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# Maltreatment, Psychiatric Symptoms and Human Immunodeficiency Virus/Sexual Transmitted Infection Risk Behavior Among Youth with Alcohol and Other Drug Use Problems: A Person-Centered Analysis

Assaf Oshri

*Florida International University*, oshriassaf@yahoo.com

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

MALTREATMENT, PSYCHIATRIC SYMPTOMS AND HUMAN  
IMMUNODEFICIENCY VIRUS/SEXUAL TRANSMITTED INFECTION RISK  
BEHAVIOR AMONG YOUTH WITH ALCOHOL AND OTHER DRUG USE  
PROBLEMS: A PERSON-CENTERED ANALYSIS

A dissertation submitted in partial fulfillment of the

requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PSYCHOLOGY

by

Assaf Oshri

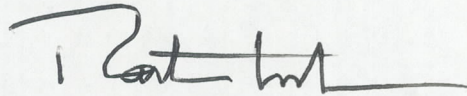
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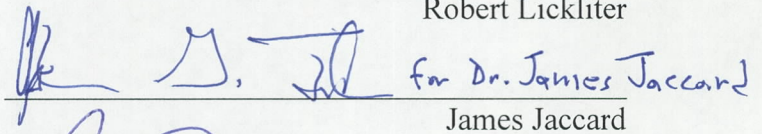
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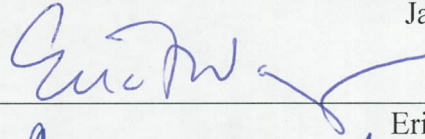


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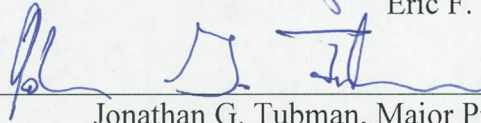


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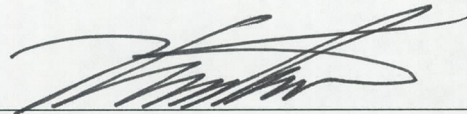
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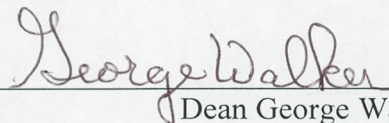
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The dissertation of Assaf Oshri is approved.



Dean Kenneth Furton  
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Florida International University, 2009

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## DEDICATION

I dedicate this thesis to my mother and father. Without their love, exemplary attitude towards life and intellectual spirit I would never have been able to maintain the level of enthusiasm and motivation necessary to complete this journey.

## ACKNOWLEDGMENT

I would like to thank my mother and wife for being next to me during this journey. My wife and my mother's love, patience and support made the completion of this dissertation possible. I would like also to thank the time and support of my dissertation committee. I would like to especially thank Dr. James Jaccard's and Dr. Robert Lickliter's support, expertise, availability and their inspiration that added tremendously to the quality of this work. Finally, I would also like to also especially thank to my mentor Dr. Jonathan Tubman whose patience and commitment to scientific inquiry and academic pedagogy provided me the necessary tools to achieve this project.

ABSTRACT OF THE DISSERTATION  
MALTREATMENT, PSYCHIATRIC SYMPTOMS AND HUMAN  
IMMUNODEFICIENCY VIRUS/SEXUAL TRANSMITTED  
INFECTION BEHAVIOR AMONG YOUTH WITH  
ALCOHOL OR OTHER DRUG USE PROBLEMS:  
A PERSON-CENTERED ANALYSIS

by

Assaf Oshri

Florida International University, 2009

Miami, Florida

Professor Jonathan Tubman, Major Professor

Multi-problem youth undergoing treatment for substance use problems are at high behavioral risk for exposure to sexually transmitted infections (STIs), including human immunodeficiency virus (HIV). Specific risk factors include childhood adversities such as maltreatment experiences and subsequent forms of psychopathology. The current study used a person-centered analytical approach to examine how childhood maltreatment experiences were related to patterns of psychiatric symptoms and HIV/STI risk behaviors in a sample of adolescents ( $N = 408$ ) receiving treatment services. Data were collected in face-to-face interviews at two community-based facilities. Descriptive statistics and Latent Profile Analysis (LPA) were used to (a) classify adolescents into groups based on past year psychiatric symptoms, and (b) examine relations between class

membership and forms of childhood maltreatment experiences, as well as past year sexual risk behavior (SRB).

LPA results indicated significant heterogeneity in psychiatric symptoms among the participants. The three classes generated via the optimal LPA solution included: (a) a low psychiatric symptoms class, (b) a high alcohol symptoms class and (c) a high internalizing symptoms class. Class membership was associated significantly with adolescents' self-reported scores for childhood sexual abuse and emotional neglect. ANOVAs documented significant differences in mean scores for multiple indices of SRB indices by class membership, demonstrating differential risk for HIV/STI exposure across classes. The two classes characterized by elevated psychiatric symptom profiles and more severe maltreatment histories were at increased behavioral risk for HIV/STI exposure, compared to the low psychiatric symptoms class. The high internalizing symptoms class reported the highest scores for most of the indices of SRB assessed. The heterogeneity of psychiatric symptom patterns documented in the current study has important implications for HIV/STI prevention programs implemented with multi-problem youth. The results highlight complex relations between childhood maltreatment experiences, psychopathology and multiple forms of health risk behavior among adolescents. The results underscore the importance of further integration between substance abuse treatment and HIV/STI risk reduction efforts to improve morbidity and mortality among vulnerable youth.



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## Chapter I: Statement of the Problem

Adolescence is a transitional period during the second decade of life when individuals undergo multiple, linked biological, psychological, and social transformations that place some adolescents at increased risk for a broad range of problem behaviors, including sexual risk behavior (Ary et al., 1999; Donovan, Jessor, & Costa, 1988,1999; Farrell, Sullivan, Esposito, Meyer, & Valois, 2005; Moffitt, 1993; Kotchick, Shaffer, Forehand, & Miller, 2001). Current prevalence rates for sexually transmitted infections (STIs), including human immunodeficiency virus (HIV), among youth worldwide are pressing public health concerns. Recent statistics for the United States document that, compared to many adult age strata, adolescents and young adults are at elevated behavioral risk for exposure to HIV, as well as other STIs, e.g., Chlamydia, Gonorrhea and Syphilis (Center for Disease Control and Prevention [CDC], 2004). There is a critical need to conduct additional research to reduce risk for HIV/STI transmission among youth, and in particular among youth manifesting multiple risk factors for HIV/STI exposure (CDC, 2004; D'Angelo, Samples, Rogers, Peralta, & Friedman, 2006; Donenberg & Pao, 2005). At present, STIs are among the most common preventable infections in the United States, with 15 million new cases reported each year (Weinstock, Berman, & Cates, 2004), of which approximately half occur among adolescents.

### *Sexual risk behavior among adolescents with alcohol or other drug use problems*

Published empirical studies have established a strong base of evidence for significant associations between alcohol and other drug (AOD) use and sexual risk behavior (SRB) among adult and adolescent populations (Duncan, Strycker, & Duncan,

1999; Ross, Hwang, Zack, Bull, & Williams, 2002). At a time when the reported numbers of STIs are growing steadily among youth and young adults, the common co-occurrence of AOD use and SRB remains a major public health concern. Specifically, previous research has shown that adolescents who seek treatment for AOD use problems reported earlier ages of onset of sexual activity, greater numbers of sexual partners and less consistent condom use compared to youth without AOD use problems (e.g., Bailey, Pollock, Martin, & Lynch, 1999; Duncan et al., 1999; Guo et al., 2002; Malow, Dévieux, Jennings, Lucenko, & Kalichman, 2001; Robertson & Plant, 1988). An important indicator of SRB among adolescents with AOD use problems is sexual activity with co-occurring use of alcohol or other drugs. Previous research has found that among sexually active adolescents, those who engage in AOD use while having sex were significantly less likely to use condoms or other forms of contraception compared to adolescents who did not engage in AOD use while having sex (Jainchill, Yagelka, Hawke, & De Leon, 1999; Millstein & Moscicki, 1995; Tapert, Aarons, Sedlar, & Brown, 2001).

#### *Co-occurring Problems among Multi-Problem Youth*

*Externalizing problems.* Youth referred to treatment for AOD use problems frequently present with co-occurring psychiatric disorders that may significantly impact treatment efficacy and substance use outcomes (Myers, Brown, & Mott, 1995; Tomlinson, Brown, & Abrantes, 2004; Tubman, Gil, & Wagner, 2004), as well as exacerbate participation in SRB (Chen, Stiffman, Cheng, & Dore, 1997). For example, Conduct Disorder (CD) is a commonly co-occurring psychiatric disorder among adolescents diagnosed with Substance Use Disorders (SUDs; Brown, Gleghorn,

Schuckit, Myers, & Mott, 1996; Chen et al., 1997; Disney, Elkins, McGue, & Iacono, 1999). While some recent research has identified CD as a reliable predictor of the development of SUDs among adolescents (Sung, Erkanli, Angold, & Costello, 2004), the underlying mechanisms related to significant associations between SRB, AOD use problems and externalizing disorders are still debatable. Some research purports a single underlying tendency for deviancy characterizes engagement in multiple problems and risk behaviors among youth (Ary et al., 1999; Donovan et al., 1988, 1999). In contrast, other research suggests challenges in emotion regulation (DiClemente et al., 2001) and specific cognitive reasoning (e.g., health behavior models; Fisher, Fisher, Bryan, & Misovich, 2002) underlie the decision making process for participation in multiple risk behaviors.

*Internalizing problems.* Youth undergoing AOD treatment frequently exhibit both internalizing psychiatric symptoms and health risk behaviors (Arcelus, & Vostanis, 2005; Crome & Bloor, 2005; Jaycox, Morral, & Juvonen, 2003; Rowe, Liddle, Greenbaum, & Henderson, 2004). However, the potential influence of internalizing psychiatric symptoms on health risk behaviors such as SRB has received mixed support. For example, some studies have reported that specific forms of anxiety and affective disorders are associated with increased behavioral risk factors (e.g., concurrent drug use and sex, multiple partners) for HIV/STI exposure (e.g., Lehrer, Shrier, Gortmaker, & Buka, 2006). In contrast, other studies have produced evidence that suggests that anxiety symptoms serve a potential protective function with regard to SRB participation (Tubman, Windle, & Windle, 1996). Therefore, an area of active research and clinical

investigation is necessary to examine relations between anxiety symptoms, externalizing symptoms and participation in SRB.

*Maltreatment Experiences: A General Risk Factor for Maladaptive Developmental Outcomes*

Childhood adversities, such as physical, sexual or psychological abuse, have been found to be a significant general risk factor for the development of conduct disorder (Caples & Barrera, 2006; Romano, Zoccolillo, & Paquette, 2006; Widom & White, 1997), substance use problems (Clark, Thatcher, & Maisto, 2005; Kilpatrick et al., 2000, 2003; Miller & Mancuso, 2004; Schuck & Widom, 2001; Widom & White, 1997), and a range of additional psychiatric diagnoses among adolescents (Clark et al., 2005; Clark, Lesnick, & Hegedus, 1997; Feldman, Conger, & Burzette, 2004). While there are established bodies of research documenting relations between childhood maltreatment and the subsequent development of a broad range of problem behaviors, psychopathology and SRB during adolescence and adulthood, the underlying mechanisms that account for these relations are not clearly understood although several compelling conceptual models have been proposed (Knutson, DeGarmo, Koepl, & Reid, 2005).

In addition to substance use psychiatric symptoms, adolescents receiving treatment for AOD are more likely to endorse symptoms from multiple types of disorders or to receive multiple psychiatric diagnoses. While literature has documented extensive risk patterns related to psychiatric comorbidity, examination of multiple psychiatric symptoms can further enhance understating regarding the etiology of SRB. Specifically, antecedent or co-occurring factors associated with the onset or maintenance

of psychiatric symptoms are important for understanding participation in SRB by adolescents with clinically significant AOD use problems.

While childhood maltreatment has been identified as a significant general risk factor for a broad range of mental health problems and health risk behavior in adolescence or young adulthood, the specificity of these relations is unclear. For example, associations among specific types of childhood maltreatment and the development of specific types of problem behavior, e.g., the influence of physical punishment on the development of CD or substance use problems, remains understudied (Manly, Kim, Rogosch, & Cicchetti, 2001). In addition, research findings have been inconsistent regarding relations between specific forms of maltreatment and subsequent forms of psychopathology. For example, some research has documented relations between neglect and subsequent externalizing problems (Knutson et al., 2005), while other research studies have linked childhood experiences of neglect to the development of internalizing problems (Manly et al., 2001).

Youth referred to AOD treatment often report significant histories of severe childhood adversities, including multiple forms of childhood maltreatment. Histories of physical, emotional and sexual maltreatment among adolescents in both clinical and community-based samples have been associated with higher scores for self-reported SRB (Fergusson, Horwood, & Lynskey, 1997; Stiffman, Dore, Cunningham, & Earls, 1995; Tubman, Montgomery, Gil, & Wagner, 2004). For example, Tubman et al. (2004) documented significant associations between lifetime history of abuse experiences and young adults' self-reported SRB and psychiatric disorders in a large, ethnically diverse community sample. Similarly, Stiffman et al. (1995) identified significant predictive



relations between child abuse history, substance use and self-reported SRB in a clinical sample of adolescents receiving medical, social and mental health services. While maltreatment histories are often reported by youth receiving AOD treatment services, it is unclear how specific forms of self-reported maltreatment may influence relations between forms of psychopathology and SRB. Specifically, variations in relations between maltreatment histories, specific psychiatric diagnoses and SRB have not been studied, among youth, and in particular, among youth receiving substance abuse treatment services. Therefore, an aim of the current study is to examine relation between multiple child maltreatment experiences and patterns of externalizing and internalizing psychiatric symptoms among youth receiving AOD treatment.

#### *The Current Study*

Previous research has documented relations between maltreatment experiences, psychopathology, and health risk behaviors. However, research studies that have utilized samples of multi-problem adolescents did not evaluate child maltreatment and SRB using multi-dimensional measures, and tended to utilize traditional variable-centered analytic strategies. In addition, the studies tended not to incorporate measures of childhood maltreatment, psychopathology and SRB within one structural model. Thus, the purpose of the current study is to examine structural relations among multiple indices of childhood maltreatment experiences, psychopathology, and health risk behaviors. These relations were investigated using a multidimensional measurement approach in conjunction with person-centered analytical strategies. Specifically, the current study addressed gaps in the current research literature regarding how childhood

maltreatment experiences influence patterns of psychiatric diagnoses and relations with HIV/STI risk behaviors among youth receiving AOD treatment services.

In the current study, guided by the conceptual paradigm of developmental psychopathology, two major analytic strategies were applied to address separate goals. The first analytical approach is person-centered, and was used to construct typologies based on patterns of psychiatric diagnoses, which were compared simultaneously on measures of different types of maltreatment experiences. Such an approach favors classifying individuals based on their self-reported person-level patterns of psychiatric diagnoses as opposed to predetermined or a priori grouping variables (e.g., grouping individuals based on a single psychiatric diagnosis). Thus, in an applied person-centered analytic strategy, classification of individuals based on co-occurring indices of psychopathology may improve current understanding of the psychiatric context for HIV/STI risk behavior participation among adolescents receiving AOD treatment services. The second analytic strategy utilized in the current study was a variable-centered approach. Specifically, multivariate mean differences in SRB indices across the resulted classes were conducted within a structural equation modeling (SEM)-based model (see Figure 2).

Research Questions Depicted in Figures 1 & 2

1. Are there latent psychiatric symptom patterns that can be classified into conceptually meaningful and statistically independent groups among AOD using adolescents?

