiple partners (> 2), 5 times more likely to report exchanging sex for money, and 3 times more likely to report inconsistent condom use. Morris et al. (1998) found that significantly fewer incarcerated drug users reported using condoms every time they engaged in sexual intercourse compared to non-drug using detainees.

Additional studies that focus on the relationship between marijuana use and risky sexual practices among incarcerated adolescents also highlight a strong association (Barthlow et al., 1995; Kingree et al., 2000; Shafer et al., 1993). Kingree and Phan (2001), for example, found that detainees who reported the use of marijuana in the past 30 days were 3.5 times more likely to have had unprotected sex in the past 30 days and nearly twice as likely to test STD positive. Malow et al. (2001) examined the sexual practices of 169 juvenile offenders court-ordered to substance abuse treatment. The youth labeled “abstainers,” reported an average frequency of marijuana use in the past three months of 19.23 times; for youth who reported monogamous, protected sex, the mean was 20.70, and of the “multiple partner, unprotected sex” group, the mean was 41.29 times.

Teplin et al. (2005) compared the sexual practices of adolescent detainees diagnosed with a substance use disorder (n = 314) to detainees without a substance use disorder (n = 330). Detainees with an SUD were significantly more likely to report a wide range of risky sexual behaviors. For example, 77% of SUD youth and 39% of non SUD youth reported more than two partners in the past three months, 41% of SUD youth and 17% of non SUD youth reported unprotected oral sex in the past month, and 47% of SUD youth and 22% of non SUD youth reported unprotected vaginal sex in the past month.

Additionally, substance use has also been shown to be a consistent predictor of a history of STD (Morris et al., 1995), current STD (Morris et al., 1998; Robertson et al., 2005), teenage pregnancy (Morris et al., 1998), and negative attitudes toward safe sex practices (Chang et al., 2003) among juvenile offenders.

Using substances before or during sexual activity. Not surprising, research also indicates that incarcerated offenders report high rates of substance use prior to or during sexual activity. For instance, Crosby et al. (2007) examined condom use in the prior two months, among a sample of 134 sexually active female detainees. The mean number of times respondents reported having sex while drunk or high was 2.78. Moreover, use of alcohol and/or drugs during sex was a significant predictor of condom use error (i.e., used a damaged condom, began sex without a condom, removed condom before sex was over, re-used a condom, had a condom break). Among a sample of 800 juvenile detainees, Teplin et al. (2003) found that over 33% admitted to engaging in unprotected sex while drunk or high. Similarly, Kingree et al. (2000) reported that 40% of African American male detainees reported using marijuana during last sexual experience and 16% reported using alcohol. Kingree and Betz (2003) found that youth who reported use of marijuana prior to last sexual intercourse were three times less likely to use a condom during this experience.

Interestingly, studies comparing the effects of alcohol and marijuana use among incarcerated adolescents suggest that marijuana use is a stronger predictor of risky sexual behavior (Castrucci & Martin, 2002; Kingree et al., 2000). Based on a sample of 167 incarcerated adolescents, 63.2% reported always using marijuana in conjunction with a partner who is “not well known” versus 40.2% who reported always using alcohol. In

regard to condom use, 46.1% reported always using marijuana and only 14.6% reported always using alcohol during unprotected sex (Rosengard et al., 2006). Similarly, Kingree and Betz found that 45% of African American detainees reported the use of marijuana during last sexual experience and 11% reported the use of alcohol. Devieux et al. (2002) found that the average number of unprotected sexual experiences when high on alcohol (in the past three months) was 13, whereas, the mean was 19 unprotected sexual experiences while high on marijuana.

Relatively little research has been conducted on the association between more serious drugs, such as cocaine or heroin, and risky sexual behaviors among juvenile offenders. Typically, research either focuses exclusively on alcohol and/or marijuana, or combines the use of several different substances such as cocaine, hallucinogens, or inhalants into an overall “other substances” category. The common justification for combining these drugs is the lower rates of the use of these substances among juvenile offenders (Castrucci & Martin, 2002; Harwell et al., 1999; Robertson et al., 2005). For instance, among juvenile offenders, cocaine prevalence rates typically range from a low of 2% to a high of 15% for incarcerated samples (Castrucci & Martin, 2002; Harwell et al., 1999; Morris et al., 1998; Oh et al., 1998; Teplin et al., 2003). Unfortunately, this is a limitation to the current body of research because it limits the ability to determine which particular substances are the most strongly related to engaging in risky sexual practices.

The research reviewed above provides strong evidence that juvenile offenders are simultaneously engaging in substance use and risky sexual behavior at alarming rates. In general, studies indicate that juvenile offenders who report the use of at least one substance (mostly marijuana) are three times more likely to engage in risky sexual

practices, most notably noncondom use and having multiple partners. At the same time, juvenile offenders who report the use of one or more substances prior to or during sex are also about three times more likely to engage in these risk behaviors. Due to the severe health consequences of engaging in such risky sexual practices, these statistics underscore the need for prevention and intervention services that are able to target delinquency, substance use, and sexual risk-taking in a single, integrated framework.

Variations in the Risky Sexual Behavior-Substance Use Link

It is also important to consider the variations in the strength of the risky sexual behavior-substance use link among juvenile offenders. Similar to the research reviewed in previous chapters (see Chapters 2 and 3), variations across gender, race, and age have been documented in prior studies and highlight the need to consider these characteristics when examining the link between risky sexual practices, substance use, and delinquency. Although this body of research is not extensive, and thus to some extent inconclusive, a brief discussion of the variation in the risky sexual behavior-substance use link across socio-demographic categories is provided.

Gender. On average, prior research on the general adolescent population suggests that the association between substance use and risky sexual behavior is stronger for females compared to males (Graber, Brooks-Gunn, & Galen, 1998; Mott & Haurin, 1988; Tapert et al., 2001). However, gender differences in the co-occurrence of risky sexual behavior and substance use among juvenile offenders is rather mixed. Several studies have failed to find significant gender differences in regard to the sexual practices of substance using delinquents. For example, Teplin et al. (2003) did not find significant gender differences regarding a situational association. Among the 800 detainees included

in their study, 32.8% of males and 33.6% of females reported having unprotected sex while drunk or high. Likewise, Kingree and Phan (2001) found that the association between marijuana use and risky sexual behavior was not moderated by gender. This finding persisted across both self-reported and biological drug test data and for noncondom use and STD test result.

Yet, Oh et al. (1998) found that, for females, a positive marijuana test significantly predicted current STD status and, for males, a positive cocaine test was a significant predictor of STD status. Robertson et al. (2005) found that having sex while using alcohol was related to STD status for female detainees, but not male detainees. Kingree and Betz (2003) found that marijuana use was significantly linked to a lack of prior discussion regarding sexual risks for females but not males. On the other hand, marijuana use was associated with noncondom use in males, but not females. As can be seen, additional research regarding gender variation in the association of risky sexual practices and substance use is needed.

Race. Very few studies have examined racial differences in the association between risky sexual practices and substance use among juvenile offenders. One study that did focus on racial differences found that a larger number of white adolescent detainees reported having unprotected sex while drunk or high. Among the 800 youth in the sample, 36% of white male and 46% of white female detainees reported ever having unprotected sex while drunk or high compared to 31% of African American male and 28% of African American female detainees (Teplin et al., 2003). The results of this study are similar to the findings of studies examining racial differences in the co-occurrence of risky sexual behavior and substance use among the general adolescent population (CDC,

2006; Ramisetty-Mikler et al., 2004; Richter et al., 1993). Among community samples of adolescents, the link between sexual risk-taking and substance use is stronger for white adolescents.

As stated in previous chapters, research tends to suggest that white juvenile offenders report higher levels of substance use, but lower levels of risky sexual behaviors (see Chapters 2 and 3). Therefore, based on the scarce research directly examining racial differences in the co-occurrence of risky sexual behavior and substance use among juvenile offenders, coupled with the contradictory findings regarding variation in each of the behaviors separately, further research regarding this association is warranted.

Age. The few studies that have examined the moderating effect of age on the association between risky sexual behavior and substance use among juvenile offenders provide inconsistent results. Kingree and Phan (2001) found that juvenile detainees aged 13-15 who reported using marijuana were 8 times more likely to report unprotected intercourse and 5 times more likely to test STD positive; however, marijuana use was not a predictor of unprotected intercourse or STD status for juvenile detainees aged 16-17. On the other hand, Kingree and Betz (2002) found contradictory results among a sample of incarcerated African American male adolescents. This study found that the association between marijuana use and noncondom use was stronger for older adolescents. Similarly, Teplin et al. (2003) found that a significantly larger proportion of juvenile detainees aged 16 to 18 reported ever having unprotected sex while drunk or high (females: 46%; males 37%) compared to the younger detainees aged 14 to 15 (females: 28%; males: 31%) and aged 10 to 13 (females: 10%; males: 12%). These latter findings are consistent with general adolescent studies that reveal a stronger risky sexual behavior-

substance use association for older adolescents (CDC, 2006; Elliott & Morse, 1989; Ramisetty-Mikler et al., 2004), and with the bulk of studies on juvenile offenders that examine age variation in substance use and risky sexual behavior separately (see Chapters 2 and 3).

As can be seen, knowledge regarding the variation in the risky sexual behavior-substance use link across demographic categories is rather sparse. However, the research that has been conducted is fairly similar to the general direction of the variation in each of the behaviors found in previous studies (see Chapters 2 and 3). Taken together, female juvenile offenders, youth who report serious criminal involvement, and older juvenile detainees tend to be more likely to 1) engage in serious substance use, 2) test positive for STDs, and 3) exhibit the co-occurrence of risky sexual behavior and substance use. Racial variations in these behaviors are more complex. On average, African American juvenile offenders tend to display elevated levels of risky sexual practices and higher prevalence rates of STDs, but lower levels of substance use and a weaker association between risky sexual behavior and substance use.

The lack of definitive results regarding variations in the co-occurrence of risky sexual practices, delinquent behavior, and substance use highlights the importance of accounting for these demographic characteristics when examining the nature and/or strength of these relationships. In addition to the research that demonstrates differences in these specific behaviors, there is also a wealth of research that highlights racial and gender differences in the cultural expectations of behavior, socialization processes, cognitive development, and mental health problems that have the potential to influence behavior (Bennett et al., 2005; Kotchick et al., 2001; Morash & Chesney-Lind, 1991).

Thus, failing to account for demographic differences can lead to an inaccurate or under informed understanding of the interrelationships among these behaviors across specific subgroups. This lack of information will lead to the assumption that the associations among these behaviors, and in turn, the prevention and/treatment needs of adolescent offenders, are similar across demographic subgroups. In reality, the needs of adolescent offenders may be quite different across demographic categories.

An additional area of research that has not been extensively explored is the causal linkages that account for the tendency to engage in risky sexual practices, substance use, and delinquent behavior. Although the public health literature provides extensive information on the strength and direction of the relationship between these behaviors, it gives sparse attention to the causal mechanisms that account for this association. As a result, a definitive conclusion regarding the nature of these associations has not been reached (Rashad & Kaestner, 2004). Therefore, the next chapter reviews the conceptual explanations commonly discussed in regard to adolescent risk-taking, in general. These conceptual explanations are then supported with evidence that specifically addresses risky sexual behavior, substance use, and juvenile delinquency. Taken as a whole, the commonality in risk factors across these three behaviors highlights the need to consider these behaviors simultaneously, as part of a general syndrome of deviance.

Chapter 5

Explanations of Risk-Taking Behaviors in Adolescence

The period of adolescence is a time of multiple transitions including puberty, change in parent-child interactions, peer influence, and cognitive and emotional development. At the same time, this time period is also marked by increased autonomy, experimentation, and exploration in a range of behaviors (Baumrind, 1991; Kuther & Higgins-D'Alessandro, 2000). As a result, these factors are posited to lead to an increased tendency to engage in different types of risk-taking behavior. In general, risk-taking refers to “participation in behavior which involves potential negative consequences (or loss) balanced in some way by perceived positive consequences (or gain)” (Gullone & Moore, 2000:393). Thus, the behaviors that are the focus of this study, risky sexual practices, delinquent behavior, and substance use, are all considered risk-taking behaviors. This chapter reviews the most commonly discussed explanations for engaging in risk-taking behaviors. The goals of this discussion are to 1) facilitate a better understanding of the nature of sexual risk-taking and substance use among adolescent offenders, and 2) highlight the commonalities among the risk factors for risky sexual behavior, substance use, and delinquency.

It is important to note that research that has been conducted on the risky sexual practices and substance use patterns of juvenile offenders rarely focuses on the cause of this association. Instead, the bulk of research has only been descriptive. Thus, the

majority of studies reviewed above were not conducted with the intention of identifying the causal nature of the associations, but rather, were interested in determining the strength of the associations. Despite the lack of research empirically testing the causal nature of the association between risky sexual practices, substance use, and delinquency, a number of explanations for this association are routinely mentioned throughout the literature. As mentioned earlier, these factors are commonly discussed as explanations for the tendency of adolescents to engage in risk-taking behavior, in general, rather than focusing on any one specific form of deviant behavior (e.g., risky sexual practices, substance use, and/or delinquent behavior). These factors can be grouped into five major categories: 1) social/environmental factors, 2) cognitive developmental factors, 3) personality factors, 4) situational factors, and 5) problem behavior syndrome.

Social/Environmental Factors

Social/environmental explanations of risk-taking behavior emphasize the influence of parents and peers. Both peer support and parental involvement are consistent predictors of delinquency, substance use, and sexual risk-taking. As Michael and Ben-Zur (2007) point out, peer groups can function as a source of social support and/or as a source of temptation and endangerment. Socialization into the peer group may encourage involvement in risk-taking behaviors. In turn, the adolescent will become involved in these risky behaviors because they appear relevant to the group identity and will aid in the attainment of status within the group (Diblasio, 1986; Lightfoot, 1992). Research consistently supports these claims. Youth that reported having peers that engage in risky sexual behavior are more likely to engage in risky sexual behavior themselves (Metzler, Noell, Biglan, Ary, & Smolkowski, 1994; Nader, Wexler, Patterson, McKusick,

& Coates, 1989; Robertson & Levin, 1999; Spitalnick et al., 2007). Similarly, youth who report having substance-using peers report higher levels and more serious forms of substance use (Fergusson, Swain-Campbell, & Horwood, 2002; Jang, 2002; Johnson, Marcos, & Bahr, 1987; Krohn et al., 1996). At the same time, having delinquent peer associations is one of the most robust predictors of engaging in delinquent behavior (Warr, 2002).

On the other hand, poor family relations, including low attachment, involvement, and monitoring, are also associated with higher levels of risky sexual behavior, substance use, and delinquent involvement (Chen & Thompson, 2007; Crosby, Leichter, & Brackbill, 2000; DiClemente et al., 2001; Huebner & Howell, 2003; Kapungu, Holmbeck, & Paikoff, 2006; Mosack, Gore-Felton, Chartier, & McGarvey, 2007; Robertson et al., 2005). Adolescents who do not have a healthy emotional bond to a parent will be less concerned with the consequences of disobeying rules and letting the parent down. At the same time, low levels of monitoring and involvement provide greater opportunities to engage in risk-taking behavior. Hence, positive relationships with parents tend to lead to less deviant behavior, while, involvement with risk-taking peers tends to lead to higher levels of deviant behavior.

The combination of these findings highlights the importance of social factors as adolescents move through adolescence. During this developmental time period, individuals undergo changes in roles and status that redefine their relationships with significant others (Coleman, 1992; Holmbeck, Paokoff, & Brooks-Gunn, 1995; Paikoff & Brooks-Gun, 1991). In particular, this time period is characterized by growing autonomy and emerging individuation from the family, and in parallel, increased interest and

reliance on the peer group (Catalano & Hawkins, 1996; Igra & Irwin, 1996; Laible, Carlo, Raffaelli, 2000; Thornberry, 1987). Specifically, during adolescence, children tend to break away from their parents, and in turn, the peer group becomes the context in which behavior is determined (Cooper & Ayes-Lopez, 1985). For example, Johnson (1979) states that during the mid-adolescent period, a youth's experiences outside of the home have a greater impact on their conformity or deviance than do their experiences within the home. A number of studies have found that, during adolescence, the influence of peers on behavior increases while the influence of parents on behaviors decreases (Jang, 1999; Johnson, 1979; Simons et al., 1991; Thornberry, 1996).

Cognitive Developmental Factors

From a developmental approach, risk-taking behavior is seen as the result of two main areas of cognition. One such factor is impairment in the ability to assess the true extent of risk in a given situation which, in turn, influences the decision-making process. Impairment in the ability to assess the extent of risk may be related to several factors including a lack of knowledge or experience and/or an inaccurate perception of risk. The greater the knowledge or understanding regarding the negative consequences and the chances of experiencing such consequences, the less likely an individual is to engage in risk taking behaviors (Chang, Bendel, Koopman, McGarvey, & Canterbury, 2003; DiClemente et al., 1991; Harwell et al., 1999; Kingree & Betz, 2003).

Self-reported perception of risk is consistently found to be related to sexual behavior and substance use among juvenile offenders (Belgrave, Randolph, Carter, Braithwaite, & Arrington, 1993; Kingree et al., 2000; Kingree & Betz, 2003; Nader et al., 1989; Robertson et al., 2005; Robertson & Levin, 1999; Tolou-Shams et al., 2007). The

more a youth believes in the negative consequences of risk-taking behavior, the less likely they are to engage in such behaviors. These findings have been interpreted using a cost-benefit perspective of decision-making. That is, the higher the perceived costs of engaging in deviant behavior, the less likely an adolescent is to engage in that behavior (Moore & Gullone, 1996; Moore, Gullone, & Kostanski, 1997; Parsons, Halkitis, Bimbi, & Borkowski, 2000; Pinkerton & Abramson, 1992).

The second area is related to egocentrism. Egocentrism emphasizes a specific type of error in judgment that results from one's heightened sense of self or perception of specialness and uniqueness (Greene et al., 1996). This sense of superiority flows from a cognitive overdifferentiation of self from others, coupled with an underdifferentiation in objective thought. Therefore, "this source of risk-taking is not a problem of error in judgment; rather, it may be a lack of recognition that judgment is needed because the adolescent is 'blinded' by feelings of invulnerability that accompany feelings of uniqueness..." (Green et al., 2000:441). This invulnerability is found to be negatively associated with perceived susceptibility, intention to avoid risky behavior, and subjective norm (Greene, Rubin, & Hale, 1995; Greene et al., 1996).

It is well established that egocentric tendencies are highest during the adolescent years which is also the time period when risk-taking behaviors are elevated (Greene, Krcmar, Walters, Rubin, & Hale, 2000; Greene, Krcmar, Rubin, Walters, & Hale, 2002; Lapsley, 1993). Therefore, a connection between egocentrism and risky-taking behavior has been widely suggested.⁴ In particular, several studies have supported the link

⁴ The literature discussing the link between egocentrism and risk-taking behavior tends to consider this relationship a developmental issue due to the heightened levels of egocentrism found in adolescence (see Green et al. 2000).

between egocentrism and risky sexual behavior in adolescence (Green et al., 1995; Green et al., 1996; Goldsmith, Gabrielson, Gabrielson, Matthews, & Potts, 1972), egocentrism and delinquency (see Greene et al., 2000), and egocentrism and substance use (Frankenberger, 2004; Green et al., 2000). This evidence suggests that adolescents who take behavioral risks believe themselves to be immune from consequences that might result from risk-taking.

Personality Characteristics

An additional explanation for the heightened levels of risk-taking found in adolescents is related to the personality characteristics of the adolescents engaging in such behavior. In particular, several researchers argue that the tendency to engage in risky behavior is the result of a general predisposition toward deviance (Gottfredson & Hirschi, 1990; Kingree & Betz, 2003; Zuckerman, 1979). That is, it is commonly assumed that an underlying personality trait, such as impulsivity or low self-control, is responsible for involvement in a range of risk-taking behaviors.

The personality trait that has received the most attention in regard to predicting risk-taking behavior is sensation-seeking (Bonino et al., 2003). As defined by Zuckerman (1979:11), sensation seeking represents a “need for varied, novel, and complex sensations and experiences and the willingness to take physical and social risks for the sake of such experiences.” Thus, sensation-seekers tend to ignore or diminish the consequences of risk-taking and focus on the stimulation obtained from the behavior (Pinkerton & Abramson, 1995). Research indicates that sensation-seeking is a strong predictor of sexual risk-taking, substance use, and delinquent behavior in adolescence (Bryan & Stallings, 2002; Devieux et al., 2002; Gillis et al., 1992; Robins, 2004; Rolison

& Scherman, 2002; Spitalnick et al., 2007; Wagner, 2001; White et al., 1985; Zuckerman, 2008). Taken as a whole, these findings suggest that sensation-seekers seek out a range of stimulating behaviors including delinquency, substance use, and sexual risk-taking. Interestingly, Zuckerman (1994) found that sensation-seeking peaks during the adolescent years.

Situational Factors

Another popular explanation for the strong association among substance use and other risk-taking behaviors suggests that substance use directly causes additional risky-taking behavior, particularly risky sexual practices. Several mechanisms for this causal process have been mentioned in the literature. These include lowering inhibitions, increasing aggression, or diminishing the ability to assess risk (Kingree & Betz, 2003; Rees, Argys, & Averett, 2001; Rotheram-Borus, O'Keefe, Kracker, & Foo, 2000). For example, researchers have posited that, when high on alcohol or drugs, an individual's inhibitions are lowered and their capacity to consider costs and rewards is diminished, which in turn, leads to a greater likelihood of making poor choices. Substance use has been shown to impair communication and psychomotor skills (Block, Braverman, Farinpour, 1998; Haney, Ward, Comer, Foltin, & Fischman, 1999), which as a result, could lead to the failure to discuss risks or to use condoms, respectively (Kingree & Betz, 2003).

Others have suggested that substance use can serve as an excuse to engage in behavior that would otherwise be considered socially unacceptable (Rees et al., 2001). Risky sexual practices and delinquent behavior are two behaviors that are considered socially unacceptable. This argument suggests that engaging in socially unacceptable

behaviors produces social strain. Substance use serves as an excuse or coping mechanism for dealing with this strain (Castrucci & Martin, 2002).

Problem Behavior Syndrome

A final explanation for risk-taking in adolescence is related to Jessor and Jessor's problem behavior syndrome. Problem behavior syndrome explains the association among risky sexual practices, substance use, and delinquency as the manifestation a general syndrome towards deviance (Jessor & Jessor, 1977). For example, it is argued that, due to the strong covariation among these behaviors, each behavior should be considered a "symptom" of a larger "syndrome" of problem behavior rather than considering each behavior separately. Previous research examining "problem behavior syndrome" provides preliminary support for the notion that engaging in several different problem behaviors, most notably, delinquency, drug use, and risky sexual behavior, constitutes a unidimensional construct (Dembo et al., 1992; Donovan & Jessor, 1985; Donovan et al., 1988; Farrington, 1998; Jessor et al., 1998; LeBlanc & Bouthillier, 2003; LeBlanc & Girad, 1997; Osgood, Johnston, O'Malley & Bachman, 1988; Stallings et al., 1997; Welte et al. 2004; Young et al., 2000).

In further support of problem behavior syndrome, it is also important to note that the large majority of risk factors for adolescent risk-taking (discussed above) are also considered key risk factors for each of the three specific problem behaviors that are the focus of this study. These shared risk factors include peer influence, family characteristics, personality traits, and cognitive development. Due to the commonality in risk factors for all three of these problem behaviors, in addition to the strong covariation

among these behaviors, it has been asserted that engaging in all three behaviors is an “indicator of a unitary construct of unconventionality” (Bryan & Stallings, 2002:388).

Determining the cause of the co-occurrence of risky sexual practices, delinquency, and substance use is beyond the scope of this study. However, given the strong and consistent relationships found among risky sexual practices, substance use, and delinquency reviewed in the preceding chapters, in addition to the previous empirical support for the existence of problem behavior syndrome, this study is based on the notion that the co-occurrence of these behaviors represents a general tendency towards deviance. Based on this premise, the current study focuses on the covariation among these behaviors and seeks to determine if 1) engaging in these behaviors forms a latent construct reflective of problem behavior syndrome, 2) if the structure of the latent factor is consistent across demographic subgroups. Accordingly, the next chapter provides an in-depth overview of “problem behavior syndrome,” the research that does and does not support this concept, and the limitations of the current body of research.

Chapter 6

Problem Behavior Syndrome in Adolescence

It is well established that adolescents are at a heightened risk for engaging in a range of deviant behaviors, including risky sexual practices, substance use, and delinquent behavior. In addition, the co-occurrence of various forms of deviant behavior throughout adolescence has also been consistently documented in the literature. Specifically, youth who engage in any one form of deviant behavior (e.g., drug use) are substantially more likely to engage in additional forms of problem behavior (e.g., delinquency). Based on these observations, for years, researchers have suggested that the tendency to simultaneously engage in more than one form of deviant behavior constitutes a general proneness to deviance often referred to as problem behavior syndrome (Jessor & Jessor, 1977).

Drawing from the work of Jessor and Jessor (1977:33), problem behavior is defined as “behavior that is socially defined as a problem, a source of concern, or as undesirable by the norms of conventional society and the institutions of adult authority, and its occurrence usually elicits some kind of social control response.” According to this definition, problem behaviors have the potential to be age-graded. A behavior that may be considered deviant in adolescence, for example sexual activity, may not be considered deviant for an adult. Therefore, the focus of this chapter, and the current

study, is on behaviors that are considered problem behaviors in adolescence, particularly risky sexual behavior, substance use, and delinquent activity.

Drawing from the extensive body of research discussed throughout previous chapters, a strong association between risky sexual practices, substance use, and delinquency has been established. Indeed, adolescents who engage in any one form of these problem behaviors are substantially more likely to engage in the other two. As such, a detailed review of the existing knowledge regarding problem behavior syndrome, including the definition, empirical evidence, and limitations of prior research, is provided below.

Problem Behavior Syndrome

A “syndrome” refers to the association of a number of detectable characteristics that often occur together, and when they do, leads to the identification of a particular abnormality (e.g., problem, trait, disease). Based on this definition, problem behavior syndrome can be defined as the tendency to simultaneously engage in a constellation of problem behaviors which form a unified disposition towards deviance.⁵ Osgood et al. (1988:82) refer to this concept as, “a variety of deviant behaviors that form a ‘syndrome,’ which is directly caused by a general latent variable of unconventionality.” Thus, engaging any one form of deviant behavior, for example substance use, is actually a “symptom” of the larger “syndrome” of problem behavior. Stemming from these definitions, several researchers have argued that explaining this general disposition towards deviance, or in other words, problem behavior syndrome, is sufficient to account

⁵ Some researchers refer to problem behavior syndrome as general deviance syndrome, generality of deviance, or unconventionality. However, throughout this document, this concept will be referred to as problem behavior syndrome.

for any one form of deviant behavior. They argue that causes specific to any one form of deviant behavior are relatively insignificant because a cause of any one behavior should be a cause of any other form of deviant behavior (Gottfredson & Hirschi, 1990; Jessor & Jessor, 1977). Several possible explanations for problem behavior syndrome have been developed. The three most widespread explanations for problem behavior syndrome are reviewed below.

Problem Behavior Theory. One of the most commonly discussed theories of problem behavior is Jessor and Jessor's Problem Behavior Theory (PBT). The PBT framework takes a social-psychological approach to the study of adolescent behavior by focusing on three systems of psychosocial influence: the personality system, the perceived environment system, and the behavior system.

The personality system is comprised of motivation, personal beliefs, and personal controls. The motivational component focuses on the value placed on, and the expectation for, the goals of achievement and independence. The personal belief structure focuses on aspects of the self that may render an adolescent susceptible to problem behaviors, such as internal-external locus of control and self-esteem. Last, the personal control component includes attitudes toward deviance, religious beliefs, and the perception of consequences of deviant behavior.

The perceived environment system is made up of two components: the distal component and the proximal component. Jessor and Jessor (1977) note that it is important to examine the perceived environment, rather than the objective environment, because the perceived environment is the one that the adolescent will most likely react to. The distal environment measures the adolescent's social context, which accounts for the

adolescent's family and peer environment. This includes peer and family support, influence, and expectations. The proximal environment measures the extent to which behaviors are modeled and reinforced by disapproval and/or approval of behavior by parents and peers.

The behavior system is made up of two types of behaviors: problem behaviors and conventional behaviors. The effects of the personality and perceived environment on the behavior system are the focus of the theory. It is suggested that engagement in problem behavior depends on the balance between the personal and environmental influences present in an adolescent's life. It is hypothesized that 1) multiple forms of deviant behavior will be highly correlated and form a single problem behavior index, 2) these deviant behaviors will be negatively correlated with conventional behaviors, and 3) the personality system and perceived environment system will predict each of the deviant behaviors in similar ways and account for a large portion of the variance in the problem behavior index.

Jessor and colleagues have provided considerable support for PBT. In one of the most comprehensive tests of PBT, Jessor and Jessor (1977) analyzed 400 high school students and 200 college students over a four-year period. Relying on measures of self-reported alcohol use, marijuana use, general deviant behavior, sexual activity, and activism, these authors found support for all three of the above cited hypotheses. With the exception of activism, significant positive covariation among the various forms of deviant behaviors was revealed, while at the same time, a significant negative covariation among the deviant behaviors and conventional behaviors (i.e., involvement in church related activities and grade point average) was also found. Furthermore, a problem

behavior index was created which revealed adequate psychometric properties (see Jessor and Jessor, 1977: Table 3). Both the personality system and perceived environment system revealed a similar association to each of the specific deviant behaviors, as well as the problem behavior index. As such, Jessor and Jessor concluded that:

with respect to problem behavior theory, its usefulness has been significantly reinforced. The magnitude of the account it provided for variation in problem behavior was in many cases substantial-about 50% of the variance in the multiple behavior index...the findings provide strong support for the concept of problem behavior by revealing an interrelatedness-a syndrome character (pg. 235-236).

Further studies conducted by Jessor, Donovan, and colleagues conducted over the past three decades have continued to provide support for the tenets of PBT (Costa, Jessor, Donovan, & Fortenberry, 1995; Donovan, Jessor, & Costa, 1988; Donovan, Jessor, & Costa, 1991; Donovan & Jessor, 1985; Jessor, Donovan, & Costa, 1990).

This study represents a partial test of problem behavior theory by examining the first hypothesis, which predicts strong covariation among several problem behaviors and the formation of a single latent construct of deviance. In addition, similar to the behaviors examined in this study, these authors include measures of sexual behavior, substance, and delinquent behavior in their studies of problem behavior syndrome.

Disposition towards deviance. Several researchers have also suggested that the tendency to engage in multiple forms of deviant behavior is the result of a disposition towards deviant behavior (Bonino, Cattelino, & Ciairano, 2003; Farrington, 1992; Hirschi & Gottfredson, 1993; Kotchick et al., 2001; Newcomb & McGee, 1991). This explanation is based on the notion that certain individual characteristics are able to

predict a variety of deviant behaviors. Some personality characteristics posited to influence the problem behavior syndrome are sensation-seeking, risk-seeking, and impulsivity (Green et al., 2000). These traits are associated with the need to run physical and social risks with the goal of provoking strong sensations, which individuals who possess these traits experience as extremely exciting and pleasurable. For example, Bonino et al. (2003: 101) point out that, “the widespread nature of this behavior [deviant behavior] has led to a belief that there are certain personality types that have a constant need for intense, unusual, new sensations – personalities that require high levels of stimulation...” Thus, sensation-seeking, risk-seeking, and/or impulsive individuals focus on the immediate rush obtained by engaging in a particular act and fail to consider the long-term consequences. The large majority of deviant behaviors, including risky sexual practices, substance use, and delinquent behavior, provoke the immediate gratification of excitement and sensation. Thus, individuals who possess these traits do not specialize in any one act, but rather, are inclined to engage in any form of deviant behavior that will satisfy these desires.

Gottfredson and Hirschi (1990) have suggested that the disposition toward deviant behavior is the result of low self-control. That is, that all deviant behaviors are the product of this latent trait. These authors define low self-control with six elements: immediate gratification of desires, risk-seeking, lack of empathy, preference for physical activities, laziness, and a lack of future orientation. According to Gottfredson and Hirschi (1990:91), “our image therefore implies that no specific act, type of crime, or form of deviance is uniquely required by the absence of low self-control.” They maintain that all deviant behaviors provide immediate gratification without concern for long-term

consequences. Thus, these authors argue that individuals low in self-control will engage in multiple forms of deviant behavior including criminal and noncriminal acts (referred to as analogous behaviors). Based on this argument, the relationship between drug use, risky sexual practices, and delinquency is not a causal question because they are all manifestations of an underlying tendency to pursue short-term, immediate pleasure.

Gottfredson and Hirschi point to the well established fact that individuals who engage in one form of deviant behavior, for example delinquency, are much more likely to engage in additional forms of deviant behavior, such as substance use. In addition, these authors also highlight the wealth of studies that support offending versatility (for a review see Gottfredson and Hirschi, 1990:91-94). To add to this, a large body of research has recently been conducted on the relationship between individual characteristics, mainly low self-control, and the tendency to engage in various forms of problem behavior. The bulk of empirical evidence supports the tenets of the theory (see Pratt & Cullen, 2000 for a review). Although some evidence of specialization does exist (Farrington, Snyder, & Finnegan, 1988; Osgood & Schreck, 2007; Sullivan, McGloin, Pratt, & Piquero, 2006), research tends to suggest that individuals low in self-control report engaging in multiple forms of deviant behavior. For example, based on a meta-analysis of 21 empirical articles examining the effect of self-control on a range of deviant behaviors, Pratt and Cullen (2000:952) found that, “consistent with Gottfredson and Hirschi’s contentions, the effects of self-control appear to be general. Thus, low self-control had a similar effect size for crime and analogous behaviors...” Based on these findings, they concluded that “low self-control must be considered an important predictor” of deviant behavior (pg. 953).

Learning theories. Other researchers have focused on the influence that an adolescent's social environment has on the development of problem behavior syndrome. Specifically, this body of research is concerned with the ways in which adolescents learn deviant behavior (Akers, 1998; Elliott et al., 1985). Akers' social learning theory is one example that focuses on learning mechanisms. According to social learning theory, adolescents model and imitate the behaviors of significant others in their immediate environment. Referred to as differential associations, these individuals not only model behavior for the adolescent, but they also provide reinforcement for the adolescent's behavior. Within these differential associations, adolescents learn definitions favorable or unfavorable to a specific behavior based on the modeling and reinforcement that occurs. Therefore, an adolescent's differential associations, which are comprised mainly of family and peers, have the ability to influence the development of problem behavior syndrome through a system of imitation, definitions, and reinforcement.

For some time, Akers has argued that social learning theory has the ability to explain a wide range of deviant behaviors (Akers, 1998). His research has provided support for the tendency to engage in several different forms of deviant behaviors including delinquency, adolescent smoking, sexual deviance, alcohol use, marijuana use, and academic cheating (Akers, 1985; Akers, 1998; Akers & Cochran, 1985; Akers & Jensen, 2003; Akers & Lee, 1996). However, a major limitation of social learning theory as an explanation for problem behavior syndrome is Akers' proposition that the definitions and techniques acquired through the learning process tend to be behavior specific. For example, principles four and five of the theory state that "the learning of deviant behavior, including specific techniques, attitudes, and avoidance procedures, is a

function of the effective and available reinforcers...” and “the specific class of behavior learned and its frequency of occurrence are a function of the effective available reinforcers, and the direction of the norms, rules and definitions which in the past have accompanied the behavior” (Akers, 1985:41). This means that social learning is the source of each specific form of deviance, and therefore, social learning would account for problem behavior syndrome only to the extent that one’s differential associations model different behaviors. Thus, in order for social learning theory to account for problem behavior syndrome, an adolescent would need to be exposed to a variety of different deviant behaviors (Welte, Barnes, & Hoffman, 2004). Unfortunately, problem behavior syndrome has not been evaluated in this context.

There are several additional criminological theories that have not been used to directly explain problem behavior syndrome, but make strong claims about their ability to explain a variety of deviant behaviors. Hence, they are referred to as “general” theories. Two such theories are Hirschi’s social bond theory and Agnew’s general strain theory. Social bond theory is also concerned with an individual’s social environment. According to this theory, an individual’s bond consists of four elements: attachment to others, commitment to conventional goals, involvement in conventional activities, and belief in conventional values and norms. An individual will engage in nonconforming behaviors when their bonds to conventional society are weak or broken (Hirschi, 1969). Thus, social bond theory does not necessarily make claims regarding law violating criminal behavior, but rather focuses on conformity versus nonconformity to conventional standards.

General strain theory (GST), on the other hand, takes a social-psychological approach to explaining deviant behavior (Agnew, 1992). According to GST, deviant behavior is an adaptation to strain. Strain comes from three main types of stressors: the removal of positively valued stimuli, the presence of negative stimuli, and the failure to achieve goals. These three types of stress produce negative affect, and in turn, deviant behavior is a coping mechanism used to deal with these negative emotions. Delinquent behavior, substance use, and/or risky sexual behavior are all possible behaviors that could be used to cope with strain. Overall, both of these theories have been able to explain a range of deviant behaviors including delinquency and substance use (see Akers & Sellers, 2004 for a review), however, they have not been used to directly test problem behavior syndrome.

Although identifying the causal mechanisms that lead to the development of problem behavior syndrome is crucial, it is beyond the scope of the current study. Before we can truly identify the causes of problem behavior syndrome, the question of whether or not the concept of general deviance is an empirical reality needs to be definitively answered. On one hand, a large body of evidence exists in support of a general tendency towards deviance. On the other hand, there is also evidence to suggest that specialization in certain deviant behaviors does occur and that multiple forms of deviant behavior do not always form a unified construct.

Prior to reviewing previous studies on problem behavior syndrome, two important characteristics of this body of research should be mentioned. First, support either for or against problem behavior syndrome is derived from models that include a wide range of behavioral indicators. Almost all studies on problem behavior syndrome include a

delinquency index, typically referred to as general delinquency, which includes a number of delinquent behaviors. In addition, most studies include some measure of substance use and sexual behavior. However, these variables differ in their measurement. On one hand, some studies include a general measure of illicit substance use (e.g., a general index of use of several different forms of substances) (Ary et al., 1999; LeBlanc & Girard, 1997; Newcomb & Bentler, 1991; Osgood et al., 1988; Welte et al., 2004; White, 1992), while other studies disaggregate illicit substance use into specific forms of use (e.g., marijuana use only) (Dembo et al., 1992; DeCourville, 1995; Donovan & Jessor, 1985; Donovan et al., 1988; White et al., 1994). A common way to measure sexual behavior is to include a measure of virginity (Donovan et al., 1988; Costa et al., 2005; Jessor & Jessor, 1977) or frequency of sexual intercourse (Farrell et al., 1992; White, 1992). But, these measurement choices are somewhat questionable. Some researchers would argue that being sexually active is not necessarily a problem behavior. Instead, it is the risks taken during sexual intercourse that lead to problems. Additional problem behaviors included in studies are gambling (Welte et al., 2004), reckless driving (Osgood et al., 1988), aggression (Cheong & Raudenbush, 2000), suicidal thoughts (White et al., 1992), family rebellion (LeBlanc & Girard, 1997) and difficulty with school (Ary et al., 1999; Donovan, 1996; Gillmore et al., 1992; LeBlanc & Girard, 1997; White, 1992).

To add to the wide variation in the behavioral indicators used to measure problem behavior syndrome, there is also a great deal of diversity in the way the behaviors are measured and the number of behaviors included in the statistical models. For instance, studies have measured severity in behaviors using past thirty days (Farrell et al., 1992; Hays et al., 1997), past six months (Cheong & Raudenbush, 2000; Donovan et al., 1988;

Newcomb & Bentler, 1991), past year (DeCourville, 1995; Welte et al., 2004; White et al., 1994), or a combination of different time frames (e.g. past 30 days substance use and past year delinquency) (Basken-Engquist et al., 1996; Donovan & Jessor, 1985; Gillmore et al., 1992; Hemphill et al., 2007; Osgood et al., 1988). Furthermore, the number of behaviors included in the tested models range from four (Donovan & Jessor, 1985; Donovan et al., 1988) to forty-five (LeBlanc & Bouthillier, 2003).

Secondly, these studies have relied on a variety of analytic techniques, most notably, exploratory factor analysis (EFA)(Donovan & Jessor, 1985; LeBlanc & Girard, 1997), confirmatory factor analysis (CFA) (DeCourville, 1995; Farrell et al., 1992; Gillmore et al., 1992; LeBlanc & Girard, 1997), and structural equation modeling (SEM) (Ary et al., 1999; Dembo et al., 1992; Newcomb & Bentler, 1991; Osgood et al., 1988; Welte et al., 2004). Although similar in their underlying assumptions regarding manifest and latent constructs, there are also important differences in these approaches. For instance, EFA models are not predetermined, that is, the links between the variables and the latent factors are unknown. Therefore, there is more freedom in the number of factors that can be identified. CFA models, on the other hand, are hypothesis-driven and, therefore, the links among the variables are specified a priori (Byrne, 2001). Factor analytic models are solely interested in observing how the observed variables are linked to their latent factors, whereas SEM models are interested in the causal direction of the variables. Put another way, SEM models assume that the latent variables are causally related, whereas factor analytic models only expect the latent variables to be correlated. Thus, the type of question that is being investigated is slightly different across the three methods.

As a result of the inconsistencies in both the behavioral indicators and statistical techniques used to examine problem behavior syndrome, it is difficult to make solid conclusions regarding the evidence in support (or against) problem behavior syndrome. However, regardless of the methodological differences noted above, a great deal of research has provided evidence in favor of a one-factor solution representative of problem behavior syndrome. This study extends this research by examining the covariation in risky sexual practices, delinquent behavior, and substance use across a variety of CFA and SEM techniques.

Evidence in Support of Problem Behavior Syndrome

A large amount of evidence in support of adolescent problem behavior syndrome has been generated. This support comes from three types of studies: 1) bivariate correlational analyses, 2) commonality of risk factors, and 3) general factor analytic techniques. Furthermore, the concept of problem behavior syndrome has been supported with samples of children (Cappaldi & Patterson, 1989; Cheong & Raudenbush, 2000; Farrell, Kung, White, & Valois, 2000), adolescents (Ary et al., 1999; Benda & Corwyn, 2000; Donovan & Jessor, 1988; Jessor & Jessor, 1977; McGee & Newcomb, 1992) and young adults (Osgood et al., 1988, Ullman & Newcomb, 1999; Welte et al., 2004). This section reviews the empirical evidence based on these three areas.

First, the strong and consistent correlation found among a number of deviant behaviors, most notably delinquency and drug use, suggests that engaging in a particular form of deviant behavior is a manifestation of a larger syndrome of problem behavior (Barnes & Welte, 1986; Barnes, Welte, Hoffman, & Dintcheff, 1999; Elliot et al., 1985; Farrell, Danish, & Howard, 1992; Newcomb & McGee, 1991; Proimos, DuRant, Pierce,

& Goodman, 1998; Winters, Stinchfield, Botzet, & Anderson, 2002; also see Donovan & Jessor, 1985 for a review). Specifically, a wealth of studies has consistently revealed that engaging in any one form of deviant behavior is strongly related to engaging in additional forms of deviant behavior. Furthermore, studies also indicate that engaging in various forms of deviant behavior (e.g., drugs, delinquency, gambling, sexual activity) is negatively correlated with engaging in conventional behaviors (e.g., school achievement, religious activity) (Costa et al., 1995; Farrell et al., 1992; Hays, Stacy, & Dimatteo, 1987; Newcomb & McGee, 1991; also see Donovan & Jessor, 1985 for a review). That is, adolescents who engage in conventional activities are significantly less likely to engage in any one form of deviant behavior.

For example, based on a sample of 1,588 students in grades 7-12, Donovan and Jessor (1988) found that the number of times drunk in the past six months, frequency of marijuana use in the past six months, virginity, and general deviant behavior (i.e., a scale of ten items including lying, stealing, shoplifting, fighting, property destruction) were all significantly and positively correlated to one another, and were significantly and negatively correlated with school performance and church attendance. Donovan and Jessor (1985) found similar results across both adolescents and college students. More recently, using six different datasets that include high school students in grades 10 through 12, Donovan (1996) found that marijuana use was positively and significantly correlated to general deviance, lower school grades, greater intake of alcohol, and a greater frequency of getting drunk. At the same time, a significant inverse correlation between marijuana use and religious activity was found. These significant correlations were stable across the twenty-year time span covered by the six different datasets.

In addition to bivariate correlations, Farrington has examined the odds ratios for the relationship between offending and an array of problem behaviors at multiple time points. When examining violent behavior, he found that, at ages 12-14, self-reported violent offenders were 3.5 times more likely to report early sexual intercourse, 2.5 times more likely to skip school, and 1.5 times more likely to be frequent liars than nonoffenders. At age 18, self-reported violent offenders were 2.2 times more likely to be sexually promiscuous, 2.3 times more likely to be heavier gamblers, 2.8 times more likely to drive drunk, 4.3 times more likely to use drug regularly, and 2.4 times more likely to be a heavy drinker than their nonoffending counterparts (Farrington, 1998). When examining property crime (Farrington, 1992), he found that, at ages 12-14, self-reported burglars 5.6 times more likely to report sexual intercourse, 3.5 times more likely to skip school, and 5 times more likely to be frequent liars. At age 18, self-reported burglars were 3.4 times more likely to report risky sexual practices, 2.5 times more likely to be heavy gamblers, 2.7 times more likely to drive drunk, and 3.1 times more likely to be a heavy drinker compared to nonoffenders. Based on these results, Farrington (1992:266) notes that “all of these types of acts could be regarded as different age-appropriate manifestations of an underlying antisocial tendency.”

Secondly, variables that are able to predict the occurrence of any one of these forms of deviant behaviors, such as risky sexual practices, are generally able to predict the occurrence of additional forms of deviant behavior, such as delinquent involvement (Ary et al., 1999; Elliott & Huizinga, 1984; Elliott et al., 1985; Ensminger, 1990; Jessor & Jessor, 1977; Metzler, Biglan, Ary, Noell, & Smolkowski, 1993). Therefore, it is argued that various forms of deviant behavior share a number of common risk factors.