2. Is the extensiveness (i.e., severity, presence of multiple types) of child maltreatment experiences associated with particular patterns of psychiatric symptoms as defined by latent profile analysis of AOD using adolescents?
3. Do members of different psychiatric classes report statistically significant differences in mean scores for specific indices of sexual risk behaviors (SRBs)?

Participants were 408 adolescents undergoing outpatient AOD treatment as part of a larger NIAAA-funded study evaluating an HIV risk reduction intervention. The sample included 287 males (70.3%) and 121 females (29.7%), receiving AOD use treatment services at two outpatient facilities in South Florida. The age of the participants ranged from 12 to 18 years old ( $M = 16.30$  years;  $SD = 1.16$ ). The sample was ethnically diverse and included 108 (25.2%) non-Hispanic White, 181 (44.4%) Hispanic, 85 (20.8%) African-American adolescents and 39 (9%) adolescents from other racial/ethnic groups.

*Significance of the current study*

To improve the current understanding of heterogeneity in the health risk behaviors of adolescents receiving treatment for AOD use problems, it is important to investigate the extent to which specific patterns of psychiatric disorders are associated with childhood maltreatment experiences (e.g., severity and type of maltreatment) as well as the usefulness of these typologies for the identification of client subpopulations at increased behavioral risk for HIV/STI exposure. Documentation of subgroups of adolescents with specific forms of psychopathology among those receiving AOD

treatment services may assist treatment providers in selecting specific strategies to address co-occurring psychopathology, AOD use and health risk behaviors, such as harm reduction strategies (Marlatt & Witkiewitz, 2002; Witkiewitz & Marlatt, 2006). Similarly, research on the impact of childhood maltreatment experiences on co-occurring psychiatric disorders and risk behaviors such as SRB can be used to tailor HIV/STI prevention strategies to include more focused content and to address the ongoing influence of past maltreatment on current and future health risk behavior.

## Chapter II: Literature Review

### *Scope and Significance of Sexually Transmitted Infections in the United States*

Public health statistics document that in the United States, compared to older age categories, adolescents and young adults are at significant risk for exposure to human immunodeficiency virus (HIV), as well as other sexually transmitted infections (STIs), e.g., chlamydia, gonorrhea and syphilis (CDC, 2004). In the U.S., the rising prevalence rates for STIs among youth are major public health and financial concerns. Through 2005, a cumulative estimate of 41,311 youth, aged 13 to 24 years, received a diagnosis of AIDS (CDC, 2004). This age segment of the population accounted for 3.9% of AIDS cases in 1999, which increased to 4.3% in 2005 (CDC, 2004). Across all categories of STIs, behavioral risk factors for exposure are a significant issue among youth for two reasons. First, STIs are among the most common preventable infections in the U.S. Second, 48% of the 18.9 million new cases of STIs reported in 2000 were among youth aged 15 to 24 years (Weinstock et al., 2004).

In the United States, HIV/STI transmission is a major financial burden. In the mid-1990s, the direct cost of HIV and other STIs among all age groups was estimated to range from 11 to 17 billion dollars, adjusted to year 2000 dollars (Chesson, Blandford, Gift, Tao, & Irwin, 2004; Siegel, 1997). A recent report estimated that the costs stemming from the nine million new cases of STIs that occurred among 15 to 24 year olds in 2000 was \$6.5 billion dollars (Chesson, Gift, & Pulver, 2006). Thus, research that enhances our understanding of risk factors for HIV/STI exposure or helps us to develop more effective HIV/STI prevention programs potentially can save billions of

dollars, and reduce individual psychological distress, physical morbidity associated with STIs, as well as increased risk for early mortality (Chesson, Gift, & Pulver, 2006).

### *Scope and Significance of Child Maltreatment*

Child maltreatment is a significant social problem in the contemporary United States. In 2005, 3.6 million children and their families were investigated by local Child Protective Services (CPS) for allegations of abuse or neglect by primary caregivers, and 899,000 children (i.e., 1,210 per 100,000 children) were determined by CPS to have been victims of some form of abuse or neglect. However, in some states, it is necessary to substantiate actual physical harm from abuse before an alleged case can be officially documented as abuse by CPS. In a recent non-governmental report, Finkelhor, Ormrod, Turner and Hamby (2005) surveyed a nationally representative sample of 2,030 children and adolescents aged 2 to 17 years, and found that more than half of the children (530 per 1,000) reported past experiences of at least one form of assault or aggression by any sort of aggressor. Application of the governmental standard criteria (i.e., evident physical harm) for maltreatment in Finkelhor's study generated rates of 1.5% for physical abuse and 1.1% for neglect, with an overall child maltreatment rate of 12.4%. Thus, the survey suggested that even the application of a conservative criterion for the definition of child maltreatment produced prevalence rates with widespread social, clinical and economic consequences.

The high prevalence rates of child maltreatment entail serious financial costs and public health concerns, in particular, given the significant associations between maltreatment experiences and maladaptive consequences for later child and adolescent development. The annual direct financial costs related to child maltreatment, as

computed using factors such as the involvement of the judicial system, the child welfare system, and the health care system, are estimated to be \$24.3 billion. The long-term financial costs to society related to child maltreatment, calculated using the indirect costs of adult criminality, juvenile delinquency and lost labor productivity, are estimated to exceed an annual total of \$69.6 billion (Fromm, 2001).

Child maltreatment is a serious public health concern as it has been found to be associated with increases in a range of psychiatric symptoms and problem behaviors during adolescence and adulthood (Widom, Schuck, & White, 2006; Wilson & Widom, 2008). For example, children with a significant history of maltreatment are at increased risk for subsequent trauma symptoms, re-victimization, lower academic performance (Holt, Finkelhor, & Kantor, 2007) tobacco and AOD use (Widom, White, Czaja, & Marmorstein, 2007), depression (Horowitz, Widom, McLaughlin, & White, 2001), SRB (Tubman et al., 2004), specific chronic diseases (Felitti et al., 1998), as well as neurodevelopmental damage (Perry, 2002). In addition, childhood maltreatment has been documented as having negative influences on indices of interpersonal competence, such as the ability to engage in long-term romantic relationships (Colman & Widom, 2004). Thus, child maltreatment has been identified as a significant general risk factor for a wide range of adverse short- and long-term outcomes for affected individuals, their families, as well as society at large.

#### *Definition and Assessment of Sexual Risk Behavior*

In the existing research literature, sexual risk behavior is cited as a major risk factor for HIV/STI exposure and transmission among adolescents and adults (Catania et al., 1992; CDC, 2004). At the same time, however, research on SRB has been hindered

by a lack of clarity with respect to the definition and assessment of this health risk behavior (Cecil, Pinkerton, Bogart, Pavlovic, & Kimball, 2005; Schroder, Carey, & Vanable, 2003). In terms of operational definitions, it is common practice in research studies to categorize SRB into several core indices (e.g., the number of sexual partners for a specific time referent, frequency of unprotected sex, and having been pregnant or having impregnated someone). However, research studies are inconsistent with regard to definitions of SRB, given the number and variety of commonly measured indices (e.g., number of partners, frequency of unprotected sex). In addition, considerable inconsistency exists with regard to the criteria used to define specific indices that can be used to assess SRB. For example, studies that select “number of sexual partners” as one index of SRB, may also select different time frames for recording the criterion behavior. These definitional inconsistencies make cross-study comparisons difficult and are a challenge to the generalizability of empirical research on SRB (Kotchick et al., 2001).

Two methods for assessing SRB are prevalent in the existing research literature: (a) absolute frequency measures (e.g., counting the number of unprotected intercourse episodes) and (b) relative frequency measures (e.g., ordinal scale-based ratings of unprotected intercourse episodes). Schroder et al. (2003a) argued that absolute frequency measures have the potential to be the most valid method for assessing SRB. Schroder et al. also acknowledged the inherent statistical challenges of an absolute count strategy, such as non-normal distributions of data and outliers, and discussed a variety of strategies to overcome these difficulties (e.g., implementing log-linear regression, permutations and bootstrapping). In contrast, Catania et al. (2005) critiqued the Schroder et al. endorsement of frequency measurement strategies and described additional



limitations of their approach. Catania et al. challenged the contention of Schroder et al. that participants' self-reported count data are more accurate than categorical derivatives of count data (e.g., relative frequency measures). Another key limitation described by Catania et al. was that unprotected sexual activity cannot be assumed to be linearly related to the actual risk for HIV/STI exposure given the complexity of relations between exposure risk and other contextual factors relevant to sexual activity. For example, Catania et al. questioned the validity of the assumption that risk for HIV/STI exposure could be accurately and sufficiently evaluated by counting the number of unprotected sexual acts only, while ignoring more detailed patterns of sexual partners, e.g., with whom and how often was one has engaged in sexual activity, as well as the sexual risk behaviors of these partners.

In addition, the assessment of SRB, similar to other forms of self-reported risk behaviors, is inherently challenging because of the subjective nature (i.e., idiosyncratic personal interpretations) of a participant's responses. For example, using an ordinal scale, Cecil et al. (2005) examined how undergraduate college students ( $N = 282$ ) assigned labels (e.g., "most of the time", "always"), to condom use based on different presented scenarios. Results showed considerable between-person variability in the labels endorsed by participants for different scenarios with equivalent risk values. The labels endorsed varied as a function of the number of total sex acts and whether condom use was expressed as a count or a percentage. For example, when a participant was asked to label a scenario in which a couple used a condom once out of 20 intercourse episodes, 41.1% of participants labeled it as "never," while 44.7% labeled the same scenario "rarely." The results suggested that ordinal condom use scale labels are subject

to some degree of interpretation differences among individuals, thereby increasing between-person variability. Cecil et al. (2005) concluded by providing suggestions for alternative methods of SRB assessment, such as counting absolute frequencies of protected and unprotected intercourse episodes and converting the data into proportions of specific behaviors, including condom use. Overall, the study concurred with the research literature (e.g., Blanton & Jaccard, 2006) that highlighted the inherent challenges in utilizing arbitrary metrics, as is common in the behavioral and developmental sciences.

#### *Towards the Multi-dimensional Definition and Assessment of Child Maltreatment*

The use of consistent definitions of child maltreatment is essential in the generation of reliable empirical research on its etiology, short- and long-term consequences, treatment and prevention (Senn, Carey, & Vanable, 2008). Recent research documents recurring limitations in the study of child maltreatment due to the lack of explicit and consistent operational definitions of child maltreatment, which hinders progress in the area (Barnett, Manly, & Cicchetti, 1991; Cooney, 2003; Dubowitz et al., 2005; Herrenkohl, 2005; Litrownik et al., 2005; Manly, Kim, Rogosch, & Cicchetti, 2001; McGee, Wolfe, Yuen, Wilson, & Carnochan, 1995; Senn et al., 2008). Definitions of child maltreatment also exist in the legal system, as abused and neglected children are often referred first to social service agencies. The federal Child Abuse Prevention and Treatment Act (CAPTA), as amended in 2003, defines child abuse and neglect as “(a) any recent act or failure to act on the part of a parent or caretaker which results in death, serious physical or emotional harm, sexual abuse or exploitation, or (b) an act or failure to act which presents an imminent risk of serious

harm.” Yet, significant debate continues over the “correct” definition of child maltreatment (Barnett et al., 1991; Dubowitz et al., 2005; Litrownik et al., 2005; Manly et al., 2001; McGee et al., 1995; Senn et al., 2008).

Among experts in the field of child maltreatment, building consensus on valid definitions of child maltreatment has been an important and serious research endeavor. Accordingly, experts have vigorously produced research that has strengthened the empirical operationalization of specific forms of maltreatment. For example, McGee, Wolfe, Yuen, and Carnochan (1991) have advocated for a definition of child maltreatment that fits the empirical need for uniform and explicitly operationalized definitions across researchers. Barnett et al. (1991) have emphasized their concerns regarding child maltreatment classifications from a developmental psychopathology perspective. According to Barnett et al. (1991), the definition of child maltreatment needs to be guided by a contextual and multidimensional perspective that addresses the source, the perpetrator, different types of maltreatment (i.e., physical, sexual, emotional, neglect), the severity, the chronicity and the developmental stage of child development during which maltreatment experiences were perpetrated.

In a study that examined the multidimensionality of the definition of child maltreatment, McGee et al. (1995) evaluated five types of maltreatment, including physical, sexual, emotional, neglect, and exposure to family violence, as reported via three different sources (i.e., children’s self-report, child protective service workers and social workers). The findings showed that different types of maltreatment rarely occur in isolation and that 90% of participants had more than one type of maltreatment experiences reported in their cases. In addition, with regard to source reliability, McGee

et al. documented considerable source disagreement with regard to judgments about the occurrence and severity of children's maltreatment experiences. Overall, however, adolescents' ratings of maltreatment were found to be more reliable predictors of externalizing and internalizing psychiatric symptoms than ratings by professional CPS employees.

In general, experts agree that any definition of child maltreatment needs to be operationalized clearly by researchers who study maltreated children. Furthermore, considerable agreement exists among researchers that the previous common practice of relying on CPS definitions of child maltreatment is significantly flawed (DePanfilis & Zuravin, 1999). Therefore, research on child maltreatment should include an explicit multidimensional definition of maltreatment (i.e., one that includes dimensions such as severity, subtype and developmental timing). Finally, basic and applied child maltreatment research will become more effective when studies incorporate contextual factors such as cultural and societal standards and practices during the assessment of child maltreatment (Barnett, Manly, & Cicchetti, 1993; Dubowitz et al., 2005; Litrownik et al., 2005; Manly et al., 2001).

#### *Co-occurring Problems among Multi-problem Youth*

##### *Externalizing Disorders and SRB among Adolescents with AOD Use Problems.*

Youth referred to AOD use treatment frequently present with co-occurring psychiatric disorders that are often associated with less positive treatment outcomes for substance use problems (Meade, 2006; Myers et al., 1995; Tomlinson et al., 2004; Tubman et al., 2004) and more frequent participation in SRB (Chen et al., 1997). For example, Conduct Disorder (CD) is a commonly co-occurring psychiatric disorder among adolescents

diagnosed with Substance Use Disorders (SUDs; Brown et al., 1996; Chen et al., 1997; Disney et al., 1999). The prevalence of CD diagnoses among adolescents receiving AOD treatment is estimated to range from 40% to 60% (Brown et al., 1996; Disney et al., 1999; Stowell & Estroff, 1992). Children and adolescents who meet diagnostic criteria for CD are at significant risk for the development of Antisocial Personality Disorder (ASPD; Burnette & Newman, 2005), substance use problems, substance abuse and dependence (Disney et al., 1999; Helstrom, Bryan, Hutchison, Riggs, & Blechman, 2004), as well as participation in a range of problem and health risk behaviors, including SRB (Booth & Zhang, 1997; Brown et al., 1996; Lambert, Wahler, Andrade, & Bickman, 2001; Tubman, Gil, Wagner, & Artigues, 2003).

Adolescents who engage in AOD use and manifest co-occurring externalizing disorders (e.g., CD) were found to demonstrate significantly more severe clinical patterns with regard to substance use and SRB, as well as to manifest less successful AOD treatment outcomes (Bryan & Stalling, 2002; Crowley, Mikulich, MacDonald, Young, & Zerbe, 1998; Fergusson & Woodward, 2000; Morris, Baker, Valentine, & Pennisi, 1998; Tomlinson et al., 2004). Previous research has shown that CD is associated significantly with premature substance use treatment drop-out and negative treatment outcomes among adolescents (Crowley et al., 1998; Kaminer, Tarter, Bukstein, & Kabene, 1992; 2001; Lambert et al., 2001; Myers et al., 1995; Myers, Stewart, & Brown, 1998). For example, the severity of CD symptoms prior to admission for substance use treatment predicted less successful substance use treatment outcomes in a two-year follow-up study of adolescents (Crowley et al., 1998).