The most common risk factors mentioned in the literature are related to family environment and peer relations. Specifically, these factors have been shown to predict a wide range of problem behavior including substance use and misuse, virginity versus nonvirginity, high-risk sexual behaviors, and a range of delinquent behaviors including violent and nonviolent offending.

Finally, a number of studies on adolescent problem behaviors have indicated that, when examining the structure of multiple deviant behaviors, they tend to form a unified construct (Ary et al., 1999; DeCourville, 1995; Dembo et al., 1992; Newcomb & McGee, 1991; Ullman & Newcomb, 1999; Welte et al., 2004; see LeBlanc & Bouthillier, 2003 for a review). These findings provide further evidence for the argument that the tendency to engage in any one form of deviant behavior in adolescence is actually a manifestation of a unidimensional syndrome of deviance.

For example, using the Monitoring the Future (MTF) data, Osgood et al. (1988) found that past year criminal behavior, heavy alcohol use, marijuana use, use of other illicit drugs, and dangerous driving formed a single latent variable for both cross-sectional and longitudinal (three waves of data) relationships. Their results indicated that criminal behavior was the form of problem behavior most closely related to the latent factor, followed by serious illicit drug use and marijuana use. Across the three waves of data, the proportion of explained variance for the observed behaviors ranged from 74% for criminal behavior to 27% for dangerous driving.

Donovan et al. (1988) also found that the four problem behaviors used in their study (i.e., times drunk in the past six months, frequency of marijuana use in the past six months, virginity, and general deviant behavior) formed a single underlying construct.

Similarly, using confirmatory factor analyses, Farrell et al. (1992) found a one factor solution based on five deviant behaviors (cigarette use alcohol use, marijuana use, delinquency, and sexual intercourse) using a sample of low income 7th and 9th graders. In both of these studies, the factor variance was less than 50% and the substance use measures revealed the strongest association to the latent factor.

Moreover, LeBlanc and Bouthillier (2003) reviewed the findings from twenty-one published studies using various forms of deviant behavior and a range of factor analytic techniques (e.g., factor analyses, structural equation modeling). In regards to the problem behaviors examined in these studies, all 21 studies included some form of delinquent behavior, 18 included some form of substance use, and eight included behaviors related to sexual activity. In sum, a latent construct representative of problem behavior syndrome was identified in every study. Based on their review, the authors stated that “this result was independent of informant, the set of deviant behaviors, the statistical method, the nature of the sample, the historical period, and the site of the study” (pg. 83). Thus, they concluded that the unidimensional construct of deviance is universal. As can be seen, a large number of studies provide support for the concept of adolescent problem behavior syndrome. Yet, a number of additional studies conducted on adolescents fail to support the concept of problem behavior syndrome.

Evidence against Problem Behavior Syndrome

The empirical evidence against the concept of problem behavior syndrome surrounds the issue of unidimensionality. Specifically, a number of studies have failed to find a unitary latent factor based on various forms of deviant behaviors (Grube &

Morgan, 1990; Shaw et al., 1992). Taken together, these studies call for a degree of skepticism regarding problem behavior syndrome.

For instance, based on a sample of 11-12 years olds, Gillmore et al. (1992) examined the covariation among past year school trouble, aggressiveness at school, delinquent behavior (six-item scale including stealing, vandalism, fighting, throwing objects, shoplifting, and burglary), and substance use (tobacco, alcohol, and other illicit drugs). Results suggested that a three-factor solution differentiating between school problems, substance use, and delinquency fit the data best. In addition, White and Labouvie (1994) and Hemphill et al. (2007) found that delinquency and drug use represent two distinct dimensions of problem behavior in adolescence.

Additional researchers have found that a second-order factor model captures the notion of problem behavior syndrome more accurately than a first order latent model (LeBlanc & Girard, 1997; Resinow, Ross-Gaddy, & Vaughan, 1995; Vingilis & Adlaf, 1990). For example, McGee and Newcomb (1992) analyzed confirmatory factor analysis (CFA) models from four different waves of data spanning early adolescence to adulthood. Each model included measures of drug use, social conformity, academic orientation, sexual involvement, and criminal behavior. Results rejected a first-order construct in all four models and confirmed a higher second-order latent construct. Based on these results, it has been suggested that deviance is not a unitary phenomenon, but instead should be organized into types of behavior within which the specific behaviors are more closely related to each other than they are to other forms of deviance in other groups. Accordingly, McGee and Newcomb (1992:773-774) stated that the finding of a

second-order latent construct is a “more comprehensive, but not contradictory, picture of the syndrome” which captures “both the specific and shared aspects of deviance.”

Limitations of the Current Body of Research

In addition to the empirical evidence against problem behavior syndrome, there are three additional shortcomings of the current body of research that need to be addressed. These limitations are related to the samples used to study problem behavior syndrome and the statistical techniques employed. Specifically, the three issues that are discussed below, and addressed by the current study, are: 1) a lack of studies examining samples of adolescent offenders, 2) an insufficient understanding of the variation in problem behavior syndrome across socio-demographic categories, and 3) the reliance on general factor analytic methods which reveal relatively low levels of explained variance. This study attempts to address these issues using a sample of newly arrested juvenile offenders and a group-based modeling strategy.

Addressing these limitations is essential because understanding the nature of problem behavior syndrome has important implications for prevention and intervention services that target at-risk adolescents. If the tendency to engage in a variety of problem behaviors constitutes a unitary syndrome and, therefore, can be explained as a whole, as implied by the researchers discussed above, then it is crucial that prevention and intervention efforts begin to target the syndrome as a whole, rather than focusing on any one particular behavior. Alternatively, if specialization in deviant behaviors is the norm then specific prevention and intervention services should continue to target the needs associated with each particular behavior. Also, identifying differences in the structure of

problem behavior across demographic categories provides valuable information regarding the specific needs of different subpopulations of adolescents.

Lack of studies involving adolescent offenders. The majority of evidence in support of problem behavior syndrome is based on community samples of adolescents which contain low rates of adolescent offenders. Indeed, it is well established that adolescent offenders report heightened levels of various forms of problem behaviors, most notably substance use and risky sexual practices. Therefore, relying on adolescent offending populations to study problem behavior syndrome will enhance the variability in risky sexual practices, substance use, and delinquent involvement which will enable us to effectively study their interrelationships by providing a more powerful test of the syndrome. If, for example, there is substantial variation in the problem behaviors and the covariation among them remains strong, greater support for the significance of these relationships will be provided, in turn, supplementing the results from general population studies (Dembo et al., 1992).

To date, only a small number of studies examining problem behavior syndrome have been conducted on adolescent offenders. Dembo et al. (1992) examined the concept of problem behavior syndrome using a sample of 201 adolescent detainees. These authors examined five separate structural equation models based on past year marijuana use, alcohol use, and one of these five delinquency variables: general theft, index crimes, drug sales, person crimes, and total delinquency. Results indicated that all of the models revealed a one-factor solution. However, the general factor failed to account for all or most of the variance in each specific behavior.

LeBlanc and Girard (1997) examined problem behavior syndrome on two separate samples of adjudicated boys residing in Canada (first sample, n = 470; second sample, n = 506). Using principal component analysis, these authors examined the factor structure of six deviant behaviors: vandalism, family and school rebellion, minor theft, serious theft, aggression, and use of drugs. Results confirmed a second-order latent factor fit the data best. More recently, LeBlanc and Bouthillier (2003) examined 45 deviant behaviors categorized into four types of deviant behaviors: overt (interpersonal violence), covert (property crimes), authority conflict (e.g., rebellious, stubborn, defiant at school and home), and reckless (e.g., substance use, sexual activity, reckless driving) on a sample of 656 adjudicated delinquents also from Canada. Using CFA, results provided support for a unidimensional latent construct of deviance, but with fairly low levels of explained variance.

Overall, these studies provide preliminary evidence of a unidimensional syndrome of problem behavior among juvenile offenders. However, they also provide a level of uncertainty regarding the nature of the syndrome. Dembo et al. and LeBlanc and Bouthillier found a one-factor solution, whereas LeBlanc and Girard found that a second-order latent factor was more appropriate. Furthermore, all three studies highlighted relatively low levels of variation in the specific deviant behaviors accounted for by the latent construct.

This study contributes to the adolescent offender literature by examining the structure of problem behavior syndrome on a sample of newly arrested juvenile offenders. By relying on newly arrested juvenile offenders, this study is an improvement over previous studies relying on both community samples and incarcerated adolescents.

On one hand, community samples only include a small number of adolescent offenders, and an even smaller number of serious juvenile offenders. Thus, the variability in problem behaviors among community samples is much smaller compared to the offender samples, which means that the ability to powerfully examine the interrelationships among the behaviors is limited. On the other hand, incarcerated samples are based on the most serious juvenile offenders at the back end of the system. But, only 20% of adolescents are sent to detention following arrest (Stahl et al., 2007). And, these are the adolescents who report the highest levels of problem behaviors. Thus, the prevalence of problem behaviors in samples of detained adolescents will be much higher than general offender samples, revealing a higher occurrence of problem behavior syndrome. Therefore, neither of these samples can be generalized to the entire adolescent offending population. The sample used in this study guards against these issues by including adolescents at the front-end of the juvenile justice system including first-time offenders and youth being sent to secure detention.

Inconclusive evidence on variations in problem behavior syndrome. Although the extent of variation in problem behavior syndrome across demographic categories has not received much empirical attention, and therefore is extremely inconclusive, variations across gender, race, and age have been documented. Specifically, differences in both the strength of the correlation among specific deviant behaviors and in the structure of the latent construct have been observed. These findings warrant consideration when examining problem behavior syndrome because they imply that the structure of problem behavior syndrome may differ across demographic subgroups. If substantiated, identifying which subgroups of adolescents are most at-risk for developing problem

behavior syndrome is critical information for preventive programs that seek to target problem behavior syndrome. The failure to account for these variations could lead to erroneous conclusions regarding the nature of the syndrome by generalizing findings to all adolescents, when they may be truly representing only one particular subgroup of youth.

Of the three areas of variation, gender differences have been studied most extensively (Williams, Ayers, Abbott, Hawkins, & Catalano, 1996). A number of studies that compare problem behavior syndrome across gender groups have failed to find a significant gender gap (Costa et al., 1995; Dembo et al., 1992; Donovan & Jessor, 1985; Farrell et al., 1992; Gillmore et al., 1991; LeBlanc & Bouthillier, 2003; Newcomb & McGee, 1991). However, other studies have found that the constellation of problem behaviors varies by gender (DeCourville, 1995; Ensminger, 1990). For example, Bartlett, Holditch-Davis, and Belyea (2005) found a significantly higher number of males than females display problem behavior syndrome in adolescence. Moreover, using 11 different forms of problem behavior (i.e., alcohol use, marijuana use, other drug use, cigarette use, violence, general delinquency, school delinquency, grades, sexual behavior, psychological problems, and suicide), White (1992) analyzed separate factor analytic models for males and females. Although both gender-specific models revealed a one factor solution, the behaviors that loaded on each factor differed. For males, suicide and psychological problems failed to load on the factor; for females, violence was the only variable that did not load on the factor.

The examination of racial variation in problem behavior syndrome has not received a great deal of empirical attention. And, the very few studies that have

examined racial differences provide mixed results. On one hand, two studies have found that the covariation among problem behaviors is stronger for white adolescents, compared to minority adolescents. Welte et al. (2004) found that the covariation among gambling, drug use, alcohol use, and delinquency was lower for African American adolescents. Similarly, Costa et al. (1995) found that early sexual intercourse was associated with less involvement in school activity, more involvement in delinquent behavior, problem drinking, and marijuana use for White and Hispanic adolescents. However, they failed to find any significant differences in these behaviors across virgins and nonvirgins among the African American respondents. On the other hand, Dembo et al. (1992) failed to find any significant differences in problem behavior syndrome across racial categories among a sample of justice involved youth, but Bartlett et al. (2005) found that Black adolescents were 1.5 times more likely to display problem behavior syndrome.

In regards to age differences, a handful of longitudinal studies indicate that the covariation among problem behaviors is stronger in early to mid adolescence (Newcomb & McGee, 1991; White, 1992). These findings suggest that, as youth progress into young adulthood, specialization in problem behaviors tends to become more common and the covariation among deviant behaviors weakens (Newcomb & Bentler, 1986; Osgood et al., 1988).

Taken together, these studies provide general support for the existence of problem behavior syndrome across socio-demographic categories. However, they also suggest that the strength of the association among various problem behaviors may differ across race, gender, and/or age. Given the variation that has been documented across race,

gender, and age in the association between substance use and delinquency (Chapter 2), risky sexual practices and delinquency (Chapter 3), and the co-occurrence of all three problem behaviors (Chapter 4), in addition to the preliminary evidence regarding variations in problem behavior syndrome discussed above, additional research regarding demographic variations in the structure of problem behavior syndrome is clearly warranted. Identifying this variation is important for two main reasons.

First, identifying the similarities and/or differences in the co-occurrence of problem behaviors has important implications for prevention and intervention services. If in fact, differences in the structure of problem behavior syndrome exist across demographic subgroups then such individual-level characteristics will aid in the identification of adolescents most at-risk for problem behavior syndrome. At the same time, if the interrelationships among behaviors differ across groups, then prevention and treatment programs will need to be tailored to meet the needs of each particular group.

Secondly, understanding the ways in which race, gender, and age influence the tendency to engage in various forms of deviant behavior will also provide a more detailed understanding of the syndrome. Typically, studies examine problem behavior syndrome on an entire sample of adolescents, often school-based samples, and fail to examine subsamples based on race, age, and/or gender. This has the potential to lead to errors in generalizing problem behavior syndrome to specific demographic subgroups.

For example, Study A examines the factor structure of five deviant behaviors on an entire sample of high-school students and concludes that these behaviors load on a single factor representative of problem behavior syndrome. Consequently, these results are generalized to high school students. But, Study A failed to examine race and/or

gender-specific models and the sample is comprised of a large number of white male students. As a result, whether or not the covariation among the behaviors is similar across demographic subcategories is unknown. Therefore, these results can not be reliably generalized across racial and/or gender categories. How can we be sure that the covariation and factor structure is similar across racial categories for high school students? Hence, by failing to account for differences across demographic characteristics, we are assuming that the results apply equally to all subjects in the sample. But, given the documented variations observed across race and/or gender in a variety of specific forms of problem behavior (i.e., substance use, delinquency, sexual behavior), it is quite possible that the covariation among the five behaviors varies across these demographic categories.

Based on a sample of 5,537 high-school students, Basen-Engquist, Edmundson, and Parcel (1996) examined the structure of 25 health risk behaviors including sexual behavior, substance use, school involvement, violence, social environmental characteristics, accidental and intentional injury, and dietary behavior. Their preliminary analyses revealed a four dimensional model fit the data best. However, when they examined this model across demographic subgroups representing Black females, white females, Black males, and white males, they found significant differences. The model fit the data well for the white male group, but, a poor fit was obtained for the Black male, Black female, and white female groups. Furthermore, white females displayed the highest loadings on Dimension 4 (illegality), whereas Black male and female participants revealed the lowest values on this dimension. Dimension 2 (health protective action) was

more relevant for the Black male and female groups and both male groups showed higher loadings on Dimension 1 (problem behaviors).

As can be seen, accounting for variations across race and gender in the study of problem behavior syndrome is crucial to obtaining an accurate understanding of this concept. The current study extends this research by examining how the structure of problem behavior syndrome varies across demographic subgroups among a sample of newly arrested juvenile offenders.

Statistical methods used. As summarized above, the large majority of studies that rely on factor analytic techniques to assess problem behavior syndrome tend to find a one-factor solution representative of problem behavior syndrome. However, the bulk of studies that do provide support for problem behavior syndrome tend to reveal 1) moderate correlations among the latent construct and the specific forms of deviant behaviors and 2) relatively low levels of explained variance. In particular, across the prior studies reviewed above, the explained variance of each specific deviant behavior included in the models ranged from the low twenties to the mid seventies. For example, Osgood et al. (1988) reported explained variance values ranging from 24% to 74%, LeBlanc and Girard (1997) reported a range of 48% to 54%, Donovan and Jessor (1985) reported a range of 39% to 44%, McGee and Newcomb's (1992) findings ranged from 55% to 57%, and White (1992) reported a range of explained variance of 27% to 32%. As reviewed above, these are studies that are used to provide strong support for the existence of problem behavior syndrome. However, as can be seen, on average, less than half of the variability in each problem behavior is accounted for by this general construct. As such, a number of the researchers that have found a single unidimensional construct of

problem behavior syndrome conclude that deviant behavior is, in part, a manifestation of a general syndrome, and in part, a unique phenomenon (Dembo et al., 1992; Osgood et al., 1988; White, 1992).

One reason for the low levels of explained variance may be related to the statistical techniques used to examine this concept. Standard factor analytic techniques examine the tendency to engage in various forms of problem behavior across the entire sample. Thus, these types of methods provide us with the weighted average of covariation across the entire data set and lead to the assumption that the average level of covariation applies equally to all individuals (Luke, 2004). As a result, these standard techniques ignore the influence that individual-level factors may have on the tendency to engage in problem behaviors. For example, it may be possible that: 1) a certain group of adolescents tends to display the problem behavior syndrome, 2) additional subgroups of adolescents are engaging in only one or two specific forms of deviant behavior (e.g., only delinquency or only substance use), and 3) the strength of the association among various forms of problem behavior differs across important individual-level factors. If so, relying on a weighted average has the potential to lead to the estimates being carried by a particular group with either very high or very low levels of behaviors, or a large number of cases belonging to a particular group (Widaman & Reise, 1997).

This likely possibility may account for the relatively low levels of explained variance found in previous studies that fail to account for such socio-demographic variation. In other words, the low levels of explained variance found in the current body of research examining problem behavior syndrome may be due to the existence of different subgroups of adolescents in regard to their engagement in multiple forms of

deviant behaviors. General factor analytic techniques are unable to account for these different groups. As such, examining differences in the interrelationship among a variety of deviant behaviors across race, gender, and age has the potential to significantly improve our understanding of problem behavior syndrome, as well as help overcome the issue of low explained variance.

Taken together, the heightened levels of co-occurring deviant behaviors among juvenile offenders, the well established variation in specific problem behaviors across demographic categories, and the low levels of explained variance that are revealed with standard factor analytic methods, suggests that examining differences in the structure of problem behavior syndrome across demographic subgroups is clearly warranted. In particular, it is possible that: 1) adolescent offenders differ in their tendency to engage in risky sexual practices, delinquency, and substance use, and 2) these subgroups differ on important demographic characteristics.

By examining these possibilities, the current study extends previous research regarding variations in problem behavior syndrome across demographic subgroups. At the same time, this study overcomes the current shortcomings of the problem behavior syndrome literature that are caused by relying on standard factor analytic techniques by applying a group-based factor analytic technique to the concept of general deviance. Briefly, with multiple-group SEM, one can compare the factor structure, or covariation, among a number of observed variables across specified subgroups (Muthèn & Muthèn, 2007). Thus, this method of analysis will enable the identification of the variation in the strength of the covariation among delinquent behavior, risky sexual practices, and substance use across demographic subgroups rather than considering the average level of

strength among the variables. Widaman and Reise (1997) point out that, when there is evidence to suggest that groups within the population exist for whom the indicator variables are differentially related to the latent variable, group-based modeling is a powerful tool for accounting for these differences.

Current Study

The purpose of the current study was to 1) examine whether or not the tendency to engage in risky sexual practices, substance use, and delinquency form a unidimensional construct reflective of problem behavior syndrome among a sample of newly arrested juvenile offenders, and 2) identify variations in the structure of problem behavior syndrome across individual-level factors. To accomplish these goals, a sample of newly arrested juvenile offenders processed at a centralized intake facility was analyzed. Exploring these associations extends previous research on problem behavior syndrome by building upon the limitations described above. Based on the literature reviewed in the previous chapters, three main research questions guide the current study.

- 1) Does the tendency to engage in risky sexual practices, substance use, and delinquent behavior form a unified latent construct representative of problem behavior syndrome among a sample of newly arrested juvenile offenders?
- 2) If so, does age have a direct effect on this latent factor?
- 3) Does the factor structure of this latent construct, as well as the association between age and the latent factor, differ across demographic subgroups of newly arrested juvenile offenders?

Chapter 7

Methods

Sample

The current study focuses on the relationship between three different forms of problem behavior among a sample of newly arrested juvenile offenders. Specifically, this study has three main objectives. The first objective is to examine the covariation in risky sexual practices, substance use, and delinquent behavior and to determine whether or not these behaviors form a unitary latent construct reflective of problem behavior syndrome. The second objective is to determine whether age has a direct effect on the latent factor. The third objective involves comparing the covariation among the observed variables (i.e., latent structure), as well as the effect of age on the latent factor, across demographic subgroups.

Data for this study were collected in a National Institute on Drug Abuse (NIDA) funded research project located in Hillsborough County, FL (Belenko et al., 2008). The project involved a successful collaboration among the Hillsborough County Juvenile Assessment Center (HJAC), the Florida Department of Health (DOH), Hillsborough County Health Department (HCHD), and the Florida Department of Juvenile Justice (DJJ). Project goals included estimating the prevalence of Chlamydia and gonorrhea among a sample of newly arrested juvenile offenders, examining the relationship between

drug use and risky sexual behaviors (including STD infection), and assessing the feasibility of providing public health services to newly arrested juvenile offenders.

All youth under the age of 18 who are arrested in Hillsborough County are transported to the HJAC for intake screening and assessment procedures. Standard HJAC processing involves trained HJAC staff completing a Detention Risk Assessment Instrument (DRAI) to determine if an arrested youth will be released to the community, placed on nonsecure home detention, or sent to secure detention. The DRAI takes into consideration the youth's most serious current offense, other current offenses, pending charges, prior offense history, current legal status, and aggravating or mitigating circumstances (see Dembo et al., 1994). In addition, youth are asked to voluntarily participate in a psychosocial risk assessment and to provide a urine specimen for drug testing.

Figure 1 provides a schematic diagram of the study protocol. Data collection procedures for the project began in June 2006.⁶ To be eligible to participate in the research project, youth had to: 1) be twelve years of age or older⁷ and 2) agree to provide a urine specimen for drug testing. Once an eligible youth was identified, data collection procedures occurred in the following steps.

1. Project-trained HJAC assessors provided brief STD pre-counseling to the youth. Counseling covered the prevalence of STDs among adolescents, importance of getting tested for Chlamydia and gonorrhea,

⁶All study protocols were approved and monitored by the project's oversight Institutional Review Board.

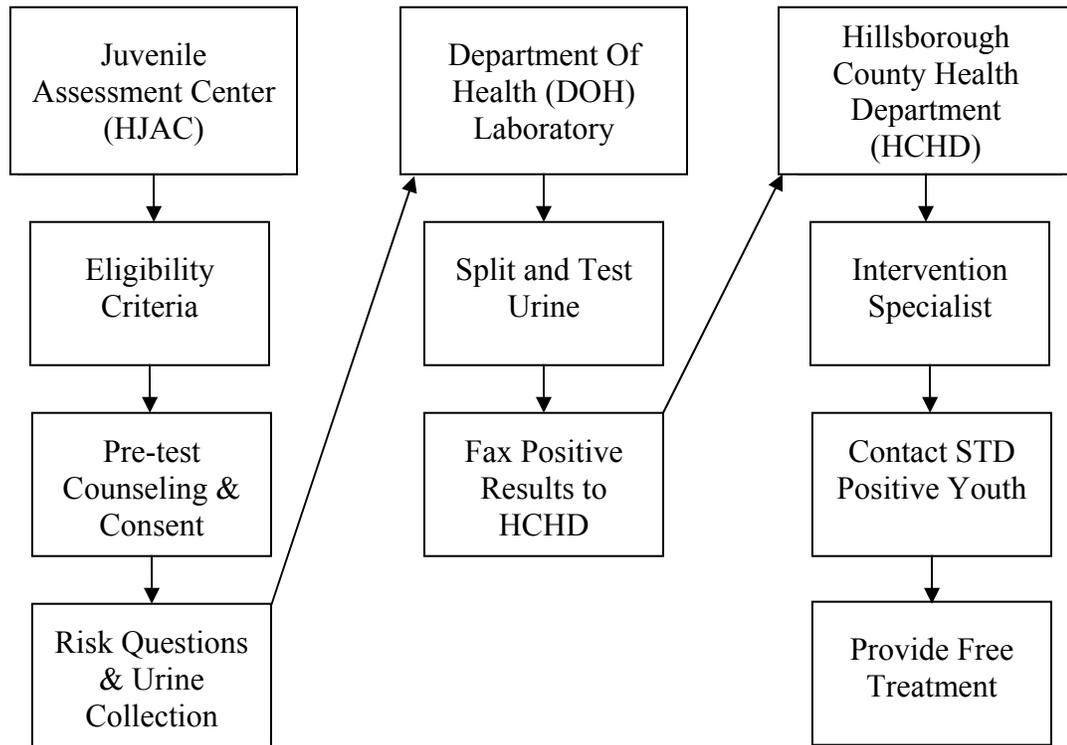
⁷ Under Florida law, youth 12 or older are protected from STD test disclosure to parents and do not need parental consent for an STD test.

how these diseases are spread, and procedures for getting treatment if positive.

2. HJAC staff asked youth to voluntarily consent to having their urine specimen split and tested for Chlamydia and gonorrhea.
3. Those consenting to STD testing completed a supplemental risk assessment interview, which consisted of several questions regarding sexual behavior, previous testing and treatment experiences, and prior sex education. They were informed that, if STD-positive, a HCHD worker would provide free, confidential treatment.
4. Urine specimens were collected and tested at the DOH laboratory.
5. Coordination was established among DOH staff and HCHD Disease Intervention Specialists (DIS) to provide confidential treatment to youth testing positive for Chlamydia or gonorrhea. To assist with contacting STD-positive youth for treatment, HJAC assessors completed a Supplemental Contact Form with socio-demographic and locator information, as well as post-HJAC placement status (release to community, nonsecure home detention, or secure detention). For STD-positive youth, this form was sent by DOH staff via secure fax to the HCHD. DIS would then seek to locate and treat positive youth.⁸

⁸ Any identifying information was removed from all data that was given to the research staff to secure the youths' confidentiality.

Figure 1. *Data Collection Protocol*



Among the eligible 759 males and 634 females who were assessed and asked to participate in the study, 83% of each gender consented to provide the initial urine specimen. Of these, 85.3% of males and 87.5% of females also consented to be tested for STDs (70.5%, 72.7%, and 71.5% of assessed males, females, and youth overall). No significant differences were found in consent rates by gender, race, age, HJAC operational shift (7AM-3PM, 3PM-11PM, 11PM-7AM), or post-HJAC placement. In total, 948 youth, 506 males and 442 females, agreed to participate in the project.

The data used for this study were weighted. In general, females account for about 25% of the overall HJAC population. However, to ensure sufficient power for gender-specific analyses, they were over-enrolled in the project to account for approximately half of study participants. Therefore, weighting was needed to adjust the sample to represent

the targeted population (i.e., the juvenile offending population in Hillsborough County). Accordingly, the proportion of potential male enrollees per month from June through September 2006 was used to estimate the number of eligible males booked over the entire recruitment period and to calculate a weighting factor of 1.901 for eligible males (n=506, weighted n=961). In all analyses, the male cohort was weighted to provide estimates for the full population during the recruitment period. The female cohort, based on all eligible females, was not weighted (n=442). Thus, the total weighted sample involves 1,403 newly arrested adolescents.

Individual Level Measures

UA Drug test results. For the current study, substance use was measured with two separate indicators: *marijuana use* and *cocaine use*. Drug use data are based on the urine specimen that was voluntarily provided by study participants. At the testing lab, the split urine specimens were tested for drugs using the EMIT procedure. The cutoff level for a positive marijuana test result was 50 ng/ml of urine and the cutoff level for a positive cocaine test result was 300 ng/ml. The surveillance window for marijuana is five days for moderate users, 10 days for heavy users, and 20 days for chronic users. For cocaine, the surveillance window is 96 hours (Dembo et al., 1999). Both variables are coded 0 = negative and 1 = positive.

Risky sexual behavior. Data pertaining to youths' sexual practices was obtained from the risk assessment questionnaire. Hence, this information is self-reported data. Three types of risky sexual behavior are included in this study. *Sex without a condom* was measured with the question "Have you ever had unprotected sexual intercourse with the opposite sex?" *Sex on drugs/alcohol* was measured with the question "Have you ever had

sexual intercourse while using alcohol or other drugs?" *Multiple partners* was an open ended question asking respondents to reveal the number of sex partners in their lifetime. Following the work of previous public health research (Teplin et al., 2003), responses were recoded into a dichotomous variable representing "four or more partners in their lifetime." Each risky sexual behavior item is a dichotomous variable coded 0 = no and 1 = yes. The dichotomous nature of the sexual risk items does not allow for the examination of differing levels of sexual risk-taking. Therefore, the three sexual risk items were summed into one overall risky sexual behavior index ranging from 0 (no risky sexual behavior) to 3 (all three risky sexual behaviors). The benefit of using this index is the ability to examine the strength of the item-factor relations across differing levels of sexual risk-taking. The mean for the sexual risk index was 0.61 (SD = .80).

Criminal history. Criminal involvement was measured using the youths' officially recorded criminal history. This information was obtained via the Department of Juvenile Justice's tracking system (JJIS). *Arrest History* represents the number of all prior arrests listed for each juvenile included in the study. This includes arrests for felony and misdemeanor charges, as well as violent, property, public disorder, and/or noncriminal arrests (e.g., violation of probation). Descriptive statistics revealed a skewed distribution. Therefore, "prior arrests" was truncated at the 90th percentile, which equaled 7 arrests (10% of the sample had seven or more arrests in their lifetime). Hence, this item is a categorical variable ranging from 0 to 7. The value 7 represents 7 or more lifetime arrests.

Demographic characteristics. Three demographic characteristics were used in the analyses. Gender is a dichotomous variable coded 1 = male and 0 = female. Age is a

continuous variable. The racial/ethnic variation in the data was quite small. Less than 1% of the respondents were identified as a race other than white or African American (e.g., Native American, Asian, other). Therefore, race is dichotomized with 1 = African American and 0 = Non African American.

Table 2 provides a description of the individual-level characteristics of the weighted sample. As can be seen, over 68% of the sample was male. A little over half identified themselves as African American. The average age of the respondents was 15.5. Over three-fourths were sent home following arrest (i.e., released or placed on non secure home detention). Thirty-eight percent of the sample tested marijuana positive and just over 5% tested cocaine positive.

Analyses Steps

Analyses for the current study were carried out in several steps. Throughout these steps, a variety of bivariate, confirmatory factor analysis, and structural equation modeling techniques were performed. First, a series of bivariate analyses were completed to determine the level of association among the four observed variables. These descriptive analyses laid the groundwork for the overall confirmatory factor analyses.

Problem behavior syndrome is defined as an underlying, unidimensional disposition toward deviance and is identified by the tendency to engage in multiple forms of problem behavior (Jessor & Jessor, 1977). Based on this definition, problem behavior syndrome represents a latent variable. A latent variable is described as an unobservable or unmeasurable concept that helps explain the association among two or more observed variables (Bollen, 2002). For the purposes of the current study, risky sexual practices, marijuana and cocaine test result, and delinquent behavior are the observed indicators

expected to form a latent variable reflective of a general disposition towards deviance.

Table 2. *Sample Characteristics of the Weighted Sample (n = 1403)*

Variable	N	% of Sample
<u>Gender:</u>		
Male	961	68.5
Female	442	31.5
<u>Race:</u>		
African American	736	52.4
Non African American (82% Caucasian)	664	47.3
<u>Age:</u>		
12	40	2.8
13	132	9.4
14	194	13.8
15	273	19.5
16	345	24.6
17	364	26.0
18	54	3.9
Mean Age = 15.5 (SD = 1.48)		
<u>Post HJAC Placement:</u>		
Release	849	60.5
Non-Secure Home Detention	217	15.5
Secure Detention	335	23.9
<u>Prior Arrests:</u>		
0	584	41.6
1	234	16.7
2	161	11.5
3	110	7.9
4	77	5.5
5	62	4.4
6	32	2.3
7 or more	141	10.0
<u>Risky Sexual Practices:</u>		
Sex without a Condom	302	21.5
More than 3 Lifetime Partners	392	28.0
Sex while Using Drugs/Alcohol	110	7.9
<u>Drug Test Positive:</u>		
Marijuana Positive	529	37.7
Cocaine Positive	75	5.3

Factor analytic methods are the most common techniques used to identify latent factors. The basic assumption of factor analytic techniques is that observed variables are

a combination of some underlying latent construct (Byrne, 2001). As such, these types of methods examine how a set of observed variables are interrelated and form dimensions of one or more underlying constructs. Joreskog (1979:5) asserts that this multivariate approach attempts to “explain” the correlations among a set of observed items through an analysis that “yields a smaller number of underlying factors that contain all the essential information about the linear interrelationships among the observed variables.”

There are three main types of factor analytic methods used to identify latent factors, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM). The distinction between EFA and CFA is related to the specification of the relationships among the observed indicators (Byrne, 2001). In EFA models, the number of factors to be extracted and the items that are reflective of each factor are not pre-specified. Thus, EFA models are not testing any specific hypotheses. The purpose of CFA models, on the other hand, is hypothesis testing (Kim & Mueller, 1978). In CFA, a model that reflects certain assumptions regarding the interrelatedness of the observed variables is pre-specified. That is, the number of latent factors and the item-factor relations are specified first. The analysis then determines how well the model, reflecting the particular factor structure, fits the data (Long, 1983). The main difference between CFA and SEM is that, in SEM, paths specifying directional relationships are included in the model (Kline, 2005). Thus, SEM often involves CFA modeling and path analysis. Specifically, SEM involves a standard CFA, which focuses on the factors and their observed indicators (measurement model), and path analysis, which focuses on the directional relationships between two or more latent factors and/or additional covariates posited to be related to the latent factor (structural model) (Byrne,

2001).

CFA and SEM involve a set of regression equations that determine how well each observed variable is explained by the latent factor. The factor loading for each variable represents the regression coefficient for that particular variable which represents the correlation between the variable and the factor (Kline, 2005). Although somewhat arbitrary, a general rule of thumb is that a factor loading greater than 0.4 indicates that an observed variable adequately “loads” onto the latent factor (Raubenheimer, 2004). In other words, the higher the factor loading, the better the observed variable is explained by the latent factor. (For SEM modeling, additional regression coefficients are used to determine the strength of the association among the covariates included in the model [e.g., age] and the latent factor [path coefficients]).

In addition to the factor loadings, several fit indices are used to assess how well the pre-specified model fits the data. The first model fit statistic is the chi-square of model fit (χ^2). A non-significant p-value indicates that the null hypothesis cannot be rejected because the specified model’s covariance structure is not significantly different from the observed covariance matrix (Byrne, 2001). The Root Mean Square Error of Approximation (RMSEA) represents a measure of the goodness-of-fit that could be expected if the model were tested on the entire population (Stamatis, 2001). RMSEA values at .05 or less indicate a close model fit, and values between .05 and .08 indicate an adequate model fit (Browne & Cudek, 1993; Hu & Bentler, 1999). The Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI) measure the covariation among the observed variables in the data (Bentler, 1990; Tucker & Lewis, 1973). The typical range for both TLI and CFI is between 0 and 1 with values greater than .90 indicating an

acceptable fit (Arbuckle & Wothke, 1999; Browne & Cudek, 1993). Finally, with categorical variables, the weighted root mean square residual (WRMR) represents the weighted difference between the predicted and observed variances and covariances in the model (Muthèn & Muthèn, 2007). WRMR values of less than .90 indicate a good model fit (Yu & Muthèn, 2001).

Standard CFA and SEM models rely on general maximum likelihood (ML) estimation, a technique that assumes that the observed variables are continuous and normally distributed (Bollen, 1989). These assumptions are not met when the observed variables are categorical. As a result, significant problems can result when fitting a standard CFA or SEM model with ML estimation using categorical data including an inflated chi-square test, underestimated parameters, and biased standard errors (Muthèn & Kaplan, 1985; 1992).

An alternative to standard CFA and SEM estimation techniques (i.e., ML estimation) is CFA and SEM with weighted least squares regression (WLS) (Flora & Curran, 2004). This type of estimation relaxes the assumptions of ML by accounting for the non-normal, categorical nature of the variables (Kaplan, 1996). Flora and Curran (2004:469) indicate that this procedure "provides asymptotically unbiased, consistent, and efficient parameter estimates as well as a correct chi-square test of fit with dichotomous or ordinal observed variables."

In addition to relying on WLS, when factor indicators are categorical, the regression coefficients (i.e., factor loadings) are probit estimates. Probit regression is a log-linear approach to handling categorical variables that is based on the Poisson distribution. Also, for categorical models, thresholds are modeled instead of intercepts or

means (which are estimated when the factor indicators are continuous). A threshold is a z-score reflecting the probability of falling in a given category, based on the latent factor. The number of thresholds for each observed indicator is the number of categories minus one. The first threshold represents the lowest value of the indicator (Muthèn & Muthèn, 2007).

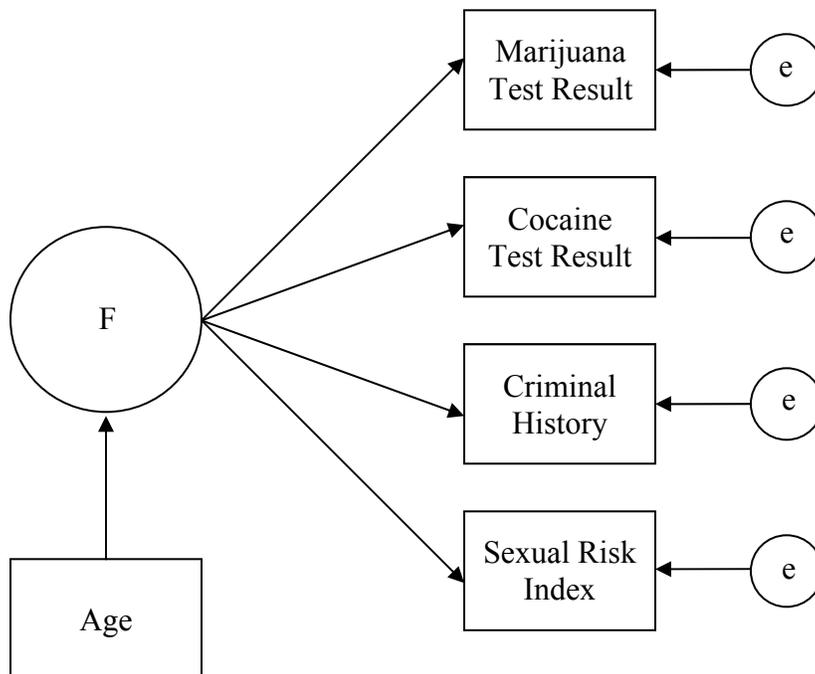
All of the models were estimated using Mplus version 5.1 (Muthèn & Muthèn, 2007). Mplus offers a number of different WLS estimation procedures. Muthèn, Du Toit, & Spisic (1997) recommend using WLSMV, involving weighted least square parameter estimates using a diagonal weight matrix with standard errors and a mean- and variance-adjusted chi-square test statistic. This type of estimation accounts for non-normality, as well as sample size (Muthèn et al., 1997).

Based on the literature reviewed in the previous chapters, it is clear that a priori assumptions regarding the factor structure of problem behavior syndrome guide the current study. Specifically, the foundation of this study rests on the basic assumption that engaging in risky sexual practices, substance use, and delinquent behavior form an underlying factor reflecting problem behavior syndrome. As such, CFA is the appropriate factor analytic technique to address the first research question because it allows for the specification of these expected relationships prior to analyzing the model (Joreskog, 1979).

Thus, the next step in the analyses examined a CFA model involving the four observed variables using all 1,403 study participants. The results of this model provide support for the first research question, and laid the groundwork for all subsequent analyses reported in this study.

A second goal of the current study is to examine how age influences problem behavior syndrome. Therefore, SEM techniques were used to incorporate a path reflecting the effect of age on the latent factor. Prior to analyzing this SEM, the relationship between age and the four observed variables was analyzed. Due to the continuous nature of the age variable, a t-test was used to examine the variability in age across these behaviors. The results of these analyses supported the inclusion of age in the basic CFA model. Figure 2 represents the general SEM model that serves as the foundation for this study.

Figure 2. *General Structural Equation Model*



As can be seen, it is hypothesized that self-reported risky sexual behavior, officially recorded criminal history, and marijuana and cocaine test results load on one underlying factor (F) reflective of problem behavior syndrome. The arrows from the

latent factor to each of the observed indicators represent a direct effect of the latent factor on each specific behavior. The “e” associated with each of the observed variables represents measurement error.

The arrow from age to the latent factor represents a direct effect of age on the latent factor. Thus, this arrow represents the direct influence that age has on the latent factor. The path coefficient is estimated using multiple regression analysis. The value of the path estimate indicates the direction and strength of the effect of age on the latent factor for a one unit increase in age (Schumaker & Lomax, 2004).

The decision to include age as a covariate was based on several reasons. First, a wealth of research has documented a strong, positive linear relationship between age and each of the observed variables. Additional research suggests that as youth progress through adolescence the covariation among these behaviors strengthens and then peaks in mid to late adolescence (Newcomb & McGee, 1991; White, 1992). Including age as a covariate, rather than a grouping variable, enables the preservation of the continuous nature of the variable, and in turn, allows for the estimation of this linear relationship.

In addition, breaking age into meaningful categories would have substantially increased the number of subgroups analyzed in the SEM models. As a result, the complexity of the models would have substantially increased. Further, several of the subgroups, particularly those involving youth at younger ages, would have contained a low number of youth. Results based on a small number of youth may be unreliable, leading to skepticism when drawing conclusions about these groups. Accordingly, accounting for the direct effect of age on the latent factor, while also maintaining the continuous nature of the variable, seems crucial to providing the most accurate

information regarding the effect of age on problem behavior syndrome.

Building on the results of the overall CFA model, the direct path from age to the latent factor was introduced into the overall model. This resulted in the overall SEM. Therefore, the next step in the analyses involved examining the overall SEM based on the weighted 1,403 newly arrested youths. This model provides support for the second research question.

Multiple-group analyses. The third objective of this study is to compare the factor structure of the latent factor discussed above across different subgroups of juvenile offenders based on important demographic characteristics. Group membership is determined by the participant's race and gender. The subgroups used in these analyses are based on prior research, reviewed in preceding chapters, regarding variations in risky sexual practices, substance use, and delinquent behavior, in addition to the meaningfulness of the groups. When there is reason to believe that groups within the population exist for whom the indicator variables are differentially related to the latent variable, group-based CFA and/or SEM technique is the appropriate technique to use because these similarities and differences can be taken into account (Widaman & Reise, 1997).

For instance, a wealth of research highlights important differences in problem behavior for males and females. In general, adolescent males are overrepresented in all forms of juvenile delinquency. It has been estimated that the ratio of male to female delinquency is nearly 4 to 1 for violent crimes and 2 to 1 for property crimes (Snyder, 2006). Additionally, studies indicate that female offenders are more likely to report serious drug use, while male juvenile offenders are more likely to report marijuana use

(Belenko et al., 2004; Neff & Waite, 2007). Gender differences in risky sexual behavior, as well as the association between risky sexual practices and substance use, reveal inconsistent patterns. However, it is well established that female offenders are more likely to test STD positive and/or report a history of an STD (Joesof et al., 2006). Furthermore, although a number of studies have failed to find significant gender differences in the structure of problem behavior, a handful of studies have highlighted variation in the strength of the association among different forms of deviant behavior (Bartlett et al., 2005; Donovan & Jessor, 1985; Gillmore et al., 1991; LeBlanc & Bouthillier, 2003; White, 1992). Taken together, the research reviewed in previous chapters indicates that the strength of the covariation among risky sexual practices, substance use, and criminal involvement may differ for male and female juvenile offenders. As such, the current study distinguishes between male and female juvenile offenders.

Racial differences in problem behavior have also been consistently documented. White juvenile offenders report higher levels and more serious forms of substance use (Belenko et al., 2004; Teplin et al., 2005). African American juvenile offenders, on the other hand, tend to report higher levels of risky sexual practices and are more likely to test STD positive (Kahn et al., 2005; Lofy et al., 2006; Risser et al., 2001). Relatively few studies have examined racial differences in the risky sexual practices-substance use link. However, the studies that have been conducted indicate that the link between these two behaviors is stronger for white offenders (Chapter 4). Furthermore, the small number of studies that has assessed the structure of problem behavior across racial groups suggests that the covariation among different forms of problem behaviors is stronger for

white adolescents (Costa et al., 1995; Welte et al., 2004). However, this evidence is far from conclusive. As a whole, the evidence regarding racial differences clearly highlights the need to account for racial variation when examining problem behavior among adolescent offenders. Thus, this study further disaggregates the gender subgroups into African American and non African American (mostly Caucasian).

The intersection of race and gender also has the potential to influence problem behavior syndrome. A handful of studies have documented differences in problem behavior across race and gender. For instance, studies tend to suggest that African American male juvenile offenders report higher levels of risky sexual practices, STD infection, and delinquent behavior, but lower levels of substance use, compared to white male juvenile offenders (Canterbury et al., 1995; Kahn et al., 2005; Neff & Waite, 2007; Teplin et al., 2003).

More recently, attention has been given to the special needs of African American female adolescents. In particular, this demographic subgroup has been identified as an important risk group for problem behavior and poor health outcomes (CDC, 2008). Compared to non African American female offenders, African American female juvenile offenders have been found to be more likely to report serious juvenile delinquency, report higher levels of unprotected sexual intercourse, and are substantially more likely to test STD positive (Brown et al., 1992; Evans et al., 2004; Kahn et al., 2005). It has been suggested that African American female offenders experience a “double disadvantage” due to both their racial minority and gender status (MacDonald & Chesney-Lind, 2001). Both race and gender have multiple correlates that may account for these differences, including cultural expectations, experience of sexual victimization, SES, education, and

poor family environment (Kotchick et al., 2001). Therefore, the intersection of these characteristics may lead to a greater likelihood of problem behavior syndrome among African American female offenders.