Furthermore, research has documented repeatedly that externalizing diagnoses among adolescents with SUDs have been associated with increased participation in SRB (Bryan & Stallings, 2002; Tubman et al., 2003). Specifically, youth diagnosed with co-occurring SUDs and externalizing diagnoses were found to report more sex partners, earlier ages of onset of intercourse and less consistent condom use compared to youth diagnosed with SUDs only (Barthlow, Horan, Diclemente, & Lanier, 1995; Booth & Zhang, 1997; DuRant, Knight, & Goodman, 1997; Morris et al., 1998). While some recent research has identified CD as a reliable predictor for the development of SUDs among adolescents (e.g., Sung et al., 2004), the underlying mechanisms related to the significant associations between SRB, AOD use problems and externalizing disorders are still unclear. In light of studies reporting that a) externalizing problems are common among youth with AOD use problems, and b) that externalizing problems have negative effects on treatment outcomes for AOD use problems, further examination of the implications of externalizing diagnoses for the presence and patterning of SRB among multi-problem adolescents is warranted.

*Internalizing Disorders and SRB among Adolescents with AOD Use Problems.* Youth undergoing AOD treatment frequently exhibit psychiatric symptoms and health-related problems of which internalizing symptoms are particularly prevalent (Arcelus, & Vostanis, 2005; Crome & Bloor, 2005; Jaycox et al., 2003; Rowe et al., 2004). However, the potential influence of internalizing psychiatric symptoms on health risk behavior such as SRB has received mixed support in recent empirical research. Some studies have reported that specific forms of anxiety and affective disorders are associated with increased behavioral risk factors for HIV/STI exposure (e.g., Lehrer et al., 2006), while

other studies suggest that anxiety symptoms serve a potential protective function with regard to SRB participation (Tubman et al., 1996).

The presence of adolescent internalizing symptoms has been documented to increase significantly the risk for the development of SUDs and to hinder the effectiveness of AOD use treatment protocols (Lubman, Allen, Rogers, Cementon, & Bonomo, 2007; Rowe et al., 2004). For example, Lubman et al. (2007) examined psychiatric profiles and global functioning ratings among a sample of youth (mean age = 19.4 years) receiving AOD treatment services. Findings of the study revealed that 49% of the youth in the sample met diagnostic criteria for a current mood or anxiety disorder, with 68% reporting a lifetime history of similar diagnoses. Furthermore, participants who received a diagnosis of an internalizing psychiatric disorder were also more likely to meet diagnostic criteria for more than one co-occurring psychiatric disorder, to report more substance use-related problems, as well as a poorer quality of life compared to youth who did not meet diagnostic criteria for an internalizing psychiatric disorder. Thus, internalizing psychiatric disorder diagnoses have been documented to be highly prevalent among youth receiving treatment services for AOD use problems. While their relation to SRB is not clear, internalizing psychiatric diagnoses often are associated with greater severity of co-occurring psychiatric diagnoses, as well as greater likelihood for the development of SUDs.

#### *Maltreatment Experiences: A General Risk Factor for Maladaptive Developmental Outcomes*

*Psychological Maltreatment and the Severity of AOD Use Problems.* Negative childhood experiences (e.g., physical, sexual or psychological abuse) have been found to

be a significant general risk factor for the development of substance use problems among adolescents (Clark et al., 2005; Kilpatrick et al., 2000; Kilpatrick et al., 2003; Miller & Mancuso, 2004; Schuck & Widom, 2001; Widom & White, 1997) and in particular, for the development of AOD abuse or dependence (Clark et al., 2005; Clark, Lesnick, & Hegedus, 1997; Feldman et al., 2004). Available research documents significant associations between childhood histories of abuse experiences and the development of alcohol abuse or dependence symptoms in females (e.g., Fergusson & Lynskey, 1997; Ireland & Widom, 1994). In addition, studies have found that a childhood or adolescent history of maltreatment is associated with the development of alcohol use problems among adolescents, regardless of gender (e.g., Clark et al., 2005; Dube et al., 2006). Thus, relations between past maltreatment experiences and AOD use problems during adolescence have been previously documented in both community and clinical samples of youth.

*Maltreatment Types as a Risk Factor for Psychiatric Disorders.* A growing body of research has documented the short- and long-term consequences of child maltreatment among children, adolescents and young adults (Arata, Langhinrichsen-Rohling, Bowers, & O'Brien, 2007; Briere & Elliott, 2003; Fergusson et al., 1997; Widom et al., 2006, 2007). Child maltreatment has been found to be associated significantly with the onset or presence of a range of adjustment problems, including internalizing and externalizing problems (Arata et al., 2007; Lansford et al., 2007; Tubman et al., 2004; Widom et al., 2006; Zielinski & Bradshaw, 2006). Several studies have documented significant relations between child maltreatment and the development of internalizing psychiatric disorders at all age strata (Ackerman, Newton, McPherson,



Jones, & Dykman, 1998; Collishaw et al., 2007; Kaplow & Widom, 2007; Molnar, Buka, & Kessler, 2001; Toth & Cicchetti, 1996). In addition, existing research studies have documented specific associations between child maltreatment and the development of externalizing disorders and problem behaviors such as CD, interpersonal aggression, and affiliation with deviant peers (Bank & Burraston, 2001; Dishion, Spracklen, Andrews, & Patterson, 1996; Jaffe, Caspi, Moffitt, & Taylor, 2004; Nix et al., 1999). Thus, child maltreatment is a significant general risk factor for the development of multiple types of behavioral and emotional problems and more severe and persistent forms of psychopathology, including internalizing and externalizing psychiatric disorders among adolescents and adults.

While there is an established literature documenting relations between child maltreatment and the development of a broad range of problem behaviors, psychopathology and SRB during adolescence and adulthood, the underlying mechanisms that account for these relations are not, as yet, clearly understood (Knutson et al., 2005; Noll, 2008). Even less is known about the processes underlying the relations between specific types of child maltreatment and the development of specific forms of maladjustment during adolescence (e.g., the influence of punishment on the development of CD or SRB; Manly et al., 2001). Research studies have produced inconsistent findings in documenting specific relations between maltreatment types and later psychopathology. For example, some research has documented relations between neglect and externalizing problems (Knutson et al., 2005), while other studies have linked neglect primarily to the development of internalizing problems (Manly et al., 2001). Similarly, sexual abuse has been documented as primarily related to internalizing

problems, such as mood and anxiety disorders, however, some research has documented that sexual abuse is predictive of the development of externalizing disorders, as well as SUDs (Auslander et al., 2002; Bulik, Prescott, & Kendler, 2001).

Previous research on forms of maltreatment and predictive relations with psychopathology documents largely consistent relations between punishment style and psychopathology. For example, severe corporal punishment in childhood has been documented to be significantly associated with the development of externalizing problem behaviors and psychopathology (Burke, Pardini, & Loeber, 2008; Jaffe, Caspi, Moffitt, & Taylor, 2004; Nix et al., 1999). Moreover, some research has suggested that relations between corporal punishment and subsequent problem behaviors can be understood through neurobiological mechanisms (Van Goozen, Snoeck, Fairchild, & Harold, 2007). Specifically, van Goozen et al. propose a model in which childhood corporal punishment influences low fear of punishment and subsequent physiological under-reactivity. Subsequently, the model suggests that physiological under-reactivity to punishment results in neurobiological deficits and forms of cognitive and emotional functioning which predispose antisocial individuals to seek out stimulation or take risks to enhance levels of arousal. Thus, some literature supports the notion that childhood physical punishment is significantly related to externalizing forms of psychopathology.

In contrast, recent research suggests that relations between childhood punishment severity and psychopathology during adolescence and young adulthood are rather more complex (Burke et al., 2008). Some research suggests that a severe style of childhood punishment is related to a wide range of psychopathology including: depression, anxiety and a range of externalizing psychopathology (Bender et al., 2007; Fergusson, Borden,

& Horwood, 2008). In addition, other research studies propose that when examined along with childhood sexual abuse, childhood punishment style has only a weak predictive relation with psychopathology (Fergusson et al., 2008). Such inconsistent findings have stimulated critiques of previous studies regarding the examination of relations between single forms of child maltreatment and specific adjustment problem outcomes (Higgins & McCabe, 2001; Manly et al., 2001; Senn et al., 2008). For example, Higgins and McCabe (2001) contended that assessing only one type of child maltreatment experience is methodologically flawed since specific forms of maltreatment rarely occur in isolation from one another. Thus, emerging research studies suggest that documenting relations between childhood maltreatment and adjustment outcomes should be conducted following the multidimensional assessment of childhood maltreatment experiences.

The potential heterogeneity in psychiatric outcomes related to childhood maltreatment experiences may be due to a range of factors in addition to maltreatment type, including the developmental timing of the onset of maltreatment, the chronicity of maltreatment, as well as the severity of abuse experiences (Browne & Finkelhor, 1986; Manly et al., 2001; Wyatt & Newcomb, 1990). In addition, psychological variables such as the child's perceptions of control and attribution of blame are important factors in the moderation of the impact of maltreatment experiences (Bolger & Patterson, 2001; McGee, Wolfe, & Olson, 2001). Consequently, recent research has indicated increasing attention among investigators to the examination of maltreatment contexts or competencies among maltreatment recipients, as they may moderate the impact of maltreatment experiences (Gephart, 1997; Zielinski & Bradshaw, 2006). Similarly,

youth who engage in maladaptive patterns of AOD use often report past maltreatment experiences, a broad range of problem behaviors and meet diagnostic criteria for psychiatric disorders (Knutson et al., 2005). Yet, among youth receiving AOD treatment, it remains unclear what types of childhood maltreatment experiences are associated with specific psychiatric disorders or maladaptive health risk behaviors including SRB.

Unexplained variability in the influence of child maltreatment on AOD treatment outcomes or on the development of psychopathology is recognized in practice and related literatures as a clinical and research challenge (Briere & Runtz, 1993; Clark et al., 2005; Manly et al., 2001; Senn et al., 2008). Specifically, the lack of knowledge regarding associations between specific types of child maltreatment experiences and related psychiatric disorders may hinder the development of appropriate prevention and treatment strategies. Such lack of empirical knowledge is unfortunate as these prevention and treatment efforts are designed to address particular needs of children and adolescents with significant histories of maltreatment (Saywitz, Mannarino, Berliner, & Cohen, 2000). Thus, the identification of psychiatric subgroups or individual disorders that are associated with specific maltreatment experiences among adolescents is important to enhance current knowledge about the nature of relations between maltreatment histories and the development of specific patterns of psychopathology (e.g., psychiatric profile subtypes).

#### *Maltreatment as a Risk Factor for SRB*

Childhood maltreatment experiences have been found to be significantly associated with adolescent SRB in both community and clinical samples (Lodico &

Diclemente, 1994; Medrano, Hatch, Zule, & Desmond, 2003; Newcomb, Locke, & Goodyear, 2003; Tubman et al., 2004; Senn et al., 2008). Furthermore, research has documented that adults diagnosed with STIs were more likely to report experiencing a history of childhood maltreatment compared to adults without STIs (Greenberg, 1999; Thompson, Potter, Sanderson, & Maibach, 1997; Senn et al., 2008). For example, Tubman et al. (2004) studied a community sample of young adults ( $N = 1,803$ ) aged 18 to 23 years who were followed up from an earlier school-based study of risk and protective factors for substance use among early adolescents. Consistent with previous research with clinical and community samples (e.g., Auslander et al., 2002; Elze, Stiffman, & Dore, 1999), Tubman et al. found significant associations between lifetime histories of abuse experiences and young adults' self-reported engagement in SRB.

When definitions of childhood maltreatment experiences are examined by specific types of adverse experiences, relations between maltreatment and indices of SRB are less clear. Specifically, while child sexual abuse (CSA) is associated significantly with increased risk for SRB participation across gender and all age strata, relations between indices of SRB and other types of maltreatment are not as consistent (Auslander, 2006; Brown, Cohen, Chen, Smailes, & Johnson, 2004; Malow, Dévieux, & Lucenko, 2006). For example, Brown et al. (2004) described sexual behavior trajectories of abused and neglected youth ( $N = 816$ ), ranging in age from 14 to 22 years. Brown et al. found that youth who reported two or more episodes of sexual abuse were more likely to experience earlier puberty, sexual intercourse and pregnancy than the comparison group of youth ( $N = 727$ ) who reported no history of abuse or neglect.

However, after controlling for sexual abuse, neither physical abuse nor neglect appeared to have a significant independent effect on the participants' self-reports of SRB.

While the study conducted by Brown et al. (2004) did not measure condom use, the study is particularly important as it suggests that childhood sexual abuse, compared to either physical abuse or neglect, may be a significant unique risk factor for youths' participation in some forms of SRB. In contrast, other studies documented that forms of neglect were associated with significant risk for SRB. For example, Klein, Elifson and Sterk (2007) examined relations between childhood neglect and SRB among women and found that a history of childhood neglect was associated significantly with risk for SRB participation. However, the sample of Klein included adult women, and it is unclear if the same relation would be identified among adolescents. Thus, with the exception of child sexual abuse among youth receiving AOD treatment, it remains unclear what types of maltreatment experiences may be related to increased risk for SRB participation.

#### *Conceptual Paradigms in the Study of Childhood Maltreatment Experiences*

In the current study, a developmental psychopathology paradigm were utilized as the guiding conceptual framework to investigate the sequelae of child maltreatment among youth with multiple behavioral and emotional problems. Such a conceptual framework is particularly advantageous to the current study as it provides the necessary conceptual framework to examine the processes behind the impact of severe adversities (e.g., child maltreatment) on subsequent adaptive and maladaptive developmental outcomes (Cicchetti, Toth, & Maughan, 2000). Developmental psychopathology is a multidisciplinary overarching paradigm that, within a developmental framework, unifies and integrates knowledge from multiple areas of inquiry with the goal of improving the

current understanding of psychopathology and its relation to atypical and normative adaptation (Cicchetti & Rogosch, 2002). Rather than adopting a specific theory to account for all developmental phenomena, developmental psychopathology seeks to integrate knowledge from multiple scientific disciplines at multiple levels of analysis (Cicchetti, 1991; Rutter & Sroufe, 2000). Given that developmental psychopathology is a paradigm that allows the investigation of normal and abnormal developmental processes and outcomes while unifying multiple disciplines, it is an appropriate perspective to investigate heterogeneity in psychopathology among multi-problem adolescents, as well as relations between psychopathology and co-occurring health risk behaviors.

Heterogeneity in developmental processes and outcomes has been examined in general within a developmental psychopathology paradigm via reference to heuristic concepts such as developmental pathways, multifinality and equifinality (Cicchetti & Rogosch, 1996,2002). The concept of developmental pathways was defined by Loeber and Farrington (1994) as “the expression of behavior development that is distinct from the behavior development of another group” (p. 890). Developmental pathways are formed through the dynamic and probabilistic interplay of, and transactions between, risk and protective factors for adaptive or maladaptive development (Cicchetti & Rogosch, 2002). To further clarify the definition of pathways, it is important to appreciate that developmental processes delineated via developmental pathways are dynamic and not static (Cicchetti & Rogosch, 1996). While pathways may represent an average of a group’s experiences, different combinations of risk and protective factors acting at different levels of analysis and across persons, alter the probabilities of specific

adaptive and maladaptive outcomes. Therefore, the developmental pathway concept refers to individuals' developmental outcomes emerging probabilistically from continual interactions among inter-individual, intra-individual and contextual factors at different levels of analysis.