Furthermore, studies that examine behavior across race and/or gender subgroups fail to take into account the age of the respondent. Therefore, this study attempts to fill this gap in the literature by examining how age influences the covariation among risky sexual behavior, criminal history, and marijuana and cocaine use across race and gender. Specifically, the subgroups examined in this study are:

1. African-American males (n = 517)
2. African-American females (n = 219)
3. Non African American males (n = 445)
4. Non African American females (n = 223)

Due to the noted differences in each of the problem behaviors across race and gender, as well as the research (reviewed above) regarding the interception of race and gender, it was decided to rely solely on the race-gender subgroups. Given the evidence, examining subgroups based on only race or only gender would have masked important differences due to the failure to consider the other demographic characteristic. The four subgroups were specified a priori as part of the initial modeling process. Then, the fit of the model to the data, as well as the relationship of the observed variables to the latent factor, were examined across the specified groups.

In order to compare subgroups of individuals on a latent trait (e.g., problem behavior syndrome), it must first be determined that the observed variables under consideration are measuring the same trait across the different groups (Drasgow, 1987).

Thus, the goals of group-based factor analytic techniques are to determine 1) if the observed indicators are measuring the same latent construct, and 2) whether the groups differ in interpretable ways on the latent factor.

These questions are answered by testing the invariance of the relations among the observed variables across the groups (Widaman & Reise, 1997). Specifically, measurement invariance “involves the study of similarities and differences in the covariation patterns of item-factor relations” (Windle, Iwawaki, & Lerner, 1988:551). Model invariance reflects the assumption that the relationship between the latent factor and the observed variables is equal across the groups (Widaman & Reise, 1997). Thus, if the best fitting model is found to possess measurement invariance, then the structure of the latent factor is the same across the groups.

Identifying the appropriate level of measurement invariance, involves comparing varying levels of invariance. Several steps are required to carry out this process. The first step involves identifying a baseline model that adequately fits the data. This model specifies minimal constraints to identify the model in each group (Widaman & Reise, 1997). The baseline CFA, therefore, is an unconstrained (i.e., free) CFA model allowing the model parameters to be freely estimated for each group. In subsequent analyses, this baseline model serves as a benchmark to compare the more restricted (i.e., invariant) models.

The next step involves testing measurement invariance. This step entails examining a constrained CFA, which consists of fixing parameter estimates, such as factor loadings, factor variances, factor means or intercepts, to be equal across the groups. The constrained model tests the assumption that relations between the observed

variables and the latent factor are similar across the groups. The modification indices based on the results of the constrained model provide suggestions for ways to improve the model fit. In particular, these suggestions indicate which parameter estimates should be allowed to vary across the groups (i.e., reducing the restrictions of the model parameters), in other words, identifying disparity in the observed variable-latent factor relationships. The value of the modification indices represents the expected drop in chi-square if the parameter in question is freed (Muthèn & Muthèn, 2007).

Model fit indices are used to determine which level of invariance fits the data best. In a group-based model, measures of model fit are invariant across groups. Satisfactory values on the model fit indices discussed above (i.e., nonsignificant chi-square, CFI and TLI greater than 0.90, low RMSEA and WRMR) signify that the specified model for each group fits the data well. If the model fit indices indicate a good fit for two or more of the models (e.g., free model and constrained model), a chi-square test of model difference is used to determine which model is the best fitting model. This statistic tests the baseline model (i.e., unconstrained model) against the more restricted (i.e., invariant) model. A non-significant chi-square value indicates that constraining the model parameters does not worsen the fit of the model to the data (Muthèn and Muthèn, 2007), thus, suggesting that a higher degree of measurement invariance is appropriate.

As can be seen, the major advantage of group-based factor analytic techniques is the ability to account for heterogeneity in the observed variable-latent factor relationship that exists within the sample. According to Widaman & Reise (1997:316), the primary benefit of group-based techniques is that “these procedures provide simple and direct ways of testing crucial hypotheses related to factor invariance.” That is, such techniques

provide a useful way to investigate similarities and differences in the factor structure across groups. Accordingly, when empirical, as well as substantive, evidence highlights the potential for heterogeneity in the structure of a latent factor across groups within a population, these techniques are the appropriate analytic tools for examining these variations.

In the current study, the multi-group analyses proceed in several steps. First, a number of significance tests comparing the four problem behavior measures across race and gender were conducted to determine if, in fact, there is variability in these behaviors across the demographic characteristics. The sample was then divided into the four demographic subgroups. Chi-square tests of significance were conducted for these comparisons because they are categorical variables (Agresti & Finlay, 1997). Significant chi-square values suggested that these subgroups differ on each of the problem behaviors, thus, providing support for the group-based SEM analyses. For exploratory purposes, Muthèn and Muthèn (2007) recommend performing a separate CFA for each subgroup to assess whether the CFA fits the data for each group separately. Therefore, four separate CFA models were examined, one for each demographic subgroup.

Then, three group-based CFA models were examined. First, the unconstrained group-based CFA was performed. In this model: 1) the factor loading for the first observed variables (sexual risk index) was set to one and all other factor loadings were freely estimated across the groups, 2) all thresholds were freely estimated across the groups, 3) factor variance was freely estimated across the groups, and 4) the factor mean was set at zero for all groups. The second CFA model tested measurement invariance by constraining the factor loadings and the thresholds for each of the observed variables. The

fit of this model determined whether or not there is important variation in the factor structure across African American females, African American males, non African American females, and non African American males.

Based on the modification indices of the constrained CFA, an additional CFA was performed freeing the arrest history factor loading for African American males and the thresholds of the sexual risk index for Non African American females. Specifically, this model involves: 1) constraining the factor loadings for sexual risk, marijuana test result, and cocaine test result to be equal across the four groups, 2) constraining the factor loading for arrest history to be equal for African American females, Non African American females, and Non African American males, 3) allowing the factor loading for arrest history to be freely estimated for African American males, 4) holding the arrest history, marijuana test result, and cocaine test result thresholds equal across the four groups, 5) constraining the sexual risk thresholds to be equal for African American females, African American males, and Non African American males, 6) allowing the sexual risk thresholds to be freely estimated for Non African American females, and 7) allowing the factor variances to be freely estimated across the four groups.

Then, a chi-square difference test was used to identify which of these models fit the data best. The best fitting model served as the measurement model of the final group-based SEM that is the focus of this study. Prior to analyzing the final, group-based SEM, the relationship between age and each of the observed variables was examined across the demographic subgroups. These results provided further support for the inclusion of the direct effect of age on the latent factor in the group-based analyses. Finally, the group-based SEM was performed. The results of this model provide moderate support for the

third research question. The next chapter presents a step-by-step discussion of the results of each phase of the analytic process outlined in this chapter.

Chapter 8

Results

The objectives of this study are to: 1) determine whether risky sexual practices, substance use, and criminal involvement form a unidimensional latent factor using a sample of newly arrested juvenile offenders, 2) assess the effect that age has on the latent factor, and 3) compare the structure of the latent factor, as well as the effect of age on the latent factor, across four demographic subgroups. To accomplish these goals, a number of bivariate relationships, followed by factor analytic and structural equation models, were analyzed. This chapter presents the findings of the current study, which are based on a sample of 948 (weighted: $n = 1,403$) newly arrested juvenile offenders.

Preliminary Analyses

Prior to examining the basic SEM that serves as the foundation of this study (displayed in Figure 2), a series of bivariate analyses were performed to examine the association among the four observed variables. The results of these analyses laid the groundwork for the CFA model, which forms the measurement model of the SEM.

Bivariate Analyses. First, the bivariate correlations among the four observed variables were analyzed to determine whether the four observed variables were associated. All correlations are significant and positive; indicating that participants who had higher values on any one of the four observed variables were more likely to have a higher value on the other three behavioral indicators. Table 3 presents the polychoric

correlation matrix.⁹ As can be seen, the relationship among the substance use variables is the strongest association.

Table 3
Polychoric Correlations between the Observed Indicators (n = 1403)

	1	2	3	4
1. Marijuana	--			
2. Cocaine	0.559	--		
3. Sexual Risk Index	0.356	0.322	--	
4. Arrest History	0.277	0.273	0.203	--

Tables 4-7 report the bivariate relationships among the four problem behaviors. As can be seen in Table 4, youth who tested marijuana positive were significantly ($p < .001$) more likely to test positive for cocaine, have a higher number of prior arrests, and report a higher number of risky sexual practices. In particular, 83% of the cocaine positive youth were marijuana positive, compared to 35% of the cocaine negative youth. Only 29% of the youth with no prior criminal history tested positive for marijuana, but 54% of the youths with four arrests and 59% of the youths with 7 or more arrests tested marijuana positive. Similarly, 59% of the youths who reported all three of the risky sexual behavior items tested marijuana positive, whereas only 27% of the youth who reported no risky sexual practices tested positive. Based on these results, it is clear that marijuana use is associated with additional problem behaviors among the youths included in this study.

⁹ Polychoric correlations are used when the variables are categorical. Polychoric correlation extrapolates what the categorical variables' distributions would be if continuous, adding tails to the distribution. As such it is an estimate based on the assumption of an underlying continuous bivariate normal distribution (Flora & Curran, 2004).

Table 4. *Bivariate Relationships between Marijuana Test Result and Risky Sexual Behavior, Arrest History, and Cocaine Test Result (n = 1,403)*

Variables	Marijuana Positive (n = 529)
<u>Cocaine:</u>	
Negative	35.2%
Positive	82.9%
	$\chi^2 (4) = 1474.64, p < .001$
<u>Arrest History:</u>	
0	29.1%
1	30.8%
2	45.3%
3	43.2%
4	53.8%
5	42.9%
6	46.9%
7 or more	58.9%
	$\chi^2 (16) = 84.76, p < .001$
<u>Sex Risk Index:</u>	
0	26.8%
1	50.9%
2	54.5%
3	58.5%
	$\chi^2 (8) = 95.07, p < .001$

Table 5 indicates that, similar to marijuana use, youth who tested cocaine positive were significantly more likely ($p < .001$) to engage in each of the problem behaviors. Of the marijuana positive youths, 12% tested cocaine positive; of the marijuana negative youth, 1.5% tested cocaine positive. An interesting curvilinear relationship between cocaine use and arrest history was revealed. For example, youth with six arrests revealed the higher proportion of cocaine positive youth. However, fourteen percent of the youths with seven or more arrests tested cocaine positive, whereas 3% of the youths with no prior arrests and 2% of the youths with one arrest tested cocaine positive. In regard to risky sexual practices, 12% of the youth who reported all three behaviors, compared to nearly 3% of the youths reporting no behaviors, tested cocaine positive.

Table 5. *Bivariate Relationships between Cocaine Test Result and Risky Sexual Behavior, Arrest History, and Marijuana Test Result (n = 1,403)*

Variables	Cocaine Positive (n = 75)
<u>Marijuana:</u>	
Negative	1.5%
Positive	11.9%
	$\chi^2 (4) = 1474.64, p < .001$
<u>Arrest History:</u>	
0	3.4%
1	2.1%
2	6.2%
3	8.1%
4	3.8%
5	6.3%
6	18.8%
7 or more	13.5%
	$\chi^2 (16) = 57.84, p < .001$
<u>Sex Risk Index:</u>	
0	2.7%
1	7.7%
2	12.6%
3	12.2%
	$\chi^2 (8) = 39.40, p < .001$

Table 6 reports the bivariate association among each of the problem behaviors and risky sexual practices. Sixty percent of the cocaine negative youth reported no risky sexual practices, whereas only 29% of the cocaine positive youth reported no risky sexual practices. Nearly 7% of the cocaine positive youth reported all three behaviors, compared to only 2.7% of the cocaine negative youth. Marijuana use revealed a similar pattern: 68% of the negative youth and 43% of the positive youth reported no risky sexual practices; however, nearly 2% of the negative and 5% of the positive youth reported all three behaviors. Prior arrests revealed an inconsistent pattern of association. The percentage of youth reporting all three behaviors increased with number of prior arrests. But as can be seen, this linear association stopped at six arrests and then

substantially declined at 7 or more. This finding is somewhat contradictory to a wealth of research that suggests that the most serious adolescent offenders tend to report the highest levels of risky sexual practices (Tolou-Simmons et al., 2007). Regardless, these findings highlight a significant ($p < .001$) association suggesting that youths involved in this study that reported a higher number of risky sexual practices were more likely to test marijuana and/or cocaine positive and have a higher number of arrests (up to six arrests).

Table 6. *Bivariate Relationships between Risky Sexual Behavior and Arrest History, Marijuana Test Result, Cocaine Test Result*

Variables	<u>Sexual Risk Index</u>			
	0	1	2	3
<u>Cocaine:</u>				
Negative	60.4%	27.4%	9.5%	2.7%
Positive	29.3%	40.0%	24.0%	6.7%
$\chi^2 (6) = 34.50, p < .001$				
<u>Marijuana:</u>				
Negative	68.3%	22.2%	7.6%	2.0%
Positive	43.1%	37.6%	14.7%	4.5%
$\chi^2 (6) = 88.12, p < .001$				
<u>Arrest History:</u>				
0	64.7%	23.5%	9.9%	1.9%
1	59.4%	32.5%	7.3%	0.9%
2	60.5%	24.1%	11.7%	3.7%
3	61.3%	30.6%	4.5%	3.6%
4	51.3%	38.5%	3.8%	6.4%
5	39.7%	28.6%	20.6%	11.1%
6	42.4%	21.2%	27.3%	9.1%
7 or more	43.3%	38.3%	15.6%	2.8%
$\chi^2 (24) = 89.34, p < .001$				

Table 7 reports similar results regarding the associations between arrest history and the other three problem behaviors. All associations are significant at the $p < .001$ level. Interestingly, a larger percentage of marijuana positive (13%) and cocaine positive (14%) positive had two prior arrests, compared to youths with three to six arrests.

However, the largest percentage of marijuana positive (15.7%) had seven or more arrests. Similarly, a larger percentage of youths with two arrests reported all three risky sexual practices (15.1%), compared to youths with three or four arrests. But, the largest proportion of youths reporting all three sexual behaviors had five arrests (16.7%).

Table 7. *Bivariate Relationships between Arrest History and Risky Sexual Behavior, Marijuana Test Result, and Cocaine Test Result*

Variables	<u>Arrest History</u>							
	0	1	2	3	4	5	6	7 or more
<u>Cocaine:</u>								
Negative	42.5%	17.2%	11.4%	7.5%	5.6%	4.4%	2.0%	9.2%
Positive	26.3%	6.6%	13.2%	11.8%	3.9%	5.3%	7.9%	25.0%
$\chi^2 (16) = 57.84, p < .001$								
<u>Marijuana:</u>								
Negative	47.4%	18.6%	10.0%	7.0%	4.1%	4.1%	1.9%	6.6%
Positive	32.1%	13.6%	13.8%	9.1%	7.9%	5.1%	2.8%	15.7%
$\chi^2 (16) = 84.76, p < .001$								
<u>Sex Risk:</u>								
0	45.8%	16.8%	11.9%	8.2%	4.8%	3.0%	1.7%	7.4%
1	34.7%	19.2%	9.9%	8.6%	7.6%	4.6%	1.8%	13.7%
2	39.7%	11.6%	13.0%	3.4%	2.1%	8.9%	6.2%	15.1%
3	26.2%	4.8%	14.3%	9.5%	11.9%	16.7%	7.1%	9.5%
$\chi^2 (24) = 88.34, p < .001$								

Indeed, these preliminary results suggest that participation in any one of the behaviors included in this study is significantly related to participation in the other three problem behaviors. Therefore, these findings support the assumption that these four observed behaviors form a latent construct reflective of problem behavior syndrome. This a priori assumption guides the general SEM model that serves as the foundation of this study.

Confirmatory Factor Analysis. The next step in the SEM process was to examine a CFA model including the four observed variables based on the sample as a whole. The

results of this model are presented in Table 8.¹⁰ The model fit indices highlight a good fit of the model to the data. The chi-square test of model fit is nonsignificant ($\chi^2 = 0.54, p = 0.76$) indicating that the null hypothesis (i.e., the model fits the data) cannot be rejected. Both CFI and TLI are close to 1 (CFI = 1.00; TLI = 1.021), and the WRMR is low (WRMR = 0.15). RMSEA equals zero, which means that the model fit the data so well the RMSEA could not be estimated. The Mplus program did not suggest any modifications to the CFA model. Based on these results, it can be concluded that the hypothesized model fits the data well.

The regression estimates for each of the observed variables are significant indicating that each behavioral indicator loads onto the latent factor. However, notable differences in the effect size of the factor loadings were revealed. The standardized loadings for both measures of substances use were much higher (marijuana: $b_{\text{stdYX}} = 0.746$; cocaine: $b_{\text{stdYX}} = 0.725$, compared to the sexual index ($b_{\text{stdYX}} = 0.480$) and arrest history ($b_{\text{stdYX}} = 0.385$).¹¹ These values indicate that, for the newly arrested offenders included in this study, the latent factor was better able to predict substance use.

It is also important to note that the residual variance of the latent factor in the CFA model is significant at the .001 level. Accordingly, there is still a significant amount of variation in the latent factor that is not accounted for by the observed variables. This finding suggests that additional factors may be useful in understanding problem behavior syndrome among newly arrested juvenile offenders.

¹⁰ The Regression estimates and standard errors reported in the tables throughout this study are unstandardized estimates.

¹¹ The standardized parameters reported in this chapter were estimated using the stdYX option in Mplus. This standardization process relies on the variances of the latent variable for standardization (Muthén & Muthén, 2007). Tables including these results are available upon request.

Table 8. *Confirmatory Factor Analysis (n = 1403)*

Variable	Estimate	S.E.	Critical Ratio
<u>F1 by:</u>			
Sex Risk	1.000	--	--
Marijuana	1.554*	0.286	5.427
Cocaine	1.511*	0.243	6.222
Arrest History	0.801*	0.149	5.370
<u>Residual Variance:</u>			
F1	0.231*	0.054	3.780

Model Fit Statistics: $\chi^2 = 0.539$, $p = 0.76$; CFI = 1.000; TLI = 1.021; RMSEA = 0.00; WRMR = 0.151.

* $p < .001$

These results provide support for the first research question. Among the newly arrested youths included in this study, the risky sexual behavior index, marijuana test result, cocaine test result, and arrest history form a unidimensional factor reflecting problem behavior syndrome. Accordingly, this CFA model serves as the measurement model for all subsequent SEM analyses reported in this study.

Basic Structural Equation Model

Due to the large body of evidence that suggests that age influences the tendency to engage in each of the observed behaviors, as well as the structure of problem behavior syndrome, including age in the model reported in Table 8 is necessary to obtaining an accurate understanding of the latent factor (White, 1992; Teplin et al., 2003; Loeber et al., 1999; Newcomb & McGee, 1991). As displayed in Figure 2, this model hypothesizes that the risky sexual behavior index, marijuana test result, cocaine test result, and arrest history form a unidimensional latent factor and that age has a direct effect on the latent factor. Prior to analyzing this model, the bivariate relationship between age and each of the four observed variables was assessed.

Bivariate analyses with age. Table 9 displays the bivariate relationships between age and the risky sexual behavior index, arrest history, marijuana test result, and cocaine test result.

Table 9. *Sexual Behavior, Arrest History, Marijuana and Cocaine Test Result by Age*

Variables	Mean Age
<u>Marijuana Positive:</u>	
Negative	15.23
Positive	15.87
	F(1,402) = 32.58, $p < .001$
<u>Cocaine Positive:</u>	
Negative	15.43
Positive	16.19
	F(1,402) = 9.53, $p < .001$
<u>Sexual Risk Index:</u>	
0	15.05
1	15.99
2	16.06
3	15.88
	F (1,402) = 36.78, $p < .001$
<u>Arrest History:</u>	
0	15.37
1	15.40
2	15.42
3	15.51
4	15.47
5	15.47
6	15.81
7 or more	15.84
	F (1,402) = 1.72, $p = .05$

As can be seen, older adolescents were significantly more likely to test marijuana and cocaine positive ($p < .001$). The mean age for youths who reported two risky sexual behaviors was the highest ($p < .001$). In regard to arrest history, older adolescents were also somewhat more likely to have a higher number of arrests ($p = .05$). Because the

latent factor is comprised of these four observed variables, these findings provide support for the hypothesis that age will have a direct effect on the latent factor.

Structural equation model. The basic structural equation model that forms the foundation of this study is presented in Figure 2 and Table 10. Introducing age as a direct effect on the latent factor reduced the quality of the fit of the model to the data (compared to the CFA results in Table 8). The fit of the overall model was marginally acceptable, although not desirable. Both CFI and TLI were somewhat low, although they were greater than the cut-off level of 0.90 (CFI=0.948, TLI = 0.906). The RMSEA (.052) and WRMR (0.841) were somewhat high. The chi-square test of model fit ($\chi^2 = 17.84$) was significant at the .05 level which indicates that the null hypothesis (i.e., the model fits the data) should be rejected.

Table 10. *Structural Equation Model (n = 1403)*

Variable	Estimate	S.E.	Critical Ratio
<u>F1 by:</u>			
Sex Risk	1.000	--	--
Marijuana	1.168*	0.166	7.028
Cocaine	1.252*	0.194	6.436
Arrest History	0.599*	0.103	5.805
<u>F1 on:</u>			
Age	0.182*	0.027	6.812
<u>Residual Variance:</u>			
F1	0.302*	0.062	4.851
<u>R-Square:</u>			
Sex Risk	0.349		
Marijuana	0.464		
Cocaine	0.526		
Arrest History	0.131		

Model Fit Statistics: $\chi^2 = 17.84$, $p = 0.003$; CFI = 0.948; TLI = 0.906; RMSEA = 0.052; WRMR = 0.841.

* $p < .001$

However, the direct effect of age on the latent factor revealed a significant effect. This effect suggests that age has a positive effect on the latent factor, which indicates that the covariation among the four observed indicators is stronger for older adolescents. Thus, the second research question is also supported. Age does have a direct effect on the latent factor.

The standardized factor loadings, as well as the r-square values, highlighted important variation in the relationship between each of the four behavioral indicators and the latent factor. Although significant, the effect size for arrest history ($b_{\text{stdYX}} = 0.362$) was substantially lower than the other three indicators (sexual risk index: $b_{\text{stdYX}} = 0.591$; marijuana test result: $b_{\text{stdYX}} = 0.682$; cocaine test result: $b_{\text{stdYX}} = 0.725$). Furthermore, the r-square values in Table 10 indicate that 46% of variation in marijuana use, 53% of variation in cocaine use, 35% of variation in the risky sexual behavior index, but only 13% of the variation in arrest history was accounted for by the latent factor. Thus, the ability of the latent factor to explain the observed indicators varied among the newly arrested juvenile offenders. Similar to the results reported in Table 9, the relationship between the latent factor and substance use was the strongest for the newly arrested juvenile offenders involved in this study. These findings coincide with prior research that highlights marked differences in the observed behaviors-latent factor relations (Osgood et al., 1988; Welte et al., 2004).

It is important to note that the residual variance of the latent factor in the CFA model is significant at the .001 level. Accordingly, there is a significant amount of variation in the latent factor that is not accounted for by the observed variables. This

finding suggests that additional factors may be useful in understanding problem behavior syndrome among newly arrested juvenile offenders.