The documentation of developmental pathways can promote the long-range goals of applied developmental science through the application of several of its core principles, including multifinality and equifinality. Originally derived from general system theory (e.g., von Bertalanffy, 1968), the principles of multifinality and equifinality are critical to elucidate the operation of developmental pathways, i.e., delineating the connections among specific sets of risk and protective factors and the probability of specific developmental outcomes. Multifinality refers to the totality of developmental processes which produce a diverse range of outcomes, both adaptive and maladaptive, from similar sets of risk or protective factors, subsequent to the input from other components of complex developmental systems (Cicchetti & Rogosch, 1996, 2002). For example, experiencing sexual abuse during childhood has been found to be associated with higher risk for a range of maladaptive outcomes during adulthood, such as depression (Cicchetti & Toth, 1998), sexual risk behaviors (Tubman et al., 2003) and alcohol abuse (Clark, De Bellis, Lynch, Cornelius, & Martin, 2002). However, some individuals experiencing similar adversities report none of these maladaptive outcomes. In contrast, equifinality refers to the totality of developmental processes by which a single outcome, adaptive or maladaptive, stems from a range of widely varying pathways (Cicchetti & Rogosch, 1996, 2002). For example, a diagnosis of major depression in a population can be influenced in part by multiple factors, such as



individual histories of neglect (Cicchetti & Toth, 1998), trauma experiences (O'Donnell, Creamer, & Pattison, 2004) or postpartum status (O'Hara & Swain, 1996). Underlying processes referenced by the concepts of equifinality and multifinality are assumed to be probabilistic, non-linear, and dynamic, in which individuals are viewed as self-organized rather than static (Gottlieb & Halpern, 2002; Gottlieb & Lickliter, 2007).

Application of the concepts of equifinality and multifinality, in the context of developmental psychopathology research, can assist investigators to appreciate more fully heterogeneity in the development of psychopathology, and subsequently to: (a) tailor more focused treatment strategies; (b) design more focused and selected prevention programming; and, (c) enhance current understanding of the etiology of different forms of psychopathology (Cicchetti & Aber, 1998; Clark, 2004; Rutter & Sroufe, 2000). The concepts of equifinality and multifinality highlight the significance of the ongoing interplay between risk and protective factors that potentially shape particular developmental paths to probabilistically increase or decrease the likelihood of specific adaptive or maladaptive developmental outcomes. Thus, the concepts of multifinality and equifinality can assist researchers by providing a heuristic device for depicting putative underlying mechanisms, processes and elements of developmental systems that contribute to the probabilistic emergence of adaptive or maladaptive outcomes. Applied developmental scientists can design and evaluate prevention and intervention programs, using their knowledge of the underlying mechanisms related to a range of adverse starting points (e.g., experiences of child maltreatment), as well as the associated pathways to psychopathology and more adaptive outcomes.

### *The Ecological-Transactional Model of Child Maltreatment*

Based on a developmental psychopathology framework and recent developmental system theories (e.g., dynamic system theories; Gottlieb & Lickliter, 2007), ontogenic development is conceptualized as a dynamic process characterized by sequential negotiations of stage-salient tasks which determine the emergence of either competence or incompetence. Exposure to significant adversities, such as child maltreatment, may act as significant impediments to the resolution of major stage-salient relational tasks. Subsequently, the individual's adaptive development may be compromised not only with regard to a specific age-salient developmental task, but the resolution of subsequent developmental tasks may be compromised if they are predicated on the presence of distal competencies. Within a developmental psychopathology perspective, child maltreatment sequelae have been conceptualized by an ecological-transactional developmental model (Cicchetti et al., 2000). According to the ecological-transactional developmental model, multiple inter- and intra-individual factors from different levels of analysis play dynamic roles in the underlying mechanisms that mediate or moderate the probabilistic sequelae of child maltreatment, including normative problem behaviors and health risk behaviors such as SRB.

Concomitant with a developmental psychopathology framework (Cicchetti & Toth, 2006), the ecological-transactional model is compatible with multiple disciplines and variable domains in explaining the confluence of risk and protective factors and their subsequent impact on the etiology, prognosis and outcomes of child maltreatment. A key focus of the current study is to identify the putative differential influences of child maltreatment experiences on the development of psychopathology and SRB. However,

certain levels of analysis, such as broad cultural factors or neurobiological deficiencies that exacerbate the impact of child maltreatment, are beyond the scope of the current study and therefore, are not addressed. The current study reviews particularly pertinent models describing putative mechanisms related to childhood maltreatment, psychopathology and SRB. Specifically, models are reviewed that address the deleterious effects of maltreatment on relations between individuals and significant others (e.g., attachment theory-based models), as well as specific concepts related to the self.

#### *Attachment Theory and the Ecological-Transactional Model*

Attachment theory, an empirically-supported ontogenic developmental theory, can be integrated within the ecological-transactional model to account for relations between child maltreatment experiences, psychopathology and SRB (Ainsworth, 1989; Bowlby, 1969/1982). While there is a lack of consensus regarding the operational definition of an attachment disorder (Hughes, 2003; Newman & Mares, 2007), developmental theorists regard secure attachment as an outcome resulting from adaptive negotiation of a key developmental task that provides the child the necessary confidence to explore his or her environment (Bowlby, 1969; 1982; Sroufe, 2005). A large body of research has provided empirical evidence supporting relations between child maltreatment and attachment organization styles, with youth who have experienced child maltreatment exhibiting less secure attachment styles (Alexander, 2003; Cicchetti, 1991; Toth & Cicchetti, 1996). Severely dysfunctional child-parent relations, characterized by families in which maltreatment occurs, are viewed by attachment theorists as significant barriers to the formation of adaptive attachment processes. These

barriers have been documented to increase the risk for the development of internalizing (e.g., Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997), or externalizing problem behaviors (e.g., Madigan, Moran, Schuengel, Pederson, & Otten, 2007), the prevalence of domestic violence offenses (Goldenson, Geffner, Foster, & Clipson, 2007) and a range of other related maladjustment behaviors (e.g., school dropout; poor academic performance; Lewis, Feiring, & Rosenthal, 2000). Similarly, the emergence of problem behaviors and emotional difficulties has been documented among children who are at increased risk for insecure attachment due to various maltreatment experiences (Cicchetti, Toth, & Lynch, 1995; Hankin, 2005; Toth & Cicchetti, 1996). Thus, the documented relations between attachment theory constructs, psychopathology and maltreatment experiences, suggest the potential utility of attachment theory in enhancing our current understanding of the mechanisms underlying relations between child maltreatment and the development of maladjustment and psychopathology.

The application of attachment theory to models of maltreatment experiences elucidates the putative mechanisms by which maltreatment experiences promote significant damage to self-concepts (Murthi, Servaty-Seib, & Elliott, 2006; Roche, Runtz, & Hunter, 1999; Schreiber & Lyddon, 1998; Shapiro & Levendosky, 1999). According to attachment theory, the formation of an individual's self-concept evolves over time from repetitive interactions with his or her significant others, including parents and other family members. Positive and supportive social interactions provide the foundation for the individual's adaptive self-perceptions (e.g., I am valuable or worthy to others) and his or her perceptions of "others" (e.g., I can rely on the presence and support of others). Various types of maltreatment, such as sexual abuse or emotional

abuse, have been documented to incur significant challenges to multiple dimensions of individuals' self-concepts, including self-awareness, identity coherence and resolution, relations with others, and relational schemas (Baldwin, Fehr, Keedian, Seidel, & Thompson, 1993; Briere & Rickards, 2007 ). Similarly, research has consistently documented the short- and long-term deleterious effects of child maltreatment upon children's relational constructs (e.g., relational schemas, child-parent relationship quality). These in turn have been shown to increase risks for the development of a range of maladaptive behaviors (Colishaw et al., 2007; Rogosch & Cicchetti, 2004).

According to an attachment-oriented conceptual framework, child maltreatment promotes maladaptive outcomes for maltreated children with regard to key representational models of significant others (Briere & Rickards, 2007). Specifically, maltreatment experiences during childhood may lead to the development of negative representational models of the self (e.g., in terms of self-efficacy and self-capacities), as well as the self in relation to significant others and attachment figures, which may result in the development of specific forms of maladjustment, such as internalizing problems (Bolger & Patterson, 2001; Kim & Cicchetti, 2006), externalizing problems (Jaffee, Caspi, Moffitt, & Taylor, 2004; McGee, Wolfe, & Wilson, 1997; Stouthamer-Loeber, Loeber, Homish, & Wei, 2001) and health-related risk behaviors (Cicchetti, 1991; Crittenden & Ainsworth, 1989; Kim & Cicchetti, 2003). For example, Kim and Cicchetti (2003) documented significant relations between child maltreatment, children's self concepts of social self-efficacy and the development of internalizing psychiatric symptoms. Kim and Cicchetti's findings suggest that, with children, social self-efficacy may serve as a protective factor in relations between maltreatment and internalizing

symptomatology. Specifically, self-efficacy has been documented to moderate the relation between maltreatment experiences and internalizing symptomatology. Similarly, in terms of SRB, Brown, Kessel, Lourie, Ford, and Lipsitt (1997) documented that maltreated adolescents have poorer self-efficacy concerning condom use than their non-maltreated peers. Thus, child maltreatment experiences challenge developmental milestones such as competencies associated with self concept or the perception of self in the context of social relationships. Available research suggests that experiences of severe adversity and subsequent deficits in interpersonal competencies may increase risk for the development of a range of maladaptive behaviors, including psychiatric problems and health-related risk behaviors, such as SRB.

Heterogeneity in adaptive and maladaptive outcomes related to childhood maltreatment experiences is congruent with the concept of multifinality in developmental psychopathology (Cicchetti & Rogosch, 1996). Specifically, multifinality refers to a developmental process in which one starting point (i.e., a significant adversity such as child maltreatment) may result in the development of qualitatively different outcomes (e.g., conduct disorder, depression, or health-related risk behavior). The differing outcomes are contingent on the influence of factors other than maltreatment that also operate in relevant developmental systems. For example, depending on the developmental context, certain protective factors can be instrumental in producing resilient outcomes (e.g., quality of perceived parental care, adolescent peer relationships; Collishaw et al., 2007; Masten, 2001; Masten & Powel, 2003; McGloin & Widom, 2001). The ecological-transactional developmental model incorporates empirically-supported constructs, such as self-concept and relations with others, to postulate

underlying mechanisms influencing pathways from child maltreatment to psychopathology and health-related risk behaviors, such as SRB. Hence, a focus of this study was to examine relations among risk factors, such as specific types of maltreatment experiences, and the development of heterogeneous psychiatric profiles and SRB among adolescents.

While the ecological-transactional model provides a sound developmental conceptual framework to account for relations among child maltreatment experiences, psychopathology and SRB, other empirical models have been similarly useful for stimulating and guiding empirical investigations of these relations. For example, the self-trauma model offered by Briere (1996) argues that individuals cope with traumatic events such as maltreatment experiences through self-processes involving internal resources (McCann & Pearlman, 1990). Therefore, Briere posits that an event is considered to be traumatic for an individual when an event compromises the individual's internal coping strategies and resources (i.e., self-resource capacities; Briere, 1996). According to the self-trauma model, psychopathology and related maladaptive behavior patterns are direct outcomes of internal conflicts that result from an individual's internal efforts to cope with trauma symptoms. Briere suggests that post-trauma symptoms are adaptive internal mechanisms in response to post-traumatic stress and that an individual's capacity to cope with trauma-related stress probabilistically determines the likelihood of adaptive versus maladaptive outcomes. Specifically, a wide gap between the demands of a traumatic event and the individual's capacity to cope effectively with adversity increases risk for the development of trauma symptoms such as flash-backs, dissociation, nightmares and other forms of re-experiencing. Accordingly, the self-

trauma model posits that children who have experienced sexual abuse have compromised self-capacities, i.e., the core mental resource for adaptive coping with trauma. Self-capacities that are challenged by adverse events, such as maltreatment experiences, require strong affect regulation, a construct that has been documented in the child maltreatment literature as being related significantly to externalizing problems, as well as health-related risk behaviors such as SRB (Cicchetti et al., 2000).

### *Heterogeneity in Maltreatment and Related Psychopathology*

Among youth undergoing treatment for AOD use problems, heterogeneity of assigned psychiatric diagnoses is highly prevalent (Crowley et al., 1998; Myers et al., 1995; Tomlinson et al., 2004). Similarly, child maltreatment has been previously documented to be significantly associated with a range of forms of psychopathology, including internalizing problems (Arata et al., 2007; Hankin, 2005; Toth & Cicchetti, 1996), externalizing problems (Arata et al., 2007; Jaffee et al., 2004; Tubman et al., 2004) and SUDs (Widom et al., 2006). In general, previous research on the consequences of child maltreatment has focused mainly on one type of maltreatment (i.e., child sexual abuse) in isolation from others (e.g., child neglect, psychological abuse), which has obscured the relative importance of (a) each predictor on later outcomes (Herrenkohl & Herrenkohl, 2007; Litrownik et al. 2005), and (b) the maladaptive outcomes related to multiple forms of maltreatment experiences (McGee et al., 2001; Rodgers et al., 2004). Thus recent studies have reiterated the scientific need to apply multi-dimensional approaches to the investigation of maltreatment experiences. Furthermore, some studies have been arguing that studying single maltreatment forms independently undermines the broader goal of understanding predictive relations



between child maltreatment and maladjustment in adolescence and young adulthood (Herrenkohl & Herrenkohl, 2007; Rodgers et al., 2004).

Some recent studies have applied a multidimensional approach to the study of multiple forms of maltreatment, psychopathology and health-related risk behaviors and have highlighted the importance of continuing this research focus (Higgins & McCabe, 2001; Manly et al., 2001; Rodgers et al., 2004). For example, Rodgers et al. (2004) examined relations between child maltreatment and health behaviors among women ( $N = 221$ ) recruited from a Veterans Administration (VA) primary care clinic. Overall, the findings showed that the more maltreatment types experienced by the participants, the more severe their scores were for self-reported substance use problems and SRB during adulthood. The findings of Rodgers et al. reflect the scientific importance of multidimensional assessment of childhood maltreatment experiences, particularly when the purpose of a study is to investigate relations between maltreatment and a wide spectrum of adverse health behaviors or health outcomes.

In contrast, other research that has identified idiosyncrasies in relations between single dimensions of childhood maltreatment experiences and maladaptive outcomes has emphasized the need to investigate the impact of child maltreatment by single types, as well as by multivariate patterns of maltreatment experiences. For example, Herrenkohl and Herrenkohl (2007) conducted an exploratory analysis to examine the potential unique and combined effects of various forms of child maltreatment on youth outcomes. The findings revealed that multiple maltreatment experiences showed the strongest relations with both internalizing and externalizing problems. When maltreatment types were examined independently, sexual and physical abuse were the only types of

maltreatment experiences for which independent, statistically significant relations were documented for externalizing problems. In addition, a significant independent relation was identified between sexual abuse and internalizing problems. Thus, the Herrenkohl and Herrenkohl (2007) study demonstrated the importance of (a) assessing multiple types of maltreatment experiences, and (b) structuring analyses to examine the unique and combined effects of different types of maltreatment experiences for the onset and maintenance of a range of forms of psychopathology.