As argued throughout this study, one potential reason for the undesirable fit of the overall SEM model to the data, as well as the large amount of unexplained variance, may be related to differences in the relationships examined in the SEM model across subgroups nested in the overall sample. That is, it is possible that the association among risky sexual behavior, cocaine and marijuana test result, and arrest history, as well as the effect of age on this association, may differ across demographic subgroups. Failing to account for this variation has the potential to influence the results of the SEM analyses conducted on the sample as a whole. Therefore, the rest of this chapter focuses on variations in the observed variables, the latent factor, and the effect of age on these variables, across four demographic subgroups: African American females, Non African American females, African American males, and Non African American males.

Group-Based Confirmatory Factor Analysis

Building on the findings above, the next phase of the analyses involved examining whether the factor structure found in Table 8 is consistent across the four demographic subgroups. The group-based analyses proceeded in several steps. First, a series of bivariate analyses were performed to determine whether each of the four observed indicators varied across race and gender. Then, the sample was broken down into four demographic subgroups: African American females (n = 219), Non African American females (n = 223), African American males (n = 517), and Non African American males (n = 445). Differences in the risky sexual behavior index, arrest history, marijuana test result, and cocaine test result were examined across these four groups.

Next, a separate CFA was performed for each of the four demographic subgroups. These results provided preliminary support for the group-based analyses.

Last, four group-based models were performed. First, an unconstrained CFA model was tested across the four groups. In the unconstrained model, the factor loadings and thresholds were free to vary across the four subgroups. Next, a constrained group-based CFA was performed to determine if the structure of the latent factor was the same across the four groups. The goal of the constrained model was to test for CFA measurement invariance and equality in the structural parameters (e.g., factor loadings, thresholds) to determine whether the model fit the data similarly across the four subgroups. This CFA model involved holding the factor loadings and thresholds equal across groups. Then, based on suggestions in the modification indices, an additional group-based CFA was performed freeing 1) the factor loading for arrest history for African American males and 2) freeing the thresholds for the sexual risk index for Non African American females. A chi-square test of model difference was used to determine which model fit the data best. The best fitting CFA served as the measurement model in the final group-based SEM analyses.

Bivariate analyses. Tables 11-13 present the bivariate relationships between the four problem behaviors included in this study and gender, race, and race-gender subgroup, separately. As Table 11 indicates, males included in this study were significantly more likely to test marijuana positive (27% of females, 43% of males, $p < .001$). However, no significant gender differences were found for cocaine test result (4% of females, 6.1% of males, $p = .36$). Males were also more likely to have a higher number of arrests (7 or more arrests = 6% of females, 12% of males, $p < .001$).

Significant differences in risky sexual practices were also revealed. As can be seen, a larger percentage of females reported no risky sexual practices and all three behaviors; however, a larger percent of males reported one or two risky sexual practices.

Table 11. *Observed Indicators by Gender*

Variables	Female (n = 442)	Males (n = 961)
<u>Marijuana Positive:</u>		
Negative	73.3%	56.9%
Positive	26.5%	42.9%
	$\chi^2 (2) = 34.69, p < .001$	
<u>Cocaine Positive:</u>		
Negative	95.7%	93.9%
Positive	4.1%	6.1%
	$\chi^2 (2) = 2.06, p = .36$	
<u>Sexual Risk Index:</u>		
0	65.4%	55.7 %
1	22.9%	30.5%
2	8.6%	11.0%
3	3.2%	2.8%
	$\chi^2 (3) = 12.92, p < .01$	
<u>Arrest History:</u>		
0	53.4%	36.2%
1	18.1%	16.0%
2	11.5%	11.4%
3	4.8%	9.3%
4	2.0%	7.1%
5	2.5%	5.3%
6	2.0%	2.4%
7 or more	5.7%	12.1%
	$\chi^2 (8) = 63.05, p < .001$	

Table 12 reports the bivariate relationships between each of the four behavior indicators and race. A significantly higher number of Non African American participants tested cocaine positive (3.5% of African American participants, 7.5% of Non African American participants, $p < .001$), and reported a higher number of risky sexual practices (all three risky sexual behaviors = 0.8% of African American participants, 5.3% of Non

African American participants, $p < .001$) than African American youths. There were no significant differences in marijuana test result (36% of African American participants, 40.0% of Non African American participants, $p = .25$). Similar to previous research, African American youths revealed more serious arrest histories (7 or more = 12.2% of African American participants, 7.7% of Non African American participants, $p < .001$) compared to Non African American participants.

Table 12. *Observed Variables by Race*

Variables	African American (n = 736)	Non African American (n = 664)
<u>Marijuana Positive:</u>		
Negative	63.9%	59.8%
Positive	36.0%	39.9%
	$\chi^2 (2) = 2.78, p = .249$	
<u>Cocaine Positive:</u>		
Negative	96.5%	92.2%
Positive	3.5%	7.5%
	$\chi^2 (2) = 12.26, p < .01$	
<u>Sexual Risk Index:</u>		
0	60.6%	57.1%
1	31.5%	24.2%
2	7.1%	13.4%
3	0.8%	5.3%
	$\chi^2 (3) = 44.91, p < .001$	
<u>Arrest History:</u>		
0	31.8%	52.0%
1	18.1%	15.2%
2	13.6%	9.3%
3	10.2%	5.4%
4	6.0%	5.0%
5	5.3%	3.5%
6	2.9%	1.7%
7 or more	12.2%	7.7%
	$\chi^2 (8) = 66.81, p < .001$	

Next, the demographic characteristics of the youth were broken down into the four subgroups. Differences in the risky sexual behavior index, arrest history, marijuana test result, and cocaine test result across these four groups are presented in Table 13.

Table 13. *Observed Indicators by Demographic Subgroup*

Variables	Non AA Female	AA Female	Non AA Male	AA Male
<u>Marijuana:</u>				
Negative	68.2%	78.5%	57.6%	56.0%
Positive	31.8%	21.4%	42.4%	43.8%
$\chi^2 (6) = 43.84, p < .001$				
<u>Cocaine:</u>				
Negative	93.7%	97.7%	91.5%	95.9%
Positive	6.3%	2.3%	8.6%	4.1%
$\chi^2 (6) = 17.46, p < .01$				
<u>Sexual Risk Index:</u>				
0	58.3%	72.6%	56.0%	55.5%
1	24.7%	21.0%	23.8%	36.0%
2	11.7%	5.5%	15.1%	7.7%
3	5.4%	0.9%	5.2%	0.8%
$\chi^2 (9) = 69.79, p < .001$				
<u>Arrest History:</u>				
0	61.4%	45.2%	47.8%	26.1%
1	17.0%	19.2%	14.1%	17.6%
2	7.2%	16.0%	10.3%	12.6%
3	4.0%	5.5%	6.1%	12.2%
4	0.4%	3.7%	7.2%	7.0%
5	3.6%	1.4%	3.4%	7.0%
6	1.3%	2.7%	1.8%	2.9%
7 or more	4.9%	6.4%	9.0%	14.7%
$\chi^2 (24) = 143.64, p < .001$				

Important differences across the four demographic subgroups were revealed for each of the four variables. African American males, followed closely by Non African American males, were more likely to test marijuana positive. Non African American males, followed by Non African American females were more likely to test cocaine positive. In regard to risky sexual practices, Non African American females and Non

African American males were substantially more likely to report all three risk-taking behaviors. A substantially larger portion of African American males had seven or more arrests, compared to the other three groups. African American females were the least likely test drug positive. Non African American females revealed the lowest proportion of youth with seven or more arrests (4.9%).

These preliminary findings coincide with prior research that highlights marked differences in problem behaviors across gender (Belenko et al., 2004; Neff et al., 2007), race (Belenko et al., 2004; Dembo et al., 2007a), and gender-race subgroups (Teplin et al., 2005) among adolescent offenders. Furthermore, by comparing the results in Tables 10-12, it is clear that examining behaviors across only one demographic factor does not provide the most accurate information. For example, the findings in Table 11 suggest that females in this study were more likely to report all three risky sexual practices. But, as can be seen in Table 13, this finding is being carried by the higher number of Non African American females reporting all three behaviors. The African American females in this study reported the relatively levels of all three sexual risk behaviors. These results are somewhat contradictory to previous research that highlights African American females as a high-risk group for problem behaviors (CDC, 2008). One possible reason for these findings could be the types of measures used in this study (e.g., risky sexual practices, officially recorded delinquency, drug test results) compared to the measures used in other studies (e.g., STD infection, self-reported delinquency and substance use).

Also, the results in Table 12 suggest that Non African American participants were more likely to test marijuana positive. Yet, as displayed in Table 13, this finding is based on the large number of Non African American males that tested positive. A substantially

larger percentage of African American males tested marijuana positive, compared to Non African American females. Throughout this study, it has been suggested that both race and gender need to be taken into account when examining the structure of problem behavior syndrome among juvenile offenders. These findings underscore the importance of considering demographic characteristics and provide a level of support for the group-based SEM.

Separate CFA models. Next, four separate CFA models were analyzed to determine whether or not the overall model fit the data for each of the groups separately. The results for each of the four models are presented in Table 14. The data fit the model in three of the four groups. The residual variance for three groups was nonsignificant indicating that the observed indicators accounted for a significant amount of the variation in the latent factor (unexplained variance: AAF = 26%, NAAM = 24%, AAM = 13%). However, the results of the separate CFA for Non African American females revealed a questionable fit of the model to the data. In addition, the residual variance for Non African American females was significant; 37% of the variation in the latent factor was not explained by the observed variables in the CFA model for this subgroup.

In all four groups, the factor loadings for each of the four observed variables were positive and significant. But, two discrepancies in the strength of the relationships should be mentioned. Although significant, the strength of the relationship between marijuana test result and the latent factor for the African American males is not as strong, compared to the other three groups. Similarly, for the African American females, the significance of the relationship between the latent factor and arrest history is somewhat weaker, compared to the other three groups.

Table 14. *Separate CFA Models for Each of the Four Demographic Subgroups*

	Estimate	S.E.	Critical Ratio
<i>Non African American Females (n = 223)</i>			
<u>F1 by:</u>			
Sex Risk	1.000	0.000	--
Marijuana	0.891**	0.266	3.343
Cocaine	1.428**	0.359	3.978
Arrest History	0.833**	0.253	3.296
<u>Residual Variance:</u>			
F1	0.371**	0.133	2.798
$\chi^2 = 6.959, p = 0.00; CFI = 0.924; TLI = 0.810; RMSEA = 0.105; WRMR = 0.475$			
<i>African American Females (n = 219)</i>			
<u>F1 by:</u>			
Sex Risk	1.000	0.000	--
Marijuana	1.593**	0.739	2.154
Cocaine	1.644**	0.400	4.100
Arrest History	0.569*	0.263	2.163
<u>Residual Variance:</u>			
F1	0.264	0.146	1.803
$\chi^2 = 0.708, p = 0.70; CFI = 1.000; TLI = 1.036; RMSEA = 0.000; WRMR = 0.173$			
<i>Non African American Males (n = 445)</i>			
<u>F1 by:</u>			
Sex Risk	1.000	0.000	--
Marijuana	1.258**	0.412	3.054
Cocaine	1.454**	0.442	3.290
Arrest History	0.982**	0.343	2.868
<u>Residual Variance:</u>			
F1	0.240	0.126	1.904
$\chi^2 = 0.513, p = 0.77; CFI = 1.000; TLI = 1.079; RMSEA = 0.000; WRMR = 0.142$			
<i>African American Males (n = 517)</i>			
Variable			
<u>F1 by:</u>			
Sex Risk	1.000	0.000	--
Marijuana	2.694*	1.220	2.209
Cocaine	1.638**	0.546	3.001
Arrest History	0.655*	0.286	2.289
<u>Residual Variance:</u>			
F1	0.131	0.076	1.716
$\chi^2 = 0.608, p = 0.74; CFI = 1.000; TLI = 1.081; RMSEA = 0.000; WRMR = 0.171$			

Overall, these preliminary CFA models suggest that the same latent factor is being measured in each of the four groups; however the factor structure for the Non

African American females may differ from the factor structure of the other three groups. These findings support further investigation of the comparison of the factor structure across these groups.

Unconstrained group-based CFA. The first model that was analyzed involves an unconstrained model in which the factor loadings and thresholds are free to vary across the groups, while the intercepts are held at zero. Results of this model indicated a good fit of the model to the data. The chi-square test of model fit was nonsignificant ($\chi^2 = 7.52, p = 0.48$), CFI and TLI were greater than 0.90 (CFI = 1.00, TLI = 1.01), RMSEA was low (0.000), and the WRMR was less than 0.90 (0.55). All of the factor loadings were significant ($p < .05$) and in the same direction across the four groups. Therefore, the next step in the analytic phase was to determine if allowing these parameters to vary across the groups is meaningful to the overall fit of the model to the data.

Constrained group-based CFA. The next step in the group-based analyses involved examining CFA measurement invariance. In the constrained CFA, the factor loadings and thresholds were held equal across the groups. The results of this model reveal a poor fit of the model to the data. The chi-square test of model fit was significant ($\chi^2 = 58.94, p = .0002$), CFI and TLI were less than 0.90 (CFI = 0.87, TLI = 0.89), and RMSEA and WRMR were high (RMSEA = 0.07, WRMR = 1.74). These results indicate that important difference(s) in the factor structure of the latent factor exist across the four groups.

The next step in the group-based modeling process was to review the modification indices to determine if allowing any of the model parameters to vary across the subgroups will improve the fit of the model. The modification indices provided two important

suggestions. The first suggestion involved freeing the factor loading for the African American males (MI = 15.043). Drawing from Table 13, it is clear that this group displays the largest proportion of youths with a high number of prior arrests (three or more arrests). The second suggestion involved freeing the threshold of the sexual risk index for Non African American females (MI = 15.943). Referring back to Table 13, it is also clear that this group represents a high-risk group for risky sexual behavior. Thus, these associations may be influencing the relationships between arrest history and the latent factor for African American males and risky sexual behavior and the latent factor for Non African American females.

Final group-based CFA. Based on the modification indices, the next, and final, CFA that was performed involved freeing the thresholds of the sexual risk index for the Non African American females, as well as freeing the factor loading of arrest history for the African American males. Results for this model are presented in Table 15. Overall, the model fit the data well ($\chi^2 = 26.95$, $p = 0.26$; CFI = 0.985; TLI = 0.986; RMSEA = 0.027; WRMR = 1.150). Significant differences in the factor mean across the four groups were revealed. As can be seen, the Non African American males served as the reference group. Thus, the African American males revealed a significantly higher factor mean, whereas the Non African American females revealed a significantly lower factor mean, compared to the Non African American males. However, there were no significant differences found in the factor mean for the Non African American males and the African American females.

Similar to the other three groups, the factor loading of arrest history for the African American males was significant. However, freeing the thresholds of the sexual

risk index for the Non African American females produced a nonsignificant association between the first and second thresholds and the latent factor. This finding indicates that important differences in the association between the extent of risky sexual practices (i.e., number of behaviors reported) and the latent factor exist for this subgroup. In contrast, all three sexual risk thresholds remained significant for the other three groups.

The last step in determining the best fitting CFA model was the chi-square difference test. This statistic compares the least restrictive model to a more restrictive model (Muthèn & Muthèn, 2007). Because the fully constrained model revealed a poor fit, it was not necessary to include this model in the chi-square difference test. Thus, this step involved comparing the unconstrained model to the model presented in Table 15. A significant p-value means the restriction worsens model fit. Results of the chi-square difference test indicated that the restricted model does not worsen the fit of the model ($\chi^2 = 20.27, p = 0.21$). Therefore, the final CFA model used in the SEM analyses is the model reported in Table 15.

Three implications can be drawn from these results. First, the differences in the values of the substance use factor loadings found in the unconstrained model do not reflect any meaningful differences in the structure of the latent factor. Constraining the factor loadings to be equal across the groups produced a better model fit. Secondly, although significant, freeing the factor loading for the African American males resulted in an improved model fit. Finally, allowing the thresholds for the sexual risk index to vary for the Non African American females also improved the fit of the model.

Table 15. *Final Group-based CFA*

	<u>Non AA Females (n = 223)</u>			<u>AA Females (n = 219)</u>			<u>Non AA Males (n = 445)</u>			<u>AA Males (n = 517)</u>		
	Estimate	S.E.	CR	Estimate	S.E.	CR	Estimate	S.E.	CR	Estimate	S.E.	CR
<u>F1 by:</u>												
Sex Risk	1.000	--	--	1.000	--	--	1.000	--	--	1.000	--	--
Marijuana	1.044**	0.251	4.159	1.044**	0.251	4.159	1.044**	0.251	4.159	1.044**	0.251	4.159
Cocaine	1.752**	0.329	5.332	1.752**	0.329	5.332	1.752**	0.329	5.332	1.752**	0.329	5.332
Arrest History	0.819**	0.206	3.974	0.819**	0.206	3.974	0.819**	0.206	3.974	2.066**	0.487	4.244
<u>Mean</u>												
F1	-0.623**	0.231	-2.698	-0.124	0.094	-1.317	0.000	--	--	0.202**	0.056	3.587
<u>Variance:</u>												
F1	0.602	0.322	1.868	0.125*	0.049	2.555	0.257**	0.085	3.974	0.025	0.014	1.817
<u>Thresholds:</u>												
Marijuana1	0.240**	0.064	3.748	0.240**	0.064	3.748	0.240**	0.064	3.748	0.240**	0.064	3.748
Cocaine1	1.347**	0.115	11.701	1.347**	0.115	11.701	1.347**	0.115	11.701	1.347**	0.115	11.701
Sex Risk1	-0.333	0.194	-1.718	0.217**	0.058	3.760	0.217**	0.058	3.760	0.217**	0.058	3.760
Sex Risk2	0.550	0.328	1.676	0.849**	0.083	10.283	0.849**	0.083	10.283	0.849**	0.083	10.283
Sex Risk3	1.368*	0.597	2.291	1.477**	0.130	11.397	1.477**	0.130	11.397	1.477**	0.130	11.397
Arrest History1	-0.150*	0.073	-2.072	-0.150*	0.073	-2.072	-0.150*	0.073	-2.072	-0.150*	0.073	-2.072
Arrest History2	0.290**	0.069	4.190	0.290**	0.069	4.190	0.290**	0.069	4.190	0.290**	0.069	4.190
Arrest History3	0.615**	0.075	8.236	0.615**	0.075	8.236	0.615**	0.075	8.236	0.615**	0.075	8.236
Arrest History4	0.851**	0.082	10.320	0.851**	0.082	10.320	0.851**	0.082	10.320	0.851**	0.082	10.320
Arrest History5	1.034**	0.092	11.260	1.034**	0.092	11.260	1.034**	0.092	11.260	1.034**	0.092	11.260
Arrest History6	1.217**	0.102	11.954	1.217**	0.102	11.954	1.217**	0.102	11.954	1.217**	0.102	11.954
Arrest History7	1.342**	0.109	12.274	1.342**	0.109	12.274	1.342**	0.109	12.274	1.342**	0.109	12.274

Model Fit Statistics: $\chi^2 = 26.95$, $p = 0.26$; CFI = 0.985; TLI = 0.986; RMSEA = 0.027; WRMR = 1.150.

Significance Levels: * $p < .05$; ** $p < .01$

Group-Based Structural Equation Model

The last set of bivariate analyses involved assessing the relationship between age and the observed variables across the four demographic subgroups. These results are presented in Table 16.

Table 16. *Bivariate Relationship between the observed indicators and age across the four demographic subgroups*

	Mean Age			
	Non AA Females (n = 223)	AA Females (n = 219)	Non AA Males (n = 445)	AA Males (n = 517)
Marijuana:				
Negative	15.36	14.95	15.54	15.04
Positive	15.80	15.85	15.97	15.81
	F(222) = 4.73*	F(218) = 5.87**	F (443) = 5.36**	F(515) = 35.80***
Cocaine:				
Negative	15.46	15.14	15.69	15.33
Positive	16.29	15.25	16.21	16.27
	F(222) = 4.88*	F(218) = 0.15	F(443) = 2.54	F(515) = 8.24**
Sex Risk Index:				
0	15.21	14.74	15.35	14.89
1	15.98	16.27	16.16	15.82
2	16.16	15.58	16.20	15.90
3	15.58	16.00	16.17	15.00
	F(222) = 5.39***	F(218) = 9.41***	F(443) = 9.69***	F(515) = 13.69***
Arrest History:				
0	15.31	15.11	15.63	15.18
1	15.68	15.05	15.73	15.44
2	15.69	15.14	16.00	15.09
3	15.78	15.67	15.93	15.27
4	16.00	15.38	15.24	15.68
5	16.38	14.67	15.88	15.16
6	15.00	14.83	16.50	16.00
7 or more	16.545	15.36	16.00	15.75
	F(222) = 1.94	F(218) = 0.32	F (443) = 1.45	F(515) = 2.18*

Significance Levels: * $p < .05$; ** $p < .01$; *** $p < .001$.

Some interesting associations emerged. For all four groups, a significant relationship between age and marijuana use, as well as age and risky sexual behavior, was revealed. However, a significant association between age and cocaine use was found

for African American males and Non African American females. On average, cocaine positive youths in these two groups were significantly older than cocaine negative youths. Last, the only group to reveal a significant association between age and arrest history was African American males. African American males with a higher number of prior arrests tended to be older than African American males with a low number of prior arrests. These bivariate analyses underscore the importance of considering the effect that age has on problem behavior, as well as highlight marked variation in the effect that age has on these behaviors across the demographic subgroups. Thus, these findings support the inclusion of the direct effect of age on the final CFA model reported in Table 15.

The results of the final group-based SEM are presented in Table 17. As can be seen, the model fit the data. Both CFI and TLI were greater than the cut-off level of 0.90 (CFI = 0.986, TLI = 0.970). The RMSEA (.034) was acceptable; WRMR (1.134) was somewhat high.¹² The chi-square test of model fit ($\chi^2 = 21.68, p = 0.20$) was nonsignificant at the .05 level.

The factor loadings for each of the observed variables were positive and highly significant, except for the free factor loading of arrest history for African American males, which remained significant, although not as strong ($b_{\text{stdYX}} = 0.329$). This finding suggests that, compared to the other three groups, the relationship between number of prior arrests and the latent factor is not as strong for newly arrested African American males. Importantly, all three sexual risk freed thresholds for the Non African American females revealed nonsignificant effects, whereas all three sexual risk thresholds for the

¹² Muthèn & Muthèn (2002) indicate that WRMR is highly sensitive to sample size and can produce unreliable estimates. They suggest that, if all other fit indices are satisfactory based on the recommendation by Hu & Bentler (1999), then the fit of the model is appropriate.

other three groups were highly significant ($p < .001$). This finding indicates that the relationship between the response categories for the sexual risk index for Non African American females is different than the other three groups. The number of risky sexual behaviors reported did not influence the strength of the relationship between risky sexual behavior and the latent factor for newly arrested Non African American females.