Currently, little is known regarding the potential for differential sequelae of several developmental aspects of child maltreatment experiences (i.e., severity, chronicity and subtypes) among youth undergoing treatment for AOD use problems. In particular, the specificity of relations between dimensions of maltreatment experiences and dimensions of psychopathology or other adverse outcomes, are not well understood. Accordingly, it is not clear how and whether multiple maltreatment experiences are related to: (a) specific empirically-derived subtypes of co-occurring psychiatric diagnoses (i.e., naturally co-occurring patterns of psychiatric diagnoses); or, (b) specific health risk behaviors among multi-problem youth. Nevertheless, such an empirical investigation is warranted, given that the current review of relations between psychopathology and SRB concluded that different types of psychopathology may play unique roles in promoting participation in SRB. Specifically, the use of a multidimensional measure of child maltreatment experiences to predict patterns of psychiatric diagnoses were allowed the identification of relations between (a) particular patterns of maltreatment experiences and (b) specific psychiatric profiles (e.g.,

internalizing versus externalizing problems or their combination) which may be associated with more extensive SRB participation.

#### *Comorbidity among Multi-Problem Youth*

Several conceptual models have tried to explain the commonly occurring psychiatric comorbidity among individuals with substance use disorders (Merikangas et al., 1998; 2008) and other psychiatric diagnoses. One theory that has been used to address the common co-occurrence of problem behaviors, such as SRB and a range of psychiatric disorders and symptoms, is problem behavior theory (PBT; Donovan, Jessor, & Costa, 1988). Problem behavior theory has been empirically derived from studies that used exploratory factor analysis to test if one construct could account for significant covariation among empirical measures of different problem behaviors (Donovan et al., 1988). The fundamental theoretical rationale of PBT stems from research reporting that a range of normative exploratory problem behaviors (e.g., smoking, drug use, sexual activity) are highly correlated with one another and have similar risk factors.

Subsequently, within the PBT theoretical framework, the existence of one problem behavior (e.g., conduct problems or delinquent behavior) is thought to indicate a general, unspecified, and underlying tendency for unconventionality that is manifested in other problem behavior domains (e.g., AOD use and SRB). According to PBT, once an adolescent has a tendency to conduct legal or socially normative transgressions, he or she is more likely to display generalized patterns of transgressions across different behavioral domains. Child maltreatment is a source of interpersonal adversity that has been consistently documented to be associated with multiple indices of psychopathology and broader forms of maladjustment, and may therefore be conceptualized as one

common risk factor for the development of PBT's core construct of unconventionality (Clark, 2004).

Heterogeneity in psychiatric profiles and sub-syndromal symptoms weaken the evidence supporting the proposition of one common underlying factor for a range of problem behaviors and forms of psychopathology, as suggested by theories such as PBT. A large body of research suggests that PBT is limited conceptually and is not empirically supported (Guilamo-Ramos, Litardo, & Jaccard, 2005; Willoughby, Chalmers, & Busseri, 2004). Conceptually, the grouping of a wide range of problem behaviors under a single problem behavior syndrome is viewed by some researchers as limited and theoretically insufficient (Farrell, Sullivan, Esposito, & Meyer, 2005; Willoughby et al., 2004). The main criticisms lodged against PBT challenge the assumption of a general underlying trait-like syndrome. Several empirical studies that have adopted a multidimensional approach (e.g., developmental psychopathology) were able to more adequately account for a range of problem behaviors among children or adolescents (Farrell et al., 2005; Guilamo-Ramos et al., 2005; Rogosch & Cicchetti, 2004; VanZile-Tamsen, Testa, Harlow, & Livingston, 2006; Willoughby et al., 2004).

Substance use research has often adopted two conceptual frameworks to describe the putative underlying mechanisms of the common association of SUDs with other psychiatric conditions (i.e., comorbidity): (a) the shared variance of comorbidity stemming from other common risk factors, and, (b) the causal etiologic explanation for comorbidity (Merikangas et al., 1998; 2008). Overall, substance use research has been inconclusive with regard to specific factors governing the common co-occurrence of SUDs and other psychiatric disorders (Kandel et al., 1999). However, it is currently

accepted among comorbidity researchers that both shared variance and causal relations exist between substance use disorders and other psychiatric disorders (Dierker et al., 2001; Merikangas et al., 1998; 2008). Similarly, Rutter (1997) provides compelling conceptual explanations for the frequent co-occurrence of psychiatric disorders by drawing parallels to pathophysiology in the medical field. For example, Rutter (1997) suggests that the common comorbidity of psychiatric diagnoses could be artifacts that stem from measurement error, artificial syndromal sub-divisions or syndrome overlap. The testing of the conceptual alternatives proposed by Rutter to explain comorbidity is beyond the scope of the current study. However, the identification of potentially differential relations between maltreatment types and sub-groups of adolescents representing different patterns of psychiatric comorbidity is an important initial step. In tandem with Rutter's conceptual formulations (Caron & Rutter, 1991), the primary aim of the current study is to adopt a multidimensional measurement approach to understand more fully relations among maltreatment experiences, psychiatric disorder comorbidity and health risk behaviors.

As a conceptual paradigm, developmental psychopathology encourages the use of multidimensional measurement approaches for the investigation of maltreatment and potential developmental outcomes such as psychopathology (e.g., Cicchetti & Rogosch, 2002). Comorbid psychiatric diagnoses are prevalent among multi-problem youth (Deas & Thomas, 2002) and associated significantly with (a) adverse effects on AOD treatment outcomes, and (b) poorer overall adjustment outcomes. Therefore, comorbidity should be further investigated to enhance current knowledge regarding its potential influence on broader patterns of adjustment, such as participation in SRB.

Specifically, conceptual models such as the ecological-transactional model draw upon core principles of developmental psychopathology and can guide studies of putative relations between childhood maltreatment experiences and the subsequent development of psychopathology. As a comprehensive model, it elucidates how child maltreatment can eventuate in psychiatric comorbidity, as well as promote participation in SRB among multi-problem adolescents. The current study examines whether adolescents reporting specific types of childhood maltreatment experiences are more likely to report specific patterns of psychopathology (e.g., sexual abuse and increased internalizing symptoms) or a broader range of heterogeneous clinical outcomes (e.g., sexual abuse with SUD symptoms, with high, moderate or low levels of internalizing symptoms).

*Methodological Approaches: Variable versus Person-Centered Approach*

Based on the previous review, the explanation of a broad range of co-occurring problems among adolescents as a unitary derivative of a single shared underlying mechanism is potentially empirically and conceptually flawed, as it attempts to account equally and simultaneously for adolescent AOD use, psychiatric symptoms and SRB. On the contrary, however, child maltreatment is a documented multifaceted source of adversity that can be related to a wide array of psychiatric problems and health risk behaviors. Thus, the sequelae of child maltreatment should be investigated using a multidimensional, as opposed to a unidimensional, measurement strategy. A traditional variable-centered analytical approach may be more likely to rely on unidimensional assumptions to identify specific variables that “best” predict SRB among individuals, while overlooking the contexts in which these variables influence participation in SRB. Such a reductionist methodological orientation has been described as a variable-centered

approach in the psychological research literature (Block, 1971; Magnusson, 2000; von Eye & Bogat, 2006).

Two underlying conceptual assumptions of the variable-centered approach are adapted from a reductionist model of human behavior in which variables, designed to explain a theory or phenomena, are minimized to simplistic terms. Accordingly, a reductionist theoretical framework is characterized by (a) reduction in the level of analysis used to formulate an explanation, and (b) reduction in the methods used in investigation (Magnusson & Stattin, 2006). Based on reductionist philosophy, key assumptions of the variable-centered approach are: (a) the “matter (i.e., psychological concept or object) of interest” lies behind the smallest independent static particles (i.e., behaviors or cognitions); and, (b) variables are taxonomic representations that operate independently to produce an outcome. While such a variable-centered analytic approach can be very useful for testing specific relations among variables within the framework of a specific measurement model, if used exclusively, it can be methodologically insufficient in cases when the description of heterogeneity is an important goal of applied developmental science. The disadvantage of using a variable-centered analytic approach to study relations between maltreatment, psychiatric disorders and health risk behaviors among adolescents is that it narrows the scope of scientific inquiry to relations among specific independent variables while ignoring the inherent heterogeneity among individuals, as well as overlooking the contexts in which individuals function. Increasingly, researchers from multiple disciplines have been providing empirical evidence supporting the utility of integrating, and taking advantage of, variable- and

person-centered analyses in developmental research (e.g., Muthen & Muthen, 2000; Von Eye & Bogat, 2006).

A person-centered analytic approach is defined as the application of multidimensional developmental models (e.g., the ecological-transactional model) that emphasize the integration of bi-directional and dynamic interactions between individuals' behavior and their environments into empirical research (Magnusson & Stattin, 2006). Accordingly, developmental models can be used to unravel the underlying mechanisms influencing individuals' maladaptive behaviors while recognizing the significance of their developmental contexts (e.g., maltreatment contexts and peer contexts in which SRB participation occurs). Thus, the study of SRB among AOD using adolescents who meet criteria for multiple co-occurring diagnoses and who report child maltreatment experiences may benefit via the integration of variable- and person-centered analytic strategies. Such an integrative approach may facilitate an improved current understanding of the complex mechanisms that underlie the co-occurrence of psychiatric diagnoses and SRB in the context of childhood maltreatment experiences among multi-problem youth. Specifically, the current study proposes to examine whether childhood maltreatment experiences uniformly increase risk for the development of multiple forms of psychopathology and SRB participation.

### *The Current Study*

Previous research has documented significant relations among maltreatment experiences, psychopathology, and health-related risk behaviors. However, to date, most of the research conducted with multi-problem adolescents: (a) did not use multidimensional measures of child maltreatment and SRB; (b) were guided by multiple



disciplines that often solely utilized variable-centered analytic strategies; and, (c) did not incorporate measures of child maltreatment, psychopathology and SRB in one structural model. Thus, the purpose of the current study is to examine structural relations among maltreatment experiences, psychopathology, and health-related risk behaviors using multidimensional measures in conjunction with person-centered analytic strategies. Therefore, the proposed study sought to address this gap in the research literature regarding multivariate associations of multiple forms of child maltreatment experiences with psychiatric symptoms and relations between psychopathology and HIV/STI risk behaviors among youth receiving AOD treatment.

In the current study, under the conceptual umbrella of developmental psychopathology, two analytic strategies were applied to undertake two different research issues. The first analytical strategy, a person-centered one, was used to identify a typology of patterns of psychiatric diagnoses and to compare them on multiple types of childhood maltreatment experiences. Such an analytic approach favors grouping individuals based on their naturally-occurring, person-level patterns of psychiatric diagnoses, as opposed to grouping individuals in an *a priori* manner based on specific diagnoses. Thus, in the application of a person-centered analytic approach, the classification of individuals based on natural groupings of different variables of interest (i.e., psychiatric diagnoses) may assist in improving our current understanding of the distal developmental contexts from which risk emerges. The second analytic strategy employed in this research project is a variable-centered one. Specifically, an SEM-based model was used to evaluate structural relations between different psychopathology profiles and multiple SRB indices.

A person-centered analysis was implemented using LPA, an innovative model-based clustering technique using structural equation modeling. Specifically, the current study employed this person-centered analytic technique to capture heterogeneity in patterns of psychiatric diagnoses within the framework of structural equation modeling. Documentation of heterogeneity in patterns of psychiatric diagnoses can provide the opportunity to examine whether specific configurations of psychiatric disorders are associated significantly with different dimensions of childhood maltreatment experiences. The utility of the constructed typology of psychiatric disorders can be evaluated by assessing the differential risk for SRB participation. Thus, the current study's analysis allowed testing of whether heterogeneity in psychiatric diagnosis patterns parallels differences in patterns of child maltreatment experiences, and subsequently, whether these psychiatric diagnosis clusters differ on mean indices of SRB.

#### *Research Questions and Hypotheses*

1. Are there latent psychiatric symptom patterns that can be classified into conceptually meaningful and statistically independent groups among AOD using adolescents?
  - a. The current study includes a person-centered analysis to identify discrete and non-overlapping subgroups of adolescents based on their unobserved self-reported psychiatric symptom patterns. For this taxonomic goal, no specific hypotheses were formulated regarding the number of distinct groups that would be derived from the analysis.

2. Is the extensiveness (i.e., severity, presence of multiple types) of child maltreatment experiences associated with particular patterns of psychiatric symptoms as defined by latent profile analysis of AOD using adolescents?
  - a. Specific types of maltreatment experiences will be associated significantly with particular psychiatric symptoms.
    - i. Experiences of childhood sexual abuse will be associated significantly with psychiatric subgroups characterized primarily by internalizing symptoms (Bolger & Patterson, 2001).
    - ii. Experiences of childhood physical punishment will be associated significantly with psychiatric subgroups characterized primarily by externalizing symptoms (Jaffee, Caspi, Moffitt & Taylor, 2004).
    - iii. No specific hypothesis will be offered regarding relations between experiences of childhood neglect and specific forms of psychopathology in adolescence because neglect has been found to be associated with multiple forms of psychopathology.
  - b. Childhood experiences of multiple forms of maltreatment will be associated significantly with membership in a subgroup with the most severe patterns of co-occurring psychiatric symptoms (e.g., Higgins & McCabe, 2001)

3. Do members of different psychiatric classes report statistically significant differences in mean scores for specific indices of sexual risk behaviors (SRBs)?
  - a. Classes with the most severe and extensive patterns of psychopathology will report the highest mean scores for participation in SRB.

## Chapter III: Methods

### *Participants*

The sample consists of 408 adolescents, including 287 males (70.3%) and 121 females (29.7%), receiving AOD use treatment services at two outpatient facilities in South Florida. The age of the participants ranges from 12 to 18 years old ( $M = 16.30$  years;  $SD = 1.16$ ). The ethnically diverse sample includes 108 (25.2%) non-Hispanic White, 181 (44.4%) Hispanic, 85 (20.8%) African American and 39 (9%) adolescents from other racial/ethnic groups. With regard to nativity, 339 (83.1%) of the participants were born in the United States, while out of the entire sample, 183 (44.9%) and 212 (52.0%) of their fathers and mothers (respectively) were also born in the United States. The majority of the sample ( $n = 304$ , 74.5%) reported their father, mother, or both as primary caregiver(s). Over half of the participants ( $n = 214$ , 52.5%) reported repeating one or more school grades.

### *Procedure*

Adolescent clients were approached within one week of enrollment in outpatient AOD treatment services and invited to participate in a brief motivational HIV/STI risk reduction intervention. Each adolescent client was screened for sexual activity participation during the prior six months as an inclusion criterion. Adolescents who: (a) were not sexually active during the previous six months; (b) exhibited significant cognitive deficits or developmental delays; (c) reported current suicidality; or (d) did not provide assent in addition to parental consent were excluded from study participation. Next, adolescents were assessed for DSM-IV psychiatric symptoms and were administered a battery of questionnaires before being enrolled in the HIV/STI risk

reduction intervention. In the broader NIAAA-funded intervention program, participants completed a 60- to 90-minute assessment focused on multiple variable domains including: substance use, sexual risk behaviors, demographics, as well as putative mediators and moderators of intervention impact. Trained graduate students collected data using a structured interview protocol on laptop computers at the facilities in which clients were receiving AOD treatment services. Active consent was obtained from both adolescents and a primary caregiver via procedures approved by the Institutional Review Board (IRB) at the sponsoring university. Participants were compensated \$25.00 for completing the baseline assessment.