The effect of age on the latent factor was significant in all four groups. As age increased, so did the covariation among the risky sexual behavior index, marijuana and cocaine test result, and arrest history for all four of the demographic subgroups. However, as can be seen in Table 16, the effect of age on the latent factor was somewhat stronger for the Non African American males, compared to the other groups. These findings are important because it suggests that early intervention efforts targeted at problem behavior syndrome may be more appropriate for certain demographic subgroups and either less or ineffective for other demographic subgroups. Interestingly, the significant differences in the factor means found in Table 15 disappeared in the group-based SEM. Thus, the introduction of age into the model accounted for differences in the average level of the latent factor across the four groups. This finding provides additional support for the importance of accounting for age when examining the latent factor.

The residual variances reported in Table 17 also reveal some important findings. For Non African American males, there is a significant amount of variance in the latent factor that is not accounted for by the risky sexual behavior index, marijuana and cocaine test result, and arrest history. This suggests that additional behaviors are important to fully understanding problem behavior syndrome for this subgroup. Conversely, the

residual variance is nonsignificant for the other three groups, which means that, for these three groups, a large amount of the variance in the latent factor is explained by the observed variables.

Across the four groups, the amount of variation in each of the four observed variables that is explained by the latent factor ranged from a low 9% (arrest history for African American females to a high 75% (cocaine test result for Non African American females). These values are similar to the results of prior studies involving juvenile offenders that reveal a wide range of explained variance across the observed variables (Dembo et al., 1992; LeBlanc & Girard, 1997). One important finding, however, is the difference in the amount of explained variation across the four groups. For example, for both female groups, a substantial portion of the variation in cocaine use was explained by the latent factor (70-75%). However, a somewhat smaller portion of cocaine use was explained for the male groups (50-51% for both male groups). For both African American groups, the latent factor explained over 55% of the variation in marijuana use, however, only 24% and 33% of the variation in marijuana use was explained by the latent factor for Non African American females and males, respectively.

Freeing the sexual risk index thresholds for the Non African American females and the arrest history factor loading for African American males also provides support for differences in the structure of the latent factor across the demographic subgroups. Although arrest history remained significant for all four of the groups, the size of the coefficient for the African American males was somewhat smaller, indicating that the association among the latent factor and arrest history was not as strong for African

American males, compared to the other three groups. Due to the substantially higher proportion of African American males with a large number of prior arrests, this finding is not surprising. Once the sexual risk thresholds for the Non African American females were freed, they all became nonsignificant. However, all three of the sexual risk thresholds for the other three groups were significant ($p < .01$). Accordingly, the number of risky sexual practices that a Non African American female engages in is not related to the latent factor.

Taken as a whole, these findings indicate that, although the overall fit of the model is similar across groups, the association between the latent factor and each observed variable is somewhat different across the groups. The next, and final, chapter discusses the implications of these results, as well as the limitations of the current study and directions for future research.

Table 17. *Group-based Structural Equation Model*

	<u>Non AA Females</u>			<u>AA Females</u>			<u>Non AA Males</u>			<u>AA Males</u>		
	Estimate	S.E.	CR	Estimate	S.E.	CR	Estimate	S.E.	CR	Estimate	S.E.	CR
<u>F1 by:</u>												
Sex Risk	1.000	--	--	1.000	--	--	1.000	--	--	1.000	--	--
Marijuana	0.942**	0.239	3.941	0.942**	0.239	3.941	0.942**	0.239	3.941	0.942**	0.239	3.941
Cocaine	1.166**	0.308	3.781	1.166**	0.308	3.781	1.166**	0.308	3.781	1.166**	0.308	3.781
Arrest History	0.685**	0.180	3.796	0.685**	0.180	3.796	0.685**	0.180	3.796	0.698*	0.226	2.622
<u>Mean</u>												
F1	-3.602	2.532	-1.423	0.484	1.446	0.334	0.000	--	--	0.578	1.191	0.485
<u>Residual Variance</u>												
F1	0.608	0.429	1.417	0.182	0.144	1.261	0.345**	0.118	2.921	0.119	0.085	1.404
<u>Thresholds:</u>												
Marijuana1	2.405**	0.801	3.033	2.405**	0.801	3.033	2.405**	0.801	3.033	2.405**	0.801	3.033
Cocaine1	3.081**	1.159	2.658	3.081**	1.159	2.658	3.081**	1.159	2.658	3.081**	1.159	2.658
Sex Risk1	1.246	1.747	0.713	3.868**	0.848	4.564	3.868**	0.848	4.564	3.868**	0.848	4.564
Sex Risk2	2.305	1.791	1.287	4.715**	0.922	5.115	4.715**	0.922	5.115	4.715**	0.922	5.115
Sex Risk3	3.163	1.896	1.668	5.466**	1.025	5.334	5.466**	1.025	5.334	5.466**	1.025	5.334
Arrest History1	0.833	0.751	1.109	0.833	0.751	1.109	0.833	0.751	1.109	0.833	0.751	1.109
Arrest History2	1.268	0.745	1.703	1.268	0.745	1.703	1.268	0.745	1.703	1.268	0.745	1.703
Arrest History3	1.605*	0.748	2.146	1.605*	0.748	2.146	1.605*	0.748	2.146	1.605*	0.748	2.146
Arrest History4	1.842*	0.754	2.443	1.842*	0.754	2.443	1.842*	0.754	2.443	1.842*	0.754	2.443
Arrest History5	2.028*	0.764	2.655	2.028*	0.764	2.655	2.028*	0.764	2.655	2.028*	0.764	2.655
Arrest History6	2.202**	0.774	2.847	2.202**	0.774	2.847	2.202**	0.774	2.847	2.202**	0.774	2.847
Arrest History7	2.328**	0.782	2.978	2.328**	0.782	2.978	2.328**	0.782	2.978	2.328**	0.782	2.978
<u>F1 on:</u>												
Age	0.284*	0.117	2.426	0.122*	0.055	2.209	0.160**	0.048	3.375	0.133*	0.053	2.523
<u>R-Square:</u>												
Sex Risk	0.404			0.446			0.377			0.239		
MJ	0.238			0.581			0.336			0.549		
Coc	0.702			0.747			0.504			0.511		
Arrest History	0.329			0.087			0.181			0.108		

Model Fit Statistics: $\chi^2 = 21.68$, $p = 0.20$; CFI = 0.986; TLI = 0.970; RMSEA = 0.034; WRMR = 1.134.

Chapter 9

Discussion and Conclusion

A wealth of previous research has indicated that engaging in a number of different problem behaviors forms a unidimensional construct commonly referred to as problem behavior syndrome (Dembo et al., 1992; Jessor & Jessor, 1979; LeBlanc & Bouthillier, 2003; Welte et al., 2004). However, three limitations of this body of research have inhibited our understanding of the nature of this concept across different populations. These limitations include the reliance on community or incarcerated samples, a lack of information regarding variation in the strength of the association among problem behaviors across important individual-level factors, and the use of standard factor analytic techniques. This study sought to overcome these limitations by assessing the covariation among risky sexual practices, marijuana and cocaine use, and criminal history among newly arrested juvenile offenders, as well as examining differences in the covariation among these behaviors across demographic subgroups. Specifically, three main objectives guided this study: 1) to determine whether risky sexual behavior, marijuana and cocaine test result, and criminal history form a unidimensional latent construct reflective of problem behavior syndrome among a sample of newly arrested juvenile offenders, 2) to examine the direct effect of age on the latent factor, and 3) to identify differences in the factor structure, as well as the effect of age on the latent factor,

across four demographic subgroups (African American females, Non African American females, African American males, and Non African American males).

The findings of this study provide support for all three objectives. Confirmatory factor analysis, using the full sample of newly arrested adolescents, provided moderate support for the first research question. The model fit indices indicated that risky sexual behavior, marijuana and cocaine use, and criminal history do form a unidimensional latent factor with significant item-factor relations. However, referring to the standardized loadings, as well as the r-square values, it is clear that the latent factor was a better predictor of substance use, compared to risky sexual practices and arrest history. This finding suggests that, although the latent factor represents a unidimensional construct, the interrelationships involved in the dimensionality are somewhat different.

The structural equation model introducing the direct effect of age onto the latent factor revealed a positive and significant effect of age. This finding suggests that, across the entire sample of newly arrested adolescents, the relationship between age and the latent factor was stronger for older adolescents involved in the study. Hence, the second research objective was also supported.

Then, a number of group-based modeling techniques were performed to assess the variation in the structure of the latent factor across the four demographic subgroups. A fully constrained model did not fit the data well. This means that the latent factor was not completely invariant across the four groups. Rather, the best fitting model involved partial invariance, indicating that although the factor structure was somewhat similar across the four groups, there were also important differences across the groups.

One important difference found in this study was in regard to the relationship between arrest history and the latent factor for African American males. Freeing the arrest history factor loading for this subgroup improved the fit of the model, which signifies differences in the relationship between arrest history and the latent factor for this group, compared to the other three groups. Although the arrest history factor loading remained significant, the value of the critical ratio, as well as the standardized estimate, suggested that the association between arrest history and the latent factor was not as strong for African American males. Referring back to Table 13, it is clear that a disproportionate number of African American males had a high number of arrests. Because getting arrested is somewhat more common among this group, it is possible that this behavior is not as strong of an indicator of additional behavioral problems, compared to the other three groups. In addition, as can be seen in Table 15, the latent factor only accounted for 11% of the variation in arrest history for this age group. Thus, for African American males, number of prior arrests may not be a critical component of problem behavior syndrome as it is for the other three groups.

Another important difference found in this study was related to the relationship between risky sexual practices and the latent factor. Results indicated that freeing all three sexual risk thresholds for the Non African American females further improved the fit of the model to the data. Once the thresholds were freed for this group, they became nonsignificant, yet the thresholds for the other three groups remained significant ($p < .001$). It is important to note that, although the thresholds were nonsignificant, the sexual risk factor loading remained significant. This means that, the overall strength of the association between risky sexual practices and the latent factor was similar across the

four groups; however, for Non African American females, the specific number of risky sexual practices reported did not influence this association. Thus, for the Non African American females included in this sample, distinguishing between those who reported one versus three risky sexual practices did not influence the strength of the relationship between the sexual behavior index and the latent factor. Alternatively, the number of risky sexual practices reported by participants in the other three groups did influence this relationship.

This study sought to explore the issue of relatively low levels of explained variance reported in previous studies. In particular, it was argued that the low levels of explained variation could be a result of the failure to account for group differences in the associations among the observed variables and the latent factor. The findings of this study provide a measure of support for this argument. Similar to a number of previous studies examining problem behavior syndrome (see LeBlanc & Bouthillier, 2003 for a review), the overall SEM model using the entire sample (Table 10) revealed a significant factor variance. But, the results of the group-based SEM highlighted important variation in the ability of the observed variables to explain the latent factor which supports the need to examine the factor across subgroups nested within a sample. Specifically, non African American males were the only group for which there was a significant amount of variation that was not accounted for by the four observed variables. That is, risky sexual practices, marijuana and cocaine test result, and arrest history explained a substantial proportion of the variation in the latent factor for African American females, African American males, and Non African American females. Yet, it seems that for Non African American males, additional problem behaviors are important in explaining variation in

problem behavior syndrome. Thus, in order to fully understand problem behavior syndrome among this demographic subgroup, future research is needed to identify which additional problem behaviors are important components of the syndrome.

Subgroup differences in the amount of variation in each of the problem behaviors accounted for by the latent factor were also revealed. For instance, the r-square values found in the current study ranged from 0.24 to 0.45 for risky sexual practices, 0.24 to 0.58 for marijuana test result, 0.50 to 0.75 for cocaine test result, and 0.09 to 0.33 for arrest history. Across the groups, the latent factor explained a greater proportion of variation in cocaine use and risky sexual practices for females, compared to males. However, compared to the Non African American subgroups, the latent factor accounted for a greater proportion of variation in marijuana use for both African American groups. Furthermore, the latent factor explained the largest amount of variation in both substance use measures for the African American females; however this group displayed the lowest levels of explained variation in arrest history. These differences suggest that examining levels of explained variance based on entire samples has the potential to significantly inhibit a true representation of the latent factor-observed variable relationship that is specific to each particular subgroup. Overall, the differences revealed in this study provide moderate support for the third research question. As a result, several implications can be drawn from these results.

Implications of the Results

Indeed, the findings of this study coincide with the large body of research that suggests that engaging in multiple problem behaviors forms a unidimensional construct reflective of problem behavior syndrome (for a review, see LeBlanc & Bouthillier, 2003).

Taken together, this body of research warrants the attention of current prevention and intervention strategies that continue to target a single problem behavior. Presently, intervention strategies that focus on reducing a single problem behavior are the norm in most juvenile justice systems across the country (OJJDP, 2008). It is crucial that these programs involve a comprehensive strategy that targets all three behaviors in an integrated fashion. Not only should these programs begin to target multiple behaviors, but more importantly, they should focus on the ways in which one problem behavior is related to another.

Furthermore, the strong relationship between the latent factor and the substance use measures found in the overall model suggests that intervention programs that target adolescent substance use may be particularly effective in reducing additional problem behaviors. For example, one component of many substance abuse prevention programs is to educate youth on the negative consequences of using substances. It is widely acknowledged that adolescent offenders are more likely to engage in risky sexual practices while using substances and substance-using adolescent offenders are disproportionately more likely to test STD positive (DiClemente et al., 1991; Teplin et al., 2005; Tolou-Shams et al., 2007). Therefore, substance use prevention programs represent an effective avenue to provide at-risk youth with lessons on sexual responsibility, as well as to target the association between risky sexual behavior and substance use.

On one hand, the invariance of the model parameters for marijuana and cocaine test results highlight important similarities in the treatment needs of newly arrested juvenile offenders. For all four demographic subgroups, the strength of the association

between substance use and the latent factor was very similar. Thus, these results indicate that identifying substance-using offenders who most likely manifest problem behavior syndrome based on racial and gender characteristics may not prove to be effective. On the other hand, the weaker (but still significant) relationship between arrest history and the latent factor for the African American males suggests that delinquent behavior may not be as much of an indicator of problem behavior syndrome for this group compared to the other three groups. Two plausible explanations for this finding exist. First, the disproportionate number of study participants who had a high number of arrests suggests that juvenile delinquency is more severe among this subgroup. Therefore, serious criminal involvement may not represent the same risk for engaging in additional problem behaviors. That is, if engaging in delinquent behavior is considered “less deviant” behavior for this group of adolescents, then it may be that the association between juvenile delinquency and additional behaviors that are considered “problemated” is not as strong, in turn, reducing the association between arrest history and problem behavior syndrome. The second possible explanation is related to the reliance on officially recorded juvenile delinquency. It is widely argued that racial bias exists in the arrest procedures of juvenile offenders (Lieber, 2003; OJJDP, 1999). Thus, because of the use of officially record delinquency, delinquency measured in this study may not necessarily be “more normative” behavior for this subgroup, but rather an indicator of bias in arrest procedures. Unfortunately, this study was unable to examine self-reported juvenile delinquency. Future research is needed to tease out the differences in the association between delinquent behavior and problem behavior syndrome based on different

measurement strategies, as well as to determine if the findings of this study can be replicated using self-reported delinquency.

The nonsignificant sexual risk thresholds for the Non African American females also provide suggestions for the identification of treatment needs. Whether a Non African American female reported one or three sexual risk-taking behaviors did not influence the relationship between the risky sexual behavior index and the latent factor. For this subgroup, what is important is whether or not she engaged in the behavior at all. Risk of problem behavior syndrome was similar across the extent to which a Non African American female was involved in risky sexual practices. Based on these results, level of risky sexual behavior may not be an effective tool for identifying Non African American females most likely to display problem behavior syndrome. However, the extent of engagement in risky sexual practices seems to be an appropriate tool for identifying youth who manifest problem behavior syndrome for the other three groups. For Non African American females, initiation of risk-taking sexual behavior may be a more appropriate indicator of the syndrome.

The concept of relative deviance may at least partially explain the subgroup differences found in this study (Dembo & Shern, 1982; Kaufman, 1978). According to this view, persons who are more deviant from the norms of their social and cultural setting tend to exhibit more serious behavior problems. As mentioned earlier, because being arrested was more common among the African American males in this study, it is likely that this behavior is considered more normative to the cultural and social surrounding of these adolescents, in turn, reducing the strength of its relationship with more serious problem behaviors. At the same time, relative deviance could also account

for the differences in the association between risky sexual practices and the latent factor. There are important gender differences in the cultural expectations of sexual behavior during adolescence. It is substantially more common for young men to talk or boast about their sexual encounters, and less likely that they will be judged, ridiculed, or scolded for engaging in these behaviors, compared to their female counterparts. Furthermore, it is well established that African American female adolescents are more likely to experience teenage pregnancy, as well as test STD positive (CDC, 2008), compared to the other three groups. Thus, engaging in risky sexual practices for Non African American females may be somewhat “more deviant” compared to the other three groups. This would explain the finding that, whether or not a Non African American female engaged in risky sexual practices, not the level of engagement, was related to problem behavior syndrome. For this subgroup of study participants, even minimal involvement in risky sexual practices is a sign of more serious problem behaviors.

Finally, the significant effect of age on the latent factor across the four groups, as well as the disappearance of the significant factor mean differences (found in Table 15) once age was included in the model, underscores the importance of early intervention for at-risk adolescents. The strongest effect of age on the latent factor was found among the African American males. For example, the standardized estimate for the effect of age on the latent factor ranged from 0.36 to 0.44 for the other three groups ($p < .05$), however the standardized estimate for the effect of age on the latent factor was nearly 0.60 for the African American males ($p < .01$). Thus, it appears that early prevention strategies may be particularly effective for this subgroup of adolescents. Based on a review of effective intervention strategies, Farrington and Welsh (2006) recommend that early intervention

should 1) begin in the early years of a child's life, by early adolescence, 2) intervene before the onset of misbehavior, and 3) target children who are identified as being at-risk for behavioral problems. The findings of this study support these recommendations, as well as represent a preliminary step in determining which subgroups of adolescents (i.e., African American males) would benefit the most from early intervention efforts.

In summary, important subgroup differences in the intervention needs of adolescent offenders were revealed in this study. A wealth of empirical evidence suggests that intervention programs that are specifically tailored and delivered to a particular subgroup of adolescents are the most successful in decreasing high-risk behaviors (e.g., Non African American females) (DiClemente et al., 2004; Jemmott, Jemmott, & Fong, 1998; Orr, Langefeld, Katz, & Caine, 1996; St. Lawrence, Brasfield, Jefferson, Alleyne, & O'Bannon, 1995). The reason for the effectiveness of tailored intervention programs stems from the acknowledgement that “adolescents are not a homogeneous population; rather, adolescents are a heterogeneous mosaic of subgroups of different ethnicities/cultures, behavioral risk characteristics, developmental levels, sexual preferences, and gender differences” (DiClemente et al., 2008:600). Thus, adapting prevention and intervention strategies to meet the developmental and social needs of each particular subgroup of adolescents at risk for problem behavior syndrome is the most effective intervention strategy. Accordingly, if the subgroup differences in the intervention needs of newly arrested adolescent offenders implied by the findings in this study are replicated in other jurisdictions, these differences cannot be ignored.

In addition, the findings of this study also carry important theoretical implications. A number of well-known criminological theories claim to be “general”

theories because they are able to explain a wide range of deviant behaviors including risky sexual practices, substance use, and delinquency. For example, Gottfredson and Hirschi (1990) argue that low self-control is the cause of delinquent, as well as analogous, behaviors. They maintain that differences in these behaviors across individual characteristics (e.g., race or gender) are the product of differences in low self-control (Nakhaie, Silverman, & LaGrange, 1999). Another example is social learning theory. Akers (1985) argues that an adolescent learns to engage in all forms of deviant behavior in the course of interactions with significant others, through a process of imitation, reinforcement, and exposure to definitions that support deviant behavior. According to this perspective, any differences in deviant behavior (e.g., racial or gender differences) are the result of differences in the direction of the learning process.

The strong association found among these behaviors supports the notion that a common set of risk factors may be causing all three forms of problem behavior; hence, providing preliminary support for a “general” cause of several forms of deviant behavior. Unfortunately, data limitations prohibited the theoretical examination of the cause(s) of problem behavior syndrome in the current study. Future research is needed to examine the ability of these general theories to predict the latent factor, as well as determine if the relationship between the theoretical constructs and the latent factor is consistent across the demographic subgroups. If, in fact, one or more of these general criminological theories is able to predict problem behavior syndrome across the four demographic subgroups then the claim of being a “general” theory will be upheld.

Limitations

The use of already collected data limited the measurement of key variables used in the current study. For example, asking participants about previous delinquent behavior was beyond the goals of the original research project. Alternatively, this study operationalized delinquent behavior with officially recorded arrests. As a result, the measure of delinquent behavior used in this study only captures behaviors for which the participant was actually caught and apprehended. It is well established that self-reported delinquency is much higher than officially recorded delinquency (Elliott & Ageton, 1980; Farrington, 1985; Farrington, Jolliffe, & Hawkins, 2003; Hindelang, Hirschi, & Weis, 1981). In addition, it is commonly argued that officially recorded delinquency is influenced by the bias that exists in the juvenile justice system (Lieber, 2003). Based on these shortcomings, the validity of relying on officially recorded arrests, as a measure of juvenile delinquency, is questionable. On the other hand, relying on officially recorded delinquency guards against problems associated with self-report measures including differences in recall, willingness to report, and/or participation levels.

In addition, although using biological data measures of substance use overcomes issues related to inaccurate self-reported information (noted above), it also has its shortcomings. For example, the short time period for which drug use is detectable in urine is one important limitation to relying on drug test results as a measure of substance use. For heavy users, marijuana only stays in a youth's system for approximately 20 days and cocaine remains in the system for less than four days (Dembo et al., 1999). Therefore, the drug tests were only able to capture recent or current drug use, which limited the number of drug users in the sample. Relying on self-reported data would have

allowed for an extension in the observation time frame for drug use (e.g., past year use), which in turn, could have increased the number of drug users included in the sample.

On the other hand, the risky sexual behavior measures used in this study were based on self-reports. Obtaining valid information regarding these items is particularly daunting because the empirical investigation of such a personal and often nonpublic, nondisclosed behavior is logistically complicated (DiClemente et al., 2008). Because engaging in sexual behavior, particularly unsafe sexual behavior, is considered a private matter, the participants involved in this study may not have felt comfortable fully disclosing their sexual history to intake screeners whom they have never met before. Therefore, underreporting of this behavior at the assessment center is quite likely.

Another issue related to relying on self-reported sexual practices is the potential for subgroup differences in the willingness to report their behavior. Research suggests that African Americans and females are less likely to be honest about their behavior (Rosay, Najaka, & Herz, 2007). Furthermore, as stated above, female adolescents are subjected to a greater level of ridicule and judgment for engaging in risky sexual practices, which may have led the females in this study to underreport their sexual history. Such differential tendency in the willingness to report behavior may also have influenced the findings. Unfortunately, asking adolescents about their sexual practices is the only plausible means of obtaining this information. Given that the items used to measure risky sexual practices used in this study are similar to measures used in previous studies on adolescent offenders (e.g., Teplin et al., 2003), it is likely that these problems are consistent across studies examining risky sexual behavior. Also, the dichotomous nature of the sexual risk items limited our ability to examine the severity of involvement

in sexual-risk taking. Future research should attempt to examine problem behavior syndrome by including improved measures for this behavior.