### *Measures*

*Childhood maltreatment experiences.* The Child Abuse and Trauma Scale (CATS; Sanders & Becker-Lausen, 1995) 38-item measure was used to assess prospectively self-reported psychological maltreatment experiences during childhood or adolescence. The CATS contains three subscales that assess dimensions of childhood maltreatment history including: Neglect/Negative Home Atmosphere, Physical Punishment, and Sexual Abuse. The CAT subscales have been found by Sanders and Becker-Lausen (1995) to have acceptable internal consistency for the Total scale ( $\alpha = .90$ ), the Neglect subscale ( $\alpha = .86$ ), the Sexual Abuse subscale ( $\alpha = .76$ ), and the Punishment Scale ( $\alpha = .63$ ). In addition, they demonstrated the test-retest reliability of the CATS to be strong: for the Total scale ( $r = .89$ ), and the Neglect ( $r = .91$ ), Sexual Abuse ( $r = .85$ ), and Punishment subscales ( $r = .71$ ). The CATS demonstrates significant convergent validity with measures assessing similar abuse-related constructs (Higgins & McCabe, 2001). In the current sample, the CAT subscales were found to

have acceptable internal consistency for the Total scale ( $\alpha = .93$ ), and the Neglect ( $\alpha = .87$ ), Sexual Abuse ( $\alpha = .74$ ), and the Punishment subscales ( $\alpha = .65$ ).

*DSM-IV Psychiatric Symptoms.* Symptoms diagnostic of lifetime and past year DSM-IV psychiatric diagnoses were assessed via the Brief Michigan Version of the Composite International Diagnostic Interview (CIDI; Kessler et al., 1994). The CIDI is a comprehensive, fully-structured diagnostic interview developed by the World Health Organization (WHO, 1990) and based in part on the Diagnostic Interview Schedule (DIS; Robins, Helzer, Croughan, & Ratcliff, 1981). The CIDI is administered by trained lay interviewers as a means to assess disorders defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) of the American Psychiatric Association (1994). The administration of the CIDI included skip patterns and probe questions. The CIDI is an instrument that was developed to standardize assessment of psychiatric disorders in community settings and samples (Kessler & Üstün, 2004).

The CIDI has excellent interrater reliability (Wittchen et al., 1991; Wittchen, 1994), good test-retest reliability (Wacker, Battegay, & Schlosser, 1990; Wittchen, 1994), as well as sufficient validity based on concordance with clinical judgments (Janca, Robins, Cottler, & Early, 1992; Spengler & Wittchen, 1988) and structured clinical interviews (Spitzer, Williams, Gibbon, & First, 1990). Five aggregated symptom score categories, derived from the CIDI, comprised the component variables for the latent profile analyses. The five categories are: (a) Externalizing – Conduct Disorder(CD)/Oppositional Defiant Disorder (ODD) and Attention Deficit Hyperactivity Disorder (ADHD), Inattentive, Hyperactive subtypes; (b) Affective Disorders – Major Depressive Disorder, Dysthymia; (c) Anxiety Disorders – Generalized Anxiety

Disorder, Specific Phobia, Social Phobia, Panic Disorder; (d) Alcohol Abuse and Dependence Disorders; and (e) Drug Abuse and Dependence Disorders.

*Timeline Follow Back-Sexual Risk Behavior (TLFB-SRB)*. The standard TLFB instrument (Sobell, Sobell & Ward, 1980; Sobell & Sobell, 1992, 1996) was modified to collect data regarding adolescents' self-reported sexual risk behavior, including unprotected intercourse, number of partners, co-occurring substance use and sexual behavior (Carey, Carey, Maisto, Gordon, & Weinhardt, 2001). An adapted calendar format was used to assist in the recall of days when target SRBs occurred. Participants completed the TLFB-SRB for the 180 days immediately prior to the baseline assessment. Similarly adapted TLFB calendar methodology has been used in published research to assess SRB in persons with AOD use problems, such as adult men who have sex with men (MSM; Midanik et al., 1998) and psychiatric inpatients (Carey et al., 2001) with adequate reliability and validity. Using the TLFB-SRB method for data collection allowed participants to accurately report, with the aid of a physical calendar, the past six months of sexual activity including protected, unprotected and total number of sexual intercourses.

Several additional items were used as indicators of sexual risk for HIV/STI exposure. Participants were asked to report their total number of sex partners during the previous six months. In addition, participants were asked to report how often during the past six months they or a partner (a) drank alcohol before or during sex or (b) used any illicit drugs before or during sex. These last two items used the response formats: *always* (5), *usually* (4), *sometimes* (3), *rarely* (2), or *never* (1). These items were



included because they are recognized risk factors for HIV/STI exposure (Millstein & Moscicki, 1995; Kalichman, Tannenbaum, & Nachimson, 1998).

### *Missing Data*

The data used in the current study is cross sectional and was drawn from baseline interviews, therefore missing data was minimal for most variables (less than 8%). Where missing values occurred, values were imputed using Expectation-Maximization (EM) based methods with importance re-sampling as described in King, Honaker, Joseph and Scheve (2001). Specifically, a multiple imputation approach was used with five imputation data sets. The imputations were performed using the computer program Amelia (Honaker, Joseph, King, Scheve & Singh, 2003). Parameter estimates and standard errors across the imputed data sets were estimated using the formulas in King et al. (2001). Missing data bias was assessed by computing a dummy variable reflecting the presence or absence of missing data for each variable in the model. The dummy variable did not correlate with other variables in the model, or with the examined demographic variables.

### *Outlier Analysis*

Outlier analyses were undertaken prior to all major analyses. The analyses were both non-model and model based. For the former, multivariate outliers were identified by examining leverage indices for each individual and defining an outlier as a leverage score four times greater than the mean leverage. Identified outliers were checked for coding errors and analyses were conducted both with and without the outliers. Given that TLFB\_SRB involved accurate reports on behalf of the participants, outliers from these count data were not modified and were addressed by the application of alternative

analytic strategies (i.e. bootstrapping). In contrast, outliers among non-TLFB data were treated using winsorizing technique (Tukey, 1962). Winsorizing has been applied in the current data by adjusting outliers into a score that was two standard deviations of the mean score.

An additional set of outlier analyses were performed using model-based outlier analysis. An indicator for each latent variable (or, for the case of single indicators, using the only indicator available) was selected and then regressed onto the indicators for variables that the endogenous variable is assumed to be a linear function of. The current analysis used ordinary least squares regression in a limited information estimation framework. Standardized df-betas were examined for each individual and each predictor, as well as the intercept. An outlier was defined as anyone with an absolute standardized dfbeta larger than 1.0.

#### *Non-normality*

Multivariate normality was evaluated using Mardia's test for multivariate normality. In addition, univariate indices of skewness and kurtosis were examined to determine if the absolute value of any of these indices was greater than 2.0. Findings revealed that non-normality appeared to be present and thus bootstrapping was pursued as a solution. In the current study, *P* values and confidence intervals were estimated using bias-corrected methods reported in the result section. The number of bootstrap replicates was 2,000. In place of the traditional Chi Square test, the Bollen-Stine bootstrapped version of the test was performed and reported in the result section.

### *Indices of Fit*

Following the recommendations of Bollen and Long (1993), a variety of global fit indices were used, including indices of absolute fit, indices of relative fit and indices of fit with a penalty function for lack of parsimony. These include the traditional overall Chi Square test of model fit (which should be statistically non-significant), the Root Mean Square Error of Approximation (RMSEA; which should be less than 0.08 to declare satisfactory fit), the  $p$  value for the Test of Close Fit (which should be statistically non-significant), the Comparative Fit Index (CFI; which should be greater than 0.95); and the standardized root mean square residual (which should be less than 0.05). In addition to the global fit indices, more focused tests included examination of the standardized residual covariances (which should be between -2.00 and 2.00) and modification indices (which should be less than 3.84).

### *Limited Information Estimation versus Full Information Estimation*

The theoretical questions posed in the current study are framed in the path diagram presented in Figure 1. Research suggests the applicable advantages of utilizing traditional SEM strategies to such classification models (Muthen & Lubke, 2006). Structural equation modeling computer programs use full information estimation approaches where all of the path coefficients (and their standard errors) are estimated simultaneously in the context of the full system of linear equations implied by the model. The same statistical algorithm (e.g., maximum likelihood estimation) is applied throughout. An alternative approach is to use a limited information estimation strategy. Such an alternative approach uses the path diagram to identify the structural relations of interest and to define the relevant linear equations. However, the overall model is broken

up into pieces and estimates of the coefficients are derived within each piece separately using statistical methods that are appropriate for that piece. Full information estimation approaches can yield more efficient estimates and also yield more plentiful statistics about goodness of model fit. However, the full information estimation approach also has disadvantages. For example, model misspecification in one part of the model can yield biased estimates in another part of the model. By contrast, in limited information estimation, specification error is compartmentalized. Limited information estimation also allows one to tailor the analytic method to the nature of the variables involved in a given piece of the overall model (e.g., logistic regression, ordinal regression, OLS regression, Poisson regression). Limited information estimation approach was used in the current analysis.

#### *Statistical Power and Sample Size Considerations*

To determine an appropriate sample size, SEM requires that in addition to statistical power, issues of the stability of the covariance matrix and the use of asymptotic theory be taken into account. In terms of power, it is difficult to evaluate the power associated with specific path coefficients in complex SEM models because of the large number of assumptions about population parameters that must be made. A rough approximation of power can be obtained by using a limited information approach with the multiple univariate analysis model implied by Figure 2. Such a strategy permits the use of traditional power analysis software to gain a sense of sample size demands (Jaccard & Wan, 1996). Specifically, the current study used G-Power (Baguley, 2004; Cunningham & McCrum-Gardner, 2007) to conduct a post-hoc statistical power analysis (i.e.,  $1-\beta$  is computed as a function of  $\alpha$ , the population effect size, and  $N$ ).

For a contrast of means between three independent groups and an effect size corresponding to Cohen's definition of a medium effect size (i.e., a  $d$  value of 0.30), the current study sample size (i.e., 408) achieved power of 0.99. When contrasting the smallest class (i.e.,  $n = 34$ ) with the other two classes, and an effect size corresponding to Cohen's definition of a medium effect size (i.e., a  $d$  value of 0.30), the achieved power was reduced to .56. The proposed overall sample size for this study appears to be adequate in terms of power. In terms of asymptotic theory and covariance stability, simulation studies tend to suggest that sample sizes of 100 to 125 or larger often yield adequate results given that reasonably reliable measures are used (i.e., reliabilities greater than 0.65) and with a reasonable number of indicators per latent variable (Jackson, 2003; Jaccard & Wan, 1996). The sample size in the proposed study ( $n=408$ ) exceeds this standard.

#### *Family-wise Error Rates and Multiple Contrasts*

At times, multiple significance tests were conducted within a family of contrasts and there was concern for inflated experimentwise error rates. The robustness of the current study's conclusions was compared both with and without statistical corrections for multiple tests, using the strategy discussed in Jaccard & Guilamo-Ramos (2002). In general, the current study used a Holm adjusted modified Bonferroni method (Jaccard, 1998) for controlling experimentwise error rates, which is more powerful than traditional Bonferroni methods.

#### *Data Analytic Plan*

A person-centered analytical approach (e.g., von Eye & Bogat, 2006) was used to guide the examination of psychiatric diagnosis profile heterogeneity and the co-

occurring expression of health risk behaviors among adolescents undergoing AOD treatment. The analytic technique used in the current paper is Latent Profile Analysis (Lazarsfeld & Henry, 1968; Lubke & Muthen, 2005, 2007). While a variety of analytic techniques have been designed to examine the issue of heterogeneity in data addressing developmental and other types of questions, the flexibility of implementation of LPA renders it appropriate and advantageous for the analytical requirements of the current study. Regarding the advantages of using LPA to investigate heterogeneity in a clinical sample of adolescents, LPA belongs to a family of *model based methods* (e.g., Latent Class Analysis; LCA) that have the advantage of being able to be examined in alternative models, as opposed to non-model based analytic techniques, such as K-means clustering [see Vermunt & Magidson (2002) for a discussion of these differences].

#### *The Current Classification Model*

*First stage:* Psychiatric symptom patterns were identified from 5 diagnostic subgroups (observed continuous variables) and were used as observed variables regressed on latent factors. The psychiatric subgroups included: Anxiety, Affect, Externalizing, Drug and Alcohol symptoms. *Second stage:* the resulted 3 Latent classes (noted in 2 circles in diagram 1) were unordered and were identified as K-1 discrete subtypes of psychiatric subgroups (Nock, Kazdin, Hiripi, & Kessler, 2006). *Third stage:* The three classes were regressed onto three covariates (i.e., Sexual Abuse, Punishment and Neglect). *Final stage:* A univariate analysis was conducted to compare the generated classes' means for six SRB indices.

## Chapter IV: Results

### *Parametric and Non-Parametric Correlational Analyses*

Table 1 summarizes Pearson bivariate correlations among continuous variables (i.e., three self-reported maltreatment experiences, psychiatric symptoms, and four indices of SRB) and Spearman correlations among ordinal variables (i.e., two SRB indices designed to measure co-occurring AOD use and sex) used in preliminary analyses in the sample of 408 participants with complete imputed data. Statistically significant correlation coefficients with  $p$  values less than .05 are noted in Table 1. The findings revealed significant covariations among most of the psychiatric symptoms assessed in the current study (e.g., alcohol and other drug abuse and dependence symptoms, anxiety symptoms, mood disorder symptoms, and externalizing symptoms) and other variables assessed, such as dimensions of maltreatment and indices of SRB. For example, significant bivariate correlations were documented between psychiatric symptoms and (a) self-reported maltreatment experiences related to neglect/negative home environment and sexual abuse, and (b) multiple forms of SRBs. The maltreatment subscale scores for Neglect/Negative Home Environment was significantly correlated with all five categories of psychiatric symptoms while Sexual Abuse was correlated significantly with substance abuse and dependence symptoms and mood disorder symptoms. In addition, significant correlation coefficients were identified between co-occurring AOD use and sex, and (a) psychiatric symptoms of all diagnostic subgroups, as well as (b) all of the other SRB variables assessed in the study.

### *Classification of Youth*

Latent profile analysis (LPA; Lubke & Muthen, 2005; 2007), is a model-based, person-centered, cross-sectional analytical technique. In the current study, LPA was used to classify observed continuous variables into categorical latent classes. In the current study, LPA permitted the classification of individuals into discrete, non-overlapping groups, based on their multivariate patterns of self-reported psychiatric symptoms. In addition, simultaneously within the same structural model, covariates were evaluated comparing the classes on self-reported severity of child maltreatment experiences. Self-reported psychiatric symptoms were entered into the model as continuous, dependent variables. The three CAT scales for childhood maltreatment experiences were entered as continuous covariates into the structural classification model.

### *Class Solution Selection Process*

The selection of an optimal number of classes in a latent class solution was based on a rigorous technical and interpretive process (Brown & Ramo, 2008; Nylund, Asparouhov, & Muthén, 2006). Table 2 summarizes all of the indices of model fit used in the current study to determine an optimal number of classes and the comparative parsimony of potential solutions including: the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), the sample-size adjusted BIC (i.e., the adjusted BIC), and the entropy index, which provides the average highest predicted probability of class membership. The AIC, BIC, and the adjusted BIC fit indices are statistics designed to balance two goals, i.e., maximizing the likelihood of class membership and keeping the model parsimonious (Ramo & Brown, 2007). The lower the value of coefficients



associated with these indices, the nearer the classified data was to a well-fitting model (Muthen & Muthen, 2000).

To provide further statistical evaluation for the selection of an optimal number of latent classes in a latent class solution, relative fit indices such as the Lo-Mendell-Rubin Likelihood Ratio Test of model fit (Lo, Mendell, & Rubin, 2001) and the parametric Bootstrapped Likelihood Ratio Test (BLRT; McLachlan & Peel, 2000) were used to compare the estimated model to a model with one fewer class than the estimated model. Lo, Mendell and Rubin (2001) developed their test to overcome limitations inherent in the likelihood ratio test (LRT). Within the context of mixture modeling, the test does not follow a traditional chi-square distribution, but analytically it derives an asymptotic distribution of the LRT. In contrast, McLachlan (1987) and McLachlan and Peel (2000) utilized a different approach to overcome the distribution problem associated with the LRT within a mixture modeling context. McLachlan and Peel (2000) developed the BLRT which applies bootstrapping methodology in order to imitate the sampling distribution of the LRT within a mixture modeling framework.

In addition to using pertinent statistical information, the selection of an optimal latent class solution was informed by relevant conceptual and practical considerations (Nylund et al., 2006; Ramo & Brown, 2008). Accordingly, the choice of an optimal latent class solution was guided by employing both statistical data and conceptually-informed judgments in an interpretive, iterative and reciprocal manner. When choosing an optimal latent class solution, it was necessary to consider both practice and theory in order to identify a sound and defensible latent class solution. Practical considerations included statistical indices of fit (e.g., AIC, BIC), as well as class size. For example

when running a four-part solution, two of the resultant classes were small in size (i.e.,  $n < 20$ ). Class solutions that include such undersized classes may compromise statistical power and thus are often considered less practical solutions.

Based on the information resulted from a rigorous technical and interpretive process, the current analysis supported the selection of an optimal 3-part latent class solution. The resulting average latent class probabilities based on the most likely latent class membership for a three-part solution are presented in Table 3. The results summarized in Table 3 revealed that the lowest average latent class probability was .930 for the category labeled the *high internalizing* class, .939 for the category labeled the *high alcohol* use class, and .989 for the category labeled the *low symptom* class. A value of 1.00 would indicate 100% accuracy in classification. Therefore, the resulting class probabilities suggested that at in any of the three generated classes, more than 93% of the class members were classified correctly.

The mean psychiatric symptom scores for the optimal three-part latent class solution are presented in Table 4. Between-class mean differences in psychiatric symptom scores described three classes with distinct multivariate patterns of self-reported psychiatric symptoms in this treatment sample of adolescents. Class 1 ( $n = 314$ ) was characterized by low average symptom counts for all symptoms assessed. Thus, it was labeled the *Low Symptom* Class. Members of the *Low Symptom* Class reported mean symptom counts of 16.9, 2.0, 6.0, 3.7, and 0.6 for externalizing disorder symptoms, affective disorder symptoms, anxiety disorder symptoms, drug abuse and dependence symptoms and alcohol abuse and dependence symptoms, respectively. Compared to the rest of the classes, Class 2 ( $n = 60$ ) reported the highest average symptom counts ( $M =$

5.7) for alcohol abuse and dependence symptoms. Thus, it was labeled the *High Alcohol Symptom Class*. Members in the *High Alcohol Symptom* class also reported mean symptom counts of 23.2, 4.0, 8.9, and 6.5 for externalizing disorder symptoms, affective disorder symptoms, anxiety disorder symptoms, and drug abuse and dependence symptoms, respectively. In contrast, Class 3 ( $n = 34$ ) reported the highest symptom counts for anxiety disorders ( $M = 21.4$ ) and mood disorders ( $M = 9.1$ ) and was labeled the *High Internalizing Symptom Class*. Similarly, members of the *High Internalizing Symptom* class reported mean symptom counts of 23.3, 6.5, and 2.3 for externalizing disorder symptoms, drug abuse and dependence symptoms and alcohol abuse and dependence symptoms, respectively.

The assignment of labels to classes was based on an examination of multivariate patterns of between-class similarities and differences in symptom counts. The findings of the between class comparison revealed that the two high psychiatric symptom classes showed similar high elevations of drug abuse and dependence and externalizing psychiatric symptoms. However, the *High Internalizing Symptom* class reported an average of 12 more anxiety disorder symptoms and an average of five more symptoms related to mood disorders compared to the *High Alcohol Symptom* class. In turn, the *High Alcohol Symptom* class reported an average of 4 more Alcohol abuse or dependence symptoms than the *High Internalizing Symptom* class. Demographic information for each of the three classes is presented in Table 4. With regard to the gender composition of each class, female adolescents comprised 52.9%, 41.7% and 24.8% of the members of *High Internalizing-*, *High Alcohol-* and *Low Symptom* class, respectively.

### *Between-Class Differences in Histories of Child Maltreatment*

The three symptom pattern classes that were identified via LPA (see table 4) were each simultaneously regressed onto the CAT maltreatment scales including: Neglect/Negative Home Environment, Sexual Abuse and Physical Punishment. The results are presented in Table 5. The data summarized in Table 5 show significant between-class differences in mean scores for two of the three CATS maltreatment scale scores, i.e., for Sexual Abuse and Neglect/Negative Home Environment. There was no statistically significant between-class difference in mean scores for Physical Punishment. Compared to other classes, the *High Alcohol Symptom* Class reported the highest maltreatment scores across three CATS scales. Specifically, compared to the *Low Symptom* Class, the *High Alcohol Symptom* Class reported significantly higher scores for Sexual Abuse and for Neglect/Negative Home Environment (C.R.= 1.96, 3.5,  $p < .05$ ; respectively). In addition, compared to the *Low Symptom* Class, the *High Internalizing* Class reported significantly higher scores for Neglect/Negative Home Environment (C.R. = 3.52,  $p < .01$ ). In contrast, there were no statistically significant between-class differences in mean scores for Physical Punishment across the three classes. No significant between-class differences in mean CATS maltreatment scores were documented for the two high symptom classes.

### *Between-Class Differences in SRB Indices*

To evaluate statistically significant between-class differences across the six SRB indices selected for the current study, a separate structural model employing multiple univariate analyses was used. The Holm-Adjusted-Modified-Bonferroni method (HAMB; Jaccard, 1998) was used to control experimentwise error rates. The HAMB

method is a more powerful technique to control for experimental error while not diminishing statistical power (Jaccard & Ramos, 2002). The structural model was used to evaluate between-class differences in scores for SRB variables while controlling for the non-normal distributions that often characterizes count data for health risk behaviors (Catania et al., 2005; Schroder et al., 2003a).

#### *Fit Indices for the Univariate Analysis Structural Model*

Univariate indices of skewness and kurtosis were examined and revealed absolute skewness and kurtosis values above 1.80 for all six of the SRB variables included in the current analysis. For SRB variables assessed via the TLFB-SRB such as protected intercourse episodes, unprotected intercourse episodes, and the proportion of unprotected intercourse, univariate indices were non-normally distributed. For these three variables, critical ratios were 25.28, 15.27, and 2.03,  $p < 0.01$ , respectively, for skewness; critical ratios were = 49.05, 15.76, and 2.03,  $p < 0.01$ , respectively for kurtosis. Similarly, examination of distributional statistics revealed that for the remaining three SRB variables including co-occurring sex and alcohol use, co-occurring sex and drug use, as well as past year number of sexual partners, univariate indices were non-normally distributed. For these three variables, critical ratios were 3.34, 5.66 and 16.77,  $p < 0.01$ , respectively for skewness; critical ratios were 4.43, 2.11 and 16.74,  $p < 0.01$ , respectively for kurtosis. To address the non-normal distributions of some variables used in analyses, 2,000 bootstrap replicates were performed. In subsequent model testing procedures, the traditional Chi-Square test was replaced by the Bollen-Stine bootstrapped version. After the implementation of bootstrapping, the results of

model tests were not similar across all indices, and thus, findings derived from both estimation approaches were reported (Table 6).

The Mardia's test for multivariate normality was employed to assess the multivariate normality of the SRB variables used in this final set of analyses. Traditional maximum likelihood methods of SEM assume that the distributions of continuous variables in the model are multivariate normal. The Mardia's test yielded a statistically significant result (critical ratio = 25.53,  $p < 0.01$ ) indicating a lack of multivariate normality associated with the variables included in the univariate analyses described above. The Mardia test has been documented to be over sensitive with sample size less than 2000 and thus may have resulted inflated estimate of multivariate lack of normality. However, in the current study a conservative approach was taken (by pursuing bootstrapping procedure) given the literature frequent documentation of data non-normality distributions when analyzing continuous SRB variables. Following bootstrapping recommendations of Bollen and Long (1993), a variety of global fit indices were used, including indices of absolute fit, indices of relative fit and indices of fit with a penalty function for lack of parsimony. These tests included: The Chi Square test of model fit, the Root Mean Square Error of Approximation (RMSEA), the  $p$  value for the Test of Close Fit, the Comparative Fit Index (CFI), and the standardized root mean square residual. In addition to the global fit indices, more focused tests of fit were pursued. These included an examination of the standardized residual covariances and the modification indices.

Further examination of the sample distributions revealed that the SRB data did not fit either a Poisson- or Negative Binomial-distribution (NB), these are non-

parametric distributions that are often prevalent among count data in which the variance and the mean are equal. Preliminary analyses showed that in the current study, the count data variable distributions were not appropriate for a Poisson or a NB regression given violation of its assumptions.

Figure 2 presents a structural model in which mean scores for six SRB variables were compared across the three classes. Results indicated that the Bollen-Stine  $p$  value for this model was not statistically significant, suggesting good model fit. Similarly, all traditional indices of global fit suggested good fit between the data and the model tested (GFI = 0.99; CFI = 1.00; RMSEA < 0.001; close fit test  $p > .931$ ; standardized RMR = 0.045). Examination of more focused fit tests (e.g., examination of modification indices, offending estimates, standardized residuals and evaluations of theoretical coherence) suggested adequate model fit.

#### *Sexual Risk Behaviors across the Three CIDI-Generated Psychiatric Symptom Classes*

Table 6 summarizes between-class differences in mean scores for six sexual risk behavior variables across the 3-part latent class solution. Univariate analyses indicated an overall pattern of significant between-class differences in mean scores for specific SRB variables across adolescents assigned to the three classes. Results suggested that significant between-class differences in scores for SRB indices were associated with the multivariate patterns of CIDI-generated psychiatric symptoms. Overall, compared to the *Low Symptom Class* the *High Internalizing* and *High Alcohol Symptom Classes* reported significantly higher scores for several SRB variables, indicating higher behavioral risk for exposure to HIV and other STIs. For example, compared to the *Low Symptom Class*, the *High Internalizing Symptom Class* reported higher scores for the past year number

partners (critical ratio = 2.09,  $p < .05$ ), co-occurring sex and alcohol use (critical ratio = 3.14,  $p < .01$ ), co-occurring sex and drug use (critical ratio = 3.51,  $p < .001$ ), total number of unprotected sex (critical ratio = 2.13,  $p < .001$ ) as well as mean proportion of unprotected sex (critical ratio = 2.03,  $p < .05$ ).

After bootstrapping, when comparing the *Low Symptom Class* and the *High Internalizing Symptom Class*, four SRB indices, i.e., past year number of partners, total number of unprotected sex, mean proportion of unprotected sex as well as mean unprotected sex ratio (95% *Confidence Interval*) failed to attain statistical significance. In contrast, compared to the *Low Symptom Class*, the *High Alcohol class* scored higher on total intercourse episodes (critical ratio = 2.20,  $p > .05$ ), co-occurring sex and alcohol use (critical ratio = 5.40,  $p < .001$ ), co-occurring sex and drug use (critical ratio = 4.41,  $p < .001$ ). Similarly, when comparing the low symptom class to the *High Alcohol Symptom class*, after bootstrapping, total unprotected episodes, mean proportion of unprotected sex, total number of past year number of partners, failed to attain statistical significance (95% *Confidence Interval*). No statistically significant between-class differences were found between the *High Internalizing Symptom* and the *High Alcohol Symptom Classes* on any of the six SRB variables included in this set of analyses.



## Chapter V: Discussion

### *Summary of Results*

The current study implemented an analytic strategy derived from a person-centered approach (e.g., Bergman, 2001; Bergman & Trost, 2006) in order to investigate multivariate relations among childhood histories of maltreatment, adolescent psychopathology and sexual risk behavior. Latent profile analysis (LPA) was used to construct a typology of adolescents receiving AOD treatment services via their self-reported DSM-IV psychiatric symptoms. Simultaneously, within the same structural model, the psychiatric symptom typology was evaluated by regressing class membership onto three covariates (i.e., self-reported CATS Sexual Abuse, Physical Punishment and Negative Home Environment/Neglect scale scores). The first two analyses were conducted to improve our current understanding of relations between patterns of psychiatric symptoms in adolescence and self-reported childhood maltreatment experiences. In a final step within an independent model, multiple univariate analyses were conducted to compare different psychiatric symptom classes for their mean scores for six continuous indices of SRB in adolescence.

The results of the LPA classification produced an optimal three-class solution derived from psychiatric symptom patterns, from which several conclusions can be drawn. First, the three classes that were identified were characterized by significant differences in multivariate patterns of psychiatric symptoms elevations (i.e., a *Low Psychiatric Symptoms Class*, a *High Alcohol Symptoms Class*, and a *High Internalizing Symptoms Class*). Second, the extent of the documented heterogeneity in the patterning of psychiatric symptoms was substantial, that is, related to multiple rather than single

psychiatric symptoms. Third, the optimal three-part classification solution documented that externalizing psychiatric symptoms were prevalent and elevated in all three classes. Fourth, self-reported childhood maltreatment experiences were associated significantly with assignment to membership in specific symptom classes that emerged from the LPA analyses. Last, significant differences in mean scores for six SRB indicators across the three psychiatric symptom classes indicated that more extensive patterns of psychiatric symptoms were associated with higher behavioral risk for HIV/STI exposure.

*Research Question 1: Are there latent psychiatric symptom patterns that can be classified into conceptually meaningful and statistically independent groups among AOD using adolescents?*

The current study evaluated whether latent (i.e., unobserved) patterns of psychiatric symptoms reported by adolescents receiving AOD treatment services could be classified into conceptually meaningful and statistically independent categorical classes. Findings bear significant similarities to previous classifications documented in research with multi-problem youth (Hoffmann et al., 2004; Potter & Jensen, 2003). For example, the current study joins an emerging literature that has documented significant psychiatric heterogeneity in youth populations (e.g., Halliday-Boykins et al., 2004; Hoffmann et al., 2004; Potter & Jensen, 2003). Congruent with previous research, the current study identified psychiatric patterns that were associated with differential risk for a range of problem behaviors (Houck et al., 2006; Potter & Jensen, 2003; Tubman et al., 2003). For example, similar to previous classifications, the current classification was able to identify a high risk pattern of elevated psychiatric symptoms (Potter & Jensen, 2003). In addition, congruent with previous research (Elkington et al., 2008; Hoffmann

et al., 2004; Tubman et al., 2003) the taxonomy used in the current study revealed the existence of a less maladaptive subgroup characterized by relatively low elevations for many psychiatric symptoms and lower behavioral risk for HIV/STI exposure (Elkington et al., 2008; Potter & Jensen, 2003; Tubman et al., 2003).

While the findings of the current study support prior research that has documented psychiatric heterogeneity in youth populations (e.g., Halliday-Boykins, Henggeler, Rowland, & DeLucia, 2004; Oshri, Tubman, Wagner, Morris, & Snyders, 2008; Tubman et al., 2003), the typological structure in the current study provides a unique advantage compared to previous classifications. Specifically, the current study identified two psychiatrically distinct subgroups with greater risk for HIV/STI exposure and one other at lower risk. A typological structure of two high risk versus one low risk groups allows for identification of unique and general risk factors in particularly high risk subgroups. In addition, the availability of one larger, lower risk group provides the study the opportunity to contrast other subgroups against it with greater statistical power. Thus, the physical structure of the typology used in the current study is advantageous, specifically when the aim is to identify patterns of psychiatric symptoms and their relation to previous maltreatment histories and current risk behaviors.