The failure to include ethnicity as an additional demographic factor was also a limitation to the current study. As a result of the data collection procedures, as well as HIPPA safeguards prohibiting the research team to see any confidential information, the participant's ethnicity was unable to be collected in a valid manner. For example, descriptive analysis indicated that less than 10% of the final sample was Hispanic. Given that over 26% of the population between the ages of 10 and 17 in Hillsborough County is Hispanic, the proportion of study participants identified as Hispanic did not seem representative (US Census Bureau, 2008).

Research does indicate that Hispanic adolescents represent a high-risk group for risky sexual practices, substance use, and delinquent behavior (Crepaz et al., 2007; Herbst et al., 2007; Loue, 2006; Ramisetty-Mikler et al., 2004). Therefore, in addition to examining racial and gender differences in problem behavior syndrome, it is also important to identify ethnic differences. It has been suggested that Hispanic adolescents experience a different socialization process, due to ethnic differences in cultural values and expectations, family relations, and socio-economic factors, compared to white and African American adolescents (Marin, 1989; Pan & Farrell, 2006; McLoyd, Cauce, Takeuchi, & Wilson, 2004; Saint-Jean & Crandall, 2004). These differences are likely to lead to differences in the development and structure of problem behavior syndrome. Thus, future research would benefit from further disaggregating the demographic subgroups examined in this study by race, gender, and ethnicity.

Another important limitation to the current study is the inconsistency in the time frame included in the measurement of the observed behaviors. For example, officially recorded delinquency encompasses delinquent behavior across the youths' lifespan. Similarly, the risky sexual practice items asked respondents if they had "ever" engaged in the behavior, again, referring to lifetime behavior. Yet, relying on drug test results to measure substance use only includes recent or current use. Therefore, it is uncertain whether or not the youths involved in this study were *simultaneously* engaging in these behaviors. Furthermore, because the arrest history and risky sexual practice items measure lifetime participation, the meaningfulness of the significant effect of age on the latent factor is also questionable. It was determined that older study participants were engaging in the four problem behaviors at a substantially higher rate than younger study participants. On one hand, this signifies an important direct effect of age. On the other hand, however, it is also possible that the older adolescents had more time to engage in such behaviors. This possibility is important to understanding the relationship between problem behavior syndrome and age. Future research is needed to tease out these possibilities and to understand the relative effect of age on the latent factor across different developmental time periods.

Moreover, the data were collected at one site, which limits the generalizability of these results. There is a need to determine if the findings obtained in this study can be replicated in centralized intake centers in other locations, serving different populations of juvenile arrestees. Last, the data were cross-sectional which prohibited the examination of the temporal sequencing of involvement in each of the problem behaviors. Thus, the analyses in this study focused only on the strength and direction of the association among

the problem behaviors; no causal statements about any of the relationships can be made (Cook & Campbell, 1979). Despite these limitations, this study contributes to the existing body of literature on adolescent problem behaviors in two important ways.

Contributions to the Literature

This study adds to the existing research on problem behavior syndrome because the findings are based on newly arrested juvenile offenders. Prior research has focused on either general adolescent samples or incarcerated samples, which represents two ends of the “juvenile offender continuum.” Thus, the generalizability of the findings of prior studies to the entire juvenile offending population is not possible. By supporting the first research objective (i.e., unidimensional latent factor), using a sample of newly arrested offenders that involved first time offenders to more serious, chronic offenders, this study strengthens the evidence in support of problem behavior syndrome among adolescent offenders as a whole.

More importantly, this study also provides preliminary information on the similarities and differences in the intervention needs of newly arrested adolescent offenders who are at the front-end of the juvenile justice system. Because intake centers represent the front-end of the juvenile justice system, all or most juvenile offenders experience the intake phase of the juvenile justice system process. Intervention efforts targeted at problem behavior syndrome at this phase of the juvenile justice process may prove to be more effective than services at the back-end of the system where only a small portion of adolescents, who are typically the most serious offenders, end up. A wealth of research has indicated that serious juvenile offenders are the most resistant to intervention strategies (Welsh, 2005). Therefore, intake screening centers provide a great avenue for

the screening and assessment of a large, diverse number of youths who may be more responsive to intervention strategies targeted at problem behavior syndrome.

Also, a major limitation of previous problem behavior research concerned the use of standard factor analytic techniques that examine the study sample as a whole. Relying on such general analytic strategies inhibited our understanding of the structure of problem behavior syndrome across important individual level characteristics. Such group-specific information is critical to obtaining a complete understanding of the syndrome. This study overcame this limitation by using group-based factor analytic techniques that identified similarities and differences in the structure of problem behavior syndrome across four demographic subgroups. Given the consistent individual-level differences in problem behaviors revealed in previous studies, in addition to the differences found in this study, group-based modeling seems to be a more appropriate technique for obtaining an accurate understanding of problem behavior syndrome. Widaman and Reise (1997:316) point out that, when there is evidence to suggest that groups within the population exist for whom the indicator variables are differentially related to the latent variable, group-based CFA and/or SEM techniques provide “an adaptable and powerful set of tools for investigating similarities and differences across groups in measurement structures.” Accordingly, it is my hope that future researchers will begin to utilize this group-based approach when studying problem behavior syndrome. In addition to the continued use of group-based modeling, this study also lays the groundwork for a number of additional areas for future research on group differences in problem behavior syndrome.

Directions for Future Research

First, it is important to include additional problem behaviors in an assessment of problem behavior syndrome. Although an acceptable (i.e., nonsignificant) amount of the variation in the latent factor was explained by risky sexual practices, substance use, and arrest history in three of the four groups, still 20% or more was unexplained (depending on the group). Thus, future research should strive to identify which additional problem behaviors are related to these three risk-taking behaviors. Alcohol use, cigarette smoking, skipping school, gambling, reckless driving, bullying, and/or suicidal behavior are some examples of behaviors that have been found to be components of problem behavior syndrome (Gottfredson, 2001; Junger et al., 1995; LeBlanc & Bouthillier, 2003; Welte et al., 2004; White, 1992). Furthermore, it is quite possible that different problem behaviors may be important to different subgroups of adolescent offenders. Therefore, the inclusion of these behaviors may improve the ability to explain the latent factor, as well as provide further insight into group differences of problem behavior syndrome.

In addition to considering the relative importance of including additional problem behaviors, future research should also strive to validate the unidimensionality of problem behavior syndrome by comparing the fit of the model that hypothesizes unidimensionality to alternative models that hypothesize two or more dimensions. Previous studies, although few in number, have found a two-factor (Hemphill et al., 2007; White & Labouvie, 1994) or three-factor solution (Gillmore et al., 1992) fits the data better than a one factor solution when examining problem behaviors among the general adolescent population. Given the small number of problem behaviors included in this study, the examination of a multiple-factor model was not practical. The findings of

this study do support a unidimensional construct. However, the stronger relationship found between the latent factor and both substance use measures (i.e., standardized loadings and r-square values), compared to the relationship between the latent factor and risky sexual practices and the latent factor and criminal involvement, yield a measure of skepticism regarding the validity of unidimensionality. Thus, not only is it important to identify additional problem behaviors that contribute to problem behavior syndrome, it is also important to validate the unidimensionality of the construct using a greater number of problem behaviors. Compared to previous studies on community samples of adolescents, the number of behaviors used in this study was relatively low. On average, about five to eight problem behaviors have been included in the latent factor model (LeBlanc & Bouthillier, 2003). Regardless, the findings of this study supplement the findings of previous studies revealing a unidimensional construct.

Also, contemporary criminological research has provided evidence of a variety of offender types. This body of research involves the longitudinal examination of offending levels (Fergusson, Horwood, Nagin, 2000; Moffitt, 1993; Nagin & Land, 1993; Patterson & Yoerger, 1993; Piquero, Brezina, & Turner, 2005; Sampson & Laub, 2003) as well as the identification of subgroups based on type of offending (Brame, Mulvey, & Piquero, 2001; Farrington et al., 1988; Francis, Soothill, & Fligelstone, 2004; Mazerolle, Brame, Paternoster, Piquero, & Dean, 2000; Piquero, Paternoster, Mazerolle, Brame, & Dean, 1999). More recently, additional studies have identified different subgroups of individuals based on a variety of deviant behaviors including criminal behavior and drug use (Dembo & Schmeidler, 2002; Massoglia, 2006). The bulk of these studies suggest that the offending population is characterized by distinctive subgroups based on the

frequency and/or continuity of engaging in these behaviors. Studies that have supported the notion of distinct subtypes of offenders indicate that anywhere from two (Moffit, 1993; Roeder, Lynch, & Nagin, 1999) to seven (Bushway, Thornberry, & Krohn, 2003) subgroups characterize the criminal population.

Drawing on this work, it seems plausible that different subgroups of juvenile offenders exist based on their involvement in a variety of problem behaviors. On one hand, the co-occurrence of problem behaviors is extremely prevalent among juvenile offenders, but on the other hand, it is also clear that not all juvenile offenders engage in risky sexual behavior and/or substance use. Accordingly, the possibility of the existence of different subgroups based on their involvement in these behaviors seems warranted. For example, it may be that a portion of juvenile offenders is frequently engaging in delinquent behavior, risky sexual behavior, and serious drug use. However, it is also possible that some juvenile offenders are engaging in risky sexual behavior, but not substance use, and vice versa. Thus, it is possible that different types and/or levels of problem behavior syndrome exist among adolescent offenders.

Latent class analysis provides the opportunity to examine whether these variations in problem behavior syndrome exist. Briefly, latent class analysis distinguishes between different patterns of covariation found in a single dataset and identifies subgroups based on these different patterns (McCutcheon, 1987). Thus, this method of analysis accounts for the variation in the strength of the associations found among the different forms of deviant behaviors and identifies different “classes” based on this variation. The important distinction between factor analytic techniques and latent classes analyses lies in the scaling of the latent variable (Muthèn, 2006). Factor analysis relies on continuous

latent variables and is used to examine underlying dimensions by explaining patterns of association among observed indicators. Latent class analysis, on the other hand, uses categorical latent variables to identify homogenous groups of individuals. The identification of subgroups of offenders based on different patterns of association among the problem behaviors also has important intervention implications. By identifying “classes” based on different patterns of covariation, we can then seek to identify important risk factors for membership into each group and create services designed to target the varying interrelationships among the problem behaviors specific to each subgroup.

The use of longitudinal data will also enhance our knowledge of problem behavior syndrome by allowing the examination of temporal ordering. Studies that include a diverse sample of elementary-aged children and follow them through early adulthood will be able to examine both the development and continuity of the syndrome. Identifying which problem behaviors tend to precede other problem behaviors will facilitate the identification of youths most at risk for the development of the syndrome. That is, at-risk youths in need of holistic intervention targeted at problem behavior syndrome could begin to be identified by engagement in these "problem-starting" behaviors. Furthermore, although the findings of this study suggest that the structure of the latent factor is relatively similar across demographic subgroups, this does not suggest that the *developmental process* of the latent construct is similar across groups. Prior research has revealed marked differences in the onset of risky sexual practices, substance use, and delinquent behavior across race and gender (Belenko et al., 2004; Kelley et al., 1997; Rosenthal et al., 1999; Santelli et al., 2000; Stevens et al., 2004). Thus, identifying differences in the temporal ordering of the development of problem behavior syndrome is

also critical to developing the most effective strategies for identifying and treating at-risk adolescents.

With the use of longitudinal data, the next step in improving our understanding of group differences in problem behavior syndrome is to apply a socio-ecological approach to this concept. A socio-ecological approach involves examining individuals' behavior within the context of their social and physical environment, inclusive of familial, peer, and community influences (DiClemente et al., 2008). The integration of these psychosocial influences reciprocally shape one another and collectively affect the balance of risk for problem behavior syndrome.

Parents and peers are considered two of the most significant factors in determining the direction of a youth's socialization process. Indeed, different kinds of family environment and/or peer groups provide differing standards for behaviors (Wilson & Donnermeyer, 2006). Poor family relations, including low attachment, involvement, monitoring, and inconsistent or harsh discipline are consistent predictors of a range of problem behaviors, including sexual behavior, substance use, and criminal involvement (Chen & Thompson, 2007; Crosby et al., 2001; DiClemente et al., 2001; Gorman-Smith et al., 2000; Huebner & Howell, 2003; Kapungu et al., 2006; Mosack et al., 2007; Robertson et al., 2005). Developmental research also reveals important racial and gender differences in parenting practices (Bulcroft, Carmody, & Bulcroft, 1996; Park & Bauer, 2002; Pinderhughes et al., 2000). This body of evidence suggests that African-American parents are less likely to supervise their children's behavior and more likely to provide harsh, physical, and inconsistent discipline. In regard to gender differences, females tend

to be supervised more closely, receive less physical discipline, and report stronger attachment to parents.

At the same time, it is well established that peers have a strong influence on the development and continuity of problem behavior. Peer groups provide the context for learning problem behaviors through modeling behavior, the transmission of definitions and neutralizations for engaging in such behaviors, and positive and/or negative reinforcement for behavior. Thus, the ratio of positive peer factors to negative peer factors may influence the likelihood of an adolescent manifesting problem behavior syndrome. A number of studies have found this to be true for risky sexual practices (Robertson & Levin, 1999; Spitalnick et al., 2007), substance use (Fergusson et al., 2002; Jang, 2002), and delinquent behavior (Warr, 2002). Studies also suggest that males are more likely to have peers that engage in problem behavior (Mears, Ploeger, & Warr, 1998; Simons, Miller, & Ageton, 1980) and the effect of deviant peers on behavior is substantially stronger for males compared to females (Johnson, 1979; Smith & Paternoster, 1987). Compared to white adolescents, African American adolescents report having a greater number of friends who engage in problem behaviors, however, the effect of having deviant peers on problem behavior is stronger for white adolescents (Brannock, Schandler, & Oncley, 1990; Matsueda & Heimer, 1987; Williams et al., 1999). Accordingly, identifying the types of parenting and peer groups that lead to problem behavior syndrome, as well as the similarities and differences in these relationships across demographic subgroups, will substantially improve our understanding of the social influences related to problem behavior syndrome. This information will aid in the quest

for the most comprehensive prevention and intervention strategies tailored to the specific needs of different subgroups of offenders.

The neighborhood in which an adolescent resides also has the potential to influence problem behavior syndrome. It is well established that adolescents who reside in disadvantaged areas, characterized by poverty, residential instability, population heterogeneity, and family disruption, are at a heightened risk for engaging in problem behavior, including delinquency, substance use, and risky sexual practices (Brooks-Gunn et al., 1993; Leventhal & Brooks-Gunn, 2000; Sampson et al., 2002). Specifically, it is suggested that these structural factors influence the 1) costs and rewards assigned to engaging in deviant behavior, 2) presence of negative role models in the neighborhood, and 3) amount of unsupervised socializing in the neighborhood. The interaction of these three factors influences the direction of the socialization process, and in turn, the tendency for an adolescent to engage in multiple problem behaviors.

Furthermore, a number of previous studies have found that the intersection of neighborhood characteristics and individual-level demographic factors influences the tendency to engage in risky sexual practices, substance use, and deviant behavior (examined separately). Such findings reflect important interactions between structural factors and demographic characteristics (Brewster, 1994; Browning et al., 2004; Cubin et al., 2005; Choi, Harachi, and Catalano, 2006; Frank et al., 2007; Kulis et al., 2007; Peeples & Loeber, 1994; Reardon, Brennan, and Buka, 2002; Turner et al., 2007; Wallace & Murroff, 2002).

These studies, coupled with the preliminary findings of this study, lay the groundwork for future research to focus on the variations in the association among

neighborhood characteristics and problem behavior syndrome across specific demographic categories. To date, studies that examine the influence of the social and economic characteristics of the neighborhood on the tendency to simultaneously engage in multiple forms of deviant behavior, as well as the interaction between community characteristics and demographic factors are relatively nonexistent. The lack of research regarding these associations is unfortunate because this information could help local and state governments identify which communities are in need of services for at-risk youth, in addition to which types of services are most needed.

Research also suggests that community conditions indirectly influence problem behavior through their impact on a youth's immediate social environment (i.e., family and peers) (Chuang, Ennett, Bauman, & Foshee, 2005; Jang & Johnson, 2001; Li, Feigelman, & Stanton, 1999; Tarter, Vanyulov, & Kirisci, 2006; Vazsonyi, Trejos-Castillo, & Young, 2007). These studies suggest that the interaction of community- and individual-level factors determines an adolescent's *developmental pathway* to problem behavior (Ingoldsby & Shaw, 2002). Communities influence the ability of the family to provide opportunities to adolescents to be exposed to, and learn about, deviant behavior. At the same time, community characteristics also influence the opportunities to associate with different types of peer groups (Wilson & Donnermeyer, 2006). Therefore, the interaction between community, family, and peer factors may not only determine if a child will engage in one or more forms of problem behavior, but may also influence which behaviors the child will engage in depending on exposure, community perception, and reinforcement in a given neighborhood.

In addition to social environmental factors, psychological factors may also be important in explaining problem behavior syndrome. Indeed, a wealth of studies has revealed a consistent relationship between mental health and problem behaviors. For example, conduct disorder, depression and suicidal ideation, attention deficit hyperactivity disorder (ADHD), and post-traumatic stress disorder (PTSD) are consistently found to negatively influence the decision to engage in risky sexual behavior, substance use, and delinquent behavior (Bardone et al., 1996; 1998; Brooks et al., 2002; Halfors et al., 2004; Dembo et al., 2007; Kaltiala-Heino, Losunen, Rimpela, 2003; Teplin et al., 2005; McClelland et al., 2004; Waller et al., 2006). In addition, racial and gender differences in the prevalence of mental health problems among juvenile offenders are routinely found in the literature (McClelland et al., 2004; Teplin et al., 2003). These variations may also prove important to understanding variations in the structure of problem behavior syndrome across demographic subgroups.

Unfortunately, such social and psychological factors were unable to be included in the analyses, which is a major limitation to the current study. In order to fully understand the developmental process of problem behavior syndrome, and in turn, develop effective prevention and intervention strategies, this is a critical task for future research. Identifying the mechanisms that lead to problem behavior syndrome will aid in the quest for the most comprehensive intervention strategies for problem behavior syndrome. Integrating information regarding the effect of the interaction of 1) individual-level psychological factors, 2) parenting and peer influences, 3) structural characteristics, and 4) demographic characteristics on problem behavior syndrome will lead to the development of effective, socio-ecological prevention and intervention strategies.

Another avenue for future research is the theoretical examination of the causal processes that lead to the development of problem behavior syndrome. In addition to enabling the examination of the temporal ordering of different problem behaviors, longitudinal data will also allow researchers to examine the "generality" of criminological theories. This line of research should entail examining the ability of a number of individual-level theoretical constructs to predict the development of problem behavior syndrome, as well as determine if this ability is consistent across demographic subgroups. For years, the capability of such general theories to explain behavior across demographic characteristics has been a popular debate among criminologists (Akers, 1998; Gottfredson & Hirchi, 1990; Hay, 2001). However, this body of research tends to examine the ability of different "general" theories to predict problem behaviors separately. When a number of problem behaviors are studied in a single study, they are typically studied separately, each behavior serving as a dependent variable and then reporting the results of each of the different models. Examining the ability of these general theories to predict the latent construct, as well as identifying any differences in this ability across individual characteristics, will enhance our understanding of the causal processes that lead to problem behavior syndrome, while at the same time, provide additional information toward a resolution to this long-standing debate. If future research reveals that the so-called "general" theoretical concepts are able to predict the latent construct of deviance across the different subgroups, additional support for the generality of these theories will be provided.

Finally, it is important to note that the notion of problem behavior syndrome as a "real" or concrete syndrome has yet to be established. The definition of a latent factor

implies that it is a hypothetical construct that accounts for associations among observed indicators (Bollen, 2002). Thus, problem behavior syndrome remains an empirical abstraction. However, the tendency to simultaneously engage in a number of risk-taking behaviors is more than just an empirical concept; it is a serious social problem.

According to Brosboom et al. (2003:207), what is needed is the adherence to realism.

This perspective holds that the latent variable signifies a real entity. In other words, the latent factor is assumed to exist independent of measurement. “The assumption that the model is true must be taken literally, more literally, than many latent variable theorists would be comfortable with” (Brosboom et al., 2003:216). Thus, in addition to the continued empirical examination of problem behavior syndrome, it is also important for juvenile justice professionals, teachers, and parents, to recognize and accept problem behavior syndrome as a concrete reality. Without such recognition, the critical need for treatment strategies targeting multiple problem behaviors in an integrated framework will continue to go unrecognized by the juvenile justice system.

Conclusion

The findings of this study underscore the importance of integrating criminological and public health efforts to reduce problem behavior among adolescent offenders. Risky sexual practices, substance use, and criminal involvement have been long considered public health, as well as criminological, issues. However, cross-disciplinary efforts to combat these behaviors are relatively rare. This is unfortunate because collaboration among public health and juvenile justice system agencies would be quite beneficial to improving the lives of juvenile offenders.

For example, such collaboration would substantially widen the resource bank of information available to both disciplines, which as result, could result in the introduction of fresh perspectives on techniques for reducing problem behavior syndrome among juvenile offenders. For example, the juvenile justice system has recently begun to emphasize law and order. Dispositions are increasingly reactive and punitive in nature, focusing on punishment rather than intervention (Feld, 1998; OJJDP, 2001). However, there is little empirical evidence that punitive sanctions are effective in reducing problem behaviors among adolescent offenders. On the contrary, studies suggest that incarceration can often produce adverse effects such as higher recidivism rates, more serious substance use, and emotional trauma (MacKenzie, 2002; Spohn & Holleran, 2002). Thus, as Welsh (2005:24) points out, this trend toward becoming adversarial "represents an unsustainable approach to the prevention" of misbehavior among juvenile offenders.

The public health approach to dealing with adolescent problem behavior represents a healthy alternative to preventing and reducing problem behavior syndrome. Public health strategies focus on primary prevention - prevention in the first instance, prior to developing serious problem behavior (Welsh, 2005). This involves identifying and targeting the root causes of the development of problem behavior syndrome, rather than reacting once it has been developed. The significant effect of age found in this study supports the importance of taking such an approach by relying on early intervention strategies. There are a number of such public health, early intervention strategies that target the risk factors for problem behaviors that have shown considerable promise (see DiClemente et al., 2008 and Farrington & Welsh, 2007 for a review) for reducing

problem behavior syndrome among adolescent offenders. However, the integration and implementation of these intervention strategies in the juvenile justice system is rarely accomplished.

This is not to suggest that public health strategies should be seen as a challenge to the standard juvenile justice focus on law and order, but rather as a complement to it, part of an effort to create a more balanced and comprehensive strategy in reducing problem behavior syndrome among juvenile offenders (Prothrow-Stith, 1992; Welsh, 2005).

Reducing the development of problem behavior syndrome "...will require an interdisciplinary approach. Professionals from sociology, criminology, economics, public policy, psychology, anthropology, and public health must work together to understand the causes and develop the solutions" (Rosenberg & Mercy, 1991:11). Taking a socio-ecological, interdisciplinary approach to understanding, and more importantly preventing, the development of problem behavior syndrome will not only improve the lives of the adolescents involved, but will also improve the health and well-being of the community as a whole.

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