In contrast to previous classifications, the current study did not identify a pure subgroup with moderated psychiatric patterns. Several reasons can be used to explain specific differences in psychiatric classifications between the current and previous studies. First, the current study is the first to employ SEM methodology to classify psychiatric symptoms among youth receiving AOD treatment. The model-based SEM classification method used in the current study provides enhanced statistical

classification accuracy (Lubke & Muthen, 2005, 2007; Mun, von Eye, Bates, & Vaschillo, 2008; Vermunt & Magidson, 2002) compared to classification methods used in previous studies (Elkington et al., 2008; Hoffmann et al., 2004; Oshri et al., 2008; Tubman et al., 2003). Second, in addition to the psychiatric symptom-based typology, multiple maltreatment dimensions were incorporated the current study's model-based classification method. Thus, in terms of maltreatment severity, the *High Internalizing Symptom Class* is a moderated class as it did show moderate levels of maltreatment experiences.

Similarly, in the current study, the selection of an optimal number of classes was based on a rigorous technical and interpretive process (Brown & Ramo, 2008; Nylund, Asparouhov, & Muthén, 2006). The interpretive component leaves the researcher the necessary degrees of freedom to select a class solution that accounts for optimal conceptual and practical considerations (Brown & Ramo, 2008). In the current study, an interpretive flexibility was required to account for different patterns of child maltreatment experiences when selecting the optimal class solution, a complexity absent in previous classification attempts. In contrast to previous studies, the current typology was not derived solely from psychiatric symptom presentation, but also from multiple levels of multiple maltreatment dimensions.

The current study generated some unique findings related to the psychiatric symptoms typology that emerged from the LPA analyses. All classes, including the one with the least evidence of psychopathology (i.e., labeled the *Low Psychiatric Symptoms Class*), were characterized by elevations of one or more psychiatric symptoms. Given that the sample recruited for the current study consisted of adolescents receiving AOD

treatment services, and nearly half were referred from juvenile justice sources, some evidence of psychiatric symptom elevation was expected. In a sample such as this, drawn from a specific clinical population (i.e., all participants presented with AOD use), more homogeneity in clinical presentation could have been expected (i.e., all participants might be expected to present with SUD). The extent of the heterogeneity in psychiatric symptoms documented in the sample was not trivial. Existing research has documented that psychiatric comorbidity can be present in as much as 60% of participants in clinical samples of youth and young adults with AOD problems (Armstrong & Costello, 2002; Hoffmann et al., 2004). However, the sample in the current study was comprised of adolescents receiving AOD treatment services, and it was particularly important to document not only that there was significant heterogeneity in AOD related symptoms, but that there was also heterogeneity in co-occurring psychiatric symptoms, such as those that are components of anxiety, mood and conduct disorders.

The use of LPA in the current study resulted in the documentation of significant heterogeneity in psychiatric symptom patterns, similar to previous studies employing similar classification strategies with samples of multi-problem youth (e.g., Houck et al., 2006; Potter & Jensen, 2003; Rowe, Liddle, Caruso, & Dakof, 2004; Stewart & Trupin, 2003). Conceptually, my findings add to an emerging body of empirical research that refutes the findings of empirical studies guided by Problem Behavior Theory (PBT), e.g., Farrell et al., 2005; Willoughby et al., 2004, regarding co-occurring problem behaviors. For example, the current study provides a sharp contrast to PBT's working hypothesis, which posits that one latent construct accounts for significant covariations

among different problem behaviors (Donovan et al., 1988). While the results of the LPA analyses in the current study contradict this fundamental tenet of PBT, a close examination of the current study's findings reveals other areas of congruence with PBT. For example, the psychiatric symptom subgroups reporting the most severe patterns of psychiatric symptoms also reported the most severe behavioral risk factors for HIV/STI exposure. The documented significant association between psychiatric symptom elevations and increased SRB participation in the current study is compatible with parts of PBT's conceptualization regarding the sources of co-occurrence of problem behaviors. However, the current study's documentation of differential behavioral risk for HIV/STI exposure across the different psychiatric symptom classes adds additional evidence to the existing research literature (Farrell et al., 2005; Willoughby et al., 2004) that challenges PBT's hypothesis regarding the homogeneity of relations between different problem behavior types among youth.

*Research Question 2: Is the extensiveness (i.e., severity, presence of multiple types) of child maltreatment experiences associated with particular patterns of psychiatric symptoms as defined by latent profile analysis of AOD using adolescents?*

Significant relations between childhood maltreatment experiences, multivariate patterns of psychiatric symptoms and participation in specific indices of SRB replicate findings documented in other community and clinical samples of adolescents and adults (e.g., Brown et al., 1997; McClelland, Teplin, Abram, & Jacobs, 2002; Rothenberg et al., 2007; Tubman et al., 2003). The presence of severe patterns of child maltreatment among adolescents placed in the *High Alcohol Symptom Class* partially replicates the findings of previous research studies (Bolger & Patterson, 2001). For example,

associations in the current study between child maltreatment experiences and psychopathology, such alcohol abuse and dependence and externalizing problems replicates earlier research documenting these relations among adolescents and adults (e.g., Clark, De Bellis, Lynch, Cornelius, & Martin, 2003; Molnar, Buka, & Kessler, 2001). Similarly, the findings in this class of participants in the current study are congruent with existing research on short- and long-term responses to prior victimization involving maladaptive patterns of substance use (e.g., Randolph & Mosack, 2006). For example, heavy, episodic patterns of substance use to cope with ongoing trauma-related distress may promote the development of substance abuse and dependence disorders, as well as participation in SRB (Grayson & Nolen-Hoeksema, 2005). Motives for substance use before or during sex among adolescents or adults may include the avoidance of anxieties associated with sexual situations or the promotion of numbing of responses to past sexual traumas (Tubman, Langer, & Calderon, 2001; Van Den Bosch, Verheul, Langeland, & Van Den Brink, 2003).

In addition, the current study documented substantial heterogeneity in participant's childhood maltreatment experiences and relations with diverse patterns of psychiatric sequelae across the participant categories generated via LPA. My findings provide additional support for emerging lines of research that have documented heterogeneity (e.g., Farrell, Sullivan, Esposito, & Meyer, 2005; Willoughby et al., 2004), as opposed to research that has attempted to identify clinical homogeneity (e.g., Ary et al., 1999; Howard & Wang, 2004; Zhang et al., 2002), in the etiology and developmental course of youths' problem behaviors. Documentation of heterogeneity in childhood adversities, self-reported psychiatric symptoms, and risk behavior outcomes

provides empirical support for future research to identify multiple underlying factors in addition to general predisposition to deviance that account for heterogeneity in these relations (Mun et al., 2008; Mun, Windle, & Schainker, 2008; von Eye & Bergman, 2003). One limitation of research that supports PBT's linear conceptualization of co-occurring problem behaviors (e.g., Howard & Wang, 2004) is methodological in nature. Specifically, research that employs solely a variable-centered approach to evaluate this tenet of PBT is likely to face methodological challenges that may lead to conclusions in support of PBT when attempting to explain the co-occurrence of problem behaviors among youth (Magnusson & Statain, 2006). Specifically, heterogeneity in patterns is often unobserved and can be obscured in conventional variable-centered analytical approaches (von Eye & Bergman, 2003).

The current study adds to the existing research literature due to its utilization of an innovative person-centered analytic technique (Ramo & Brown, 2008; Von eye & Bogat, 2006). Latent profile analysis (LPA) is particularly advantageous when the purpose of the analysis is to document heterogeneity in health risk behaviors and patterns of psychiatric symptoms, which is often latent and unobservable in the application of variable-centered analytical techniques. Specifically, the person-centered analysis used in the current study made possible the identification of latent pattern-based subgroups of participants, often obscured via the use of traditional analytical techniques. The documentation of heterogeneity in psychiatric symptoms and related childhood maltreatment experiences associated with behavioral risk for HIV/STI exposure was also made possible by person-centered analytic techniques (Magnusson, 2000; von Eye & Bogat, 2006).



*Hypothesis 1: Experiences of childhood sexual abuse will be associated significantly with psychiatric subgroups characterized primarily by internalizing symptoms (Bolger & Patterson, 2001).*

The findings of the current study partially support this hypothesis and previous research that documented significant associations between child sexual abuse (CSA) and affective symptomatology (Toth & Cicchetti, 1996, 2002). The findings are congruent with previous research because participants with the highest self-reported scores for sexual abuse experiences also reported elevated scores for affective symptoms.

However, in contrast to the current study's hypothesis, findings revealed that the *High Alcohol Symptoms Class* reported the highest scores for childhood experiences of sexual abuse. Specifically, in the current study, the highest average scores for internalizing and affective symptoms were reported by the *High Internalizing Symptom Class*, membership in which was not associated with the highest scores for childhood sexual abuse experiences. According to relevant conceptual formulations such as those derived from Attachment Theory, experiences of child maltreatment are expected to challenge the normative development of specific self-capacities and affect regulation systems critical to the attainment of many foundational individual and interpersonal competencies (Briere & Rickards, 2007; Cicchetti & Valentino, 2006; Ford, 2005).

Impaired self-capacities or competencies have been documented in previous literature to be significantly associated with a range of affective symptoms (Toth & Cicchetti, 1996, 2002). However, in line with the findings of the current study, recent research suggests that child maltreatment outcomes are likely to contribute to diverse developmental outcomes, and in particular when individual or contextual variables (individual

dispositions, other childhood adversities, positive social resources) interact dynamically in broader developmental systems (Cicchetti & Valentino, 2006). For example, some research suggests that child maltreatment outcomes may vary widely depending on whether children attribute the adverse events to: (a) internal or external factors; (b) stable or unstable factors; (c) global or specific factors; and, (d) controllable or uncontrollable factors (e.g., Feiring et al., 2002; Kolko et al., 2002; Valle & Silovski, 2002).

The findings in the current study concur with existing research that suggests significant predictive relations between childhood maltreatment experiences and the development of alcohol problems during adolescence (Clark et al., 2005; Sartor et al., 2007). For example, Sartor et al. (2007) documented that maltreatment, and in particular childhood sexual abuse (CSA) experiences have a significant developmental impact on early alcohol use and subsequent alcohol dependence diagnoses. Specifically, Sartor et al. documented that CSA experiences were associated with higher rates of both lifetime alcohol use and AD, and that relations between CSA and risk for early alcohol consumption were evident at ages 12 and 13. While in the current study the highest average score for sexual abuse experiences was reported by the *High Alcohol Symptoms Class*, this class also reported significantly higher scores for SRB, compared to participants in the *Low Psychiatric Symptoms Class*. Among the multiple psychiatric symptoms and forms of child maltreatment experiences assessed in the current study, the findings suggested significant links among (a) experiences of CSA, (b) problem patterns of alcohol use and (c) and higher scores for indices of SRB. Thus, the obtained findings in my study add to previous research that suggests that one maladaptive developmental

outcome of CSA experiences includes a pathway involving problem alcohol use and more extensive participation in SRB in adolescence.

*Hypothesis 2: Experiences of childhood physical punishment will be associated significantly with psychiatric subgroups characterized primarily by externalizing symptoms (Jaffee, Caspi, Moffitt & Taylor, 2004).*

My results did not support the hypothesis that childhood physical punishment would be associated significantly with psychiatric symptom classes characterized primarily by externalizing symptoms. One possible interpretation of the failure to support this hypothesis may be that the severity of childhood punishment was not related significantly to externalizing behaviors among youth receiving AOD treatment services. However, such a conclusion is not congruent with previous research that has documented significant relations between the severity of physical punishment experiences and a range of psychiatric symptoms in both youth and adult populations (Bank & Burraston, 2001; Dishion, Spracklen, Andrews, & Patterson, 1996; Jaffee, Caspi, Moffitt, & Taylor, 2004; Nix et al., 1999).

A plausible alternative explanation for the lack of a significant relation between the severity of childhood physical punishment and psychiatric symptom class membership is methodological in nature. The sample included in the current study is comprised of multi-problem youth receiving treatment services. A treatment population such as this frequently reports externalizing problems (Brown et al., 1996; Davies, 2009; Disney et al., 1999; Wise, Cuffe, & Fischer, 2001). The normative endorsement of externalizing problems among a majority of study participants may have resulted in a form of measurement challenge that has been termed a ceiling effect (Wang, Zhang,

McArdle, & Salthouse, 2008). The term ceiling effect refers to a constraint imposed on a measurement tool's ability to detect values higher than a fixed upper limit (e.g., DSM-IV symptoms for conduct disorder). The value for a measure's upper limit in social science research is often determined by sample-specific characteristics. In the current study, normative endorsement of multiple externalizing psychiatric symptoms may have undermined the ability of subsequent analytic techniques to detect differences between subgroups in the sample for that specific variable due to a restriction of range of the scores reported. Therefore, ceiling effects present statistical challenges when they reduce score variability, which in turn compromises a measure's capacity to differentiate among groups of individuals (Wang et al., 2008).

*No specific hypothesis will be offered regarding relations between experiences of childhood neglect and specific forms of psychopathology in adolescence because neglect has been found to be associated with multiple forms of psychopathology.*

Findings also supported the cautionary stance that avoided formulating a hypothesis regarding relations between experiences of childhood neglect and specific forms of psychopathology in adolescence. Child neglect was documented in the current study to be highly prevalent among participants, with higher neglect scores reported by members of the two high psychiatric symptom classes. In terms of specific psychiatric symptom elevations, the findings documented that childhood neglect was related to a broad spectrum of psychiatric symptoms. These findings are congruent with existing literature that documented significant relations between childhood neglect and externalizing problems (Knuston et al., 2005), as well as the development of internalizing problems (Manly et al., 2001). In tandem with previous empirical studies,

the current study found that neglect was associated significantly with a broad range of indicators of psychopathology. Among adolescents in the *High Internalizing Symptom Class*, scores for child neglect were more elevated than were scores for the other two childhood maltreatment types. However, high average scores for childhood neglect were also documented among the participants in the *High Alcohol Symptoms Class*, suggesting that childhood experiences of neglect were associated with two, empirically distinct, high psychiatric symptom classes.

The presence of high scores for childhood neglect experiences among adolescents from the two high psychiatric symptom classes is congruent with the concept of multifinality, utilized by the developmental psychopathology paradigm (Cicchetti & Rogosch, 1996, 2002; Gottlieb & Tucker-Halpern, 2002). In the current study, extensive experiences of childhood neglect were associated significantly with membership in two classes characterized by high elevations of psychiatric symptoms. The significant relation documented between the extensiveness of child neglect experiences and membership in the *High Alcohol Symptom Class* is supported by previous research that suggests a possible path from childhood experiences of parental neglect to problem patterns of substance use in adolescence (Clark, Thatcher, & Maisto, 2005; Kilpatrick et al., 2000; Kilpatrick et al., 2003; Miller & Mancuso, 2004; Schuck & Widom, 2001; Widom & White, 1997). In addition, extensive experiences of childhood neglect was documented to be associated significantly with membership in the *High Internalizing Symptom Class*, supporting previous research that highlights significant relations between childhood neglect experiences and the manifestations of anxiety and depression symptoms among youth (Bolger & Patterson, 2001; Herrenkohl &

Herrenkohl, 2007). In contrast, the presence of high scores for externalizing symptoms in both high psychiatric symptom classes suggests that the concept of equifinality is also relevant. Accordingly, the current study demonstrates that experiencing extensive parental neglect in childhood is associated significantly with two maladaptive psychiatric profiles characterized in part by similarly high elevations of externalizing psychiatric symptoms.

One relevant methodological issue that can help to explain the degree of heterogeneity in mental health or health behavior outcomes attributed to a single source of childhood maltreatment experiences (e.g., neglect) is the common co-occurrence of multiple types of maltreatment experiences in childhood (e.g., Higgins & McCabe, 2001; Manly et al., 2001; Rodgers et al., 2004). Emerging literature suggests that types of childhood maltreatment rarely occur in isolation, and thus, developmental sequelae attributed to a single type of maltreatment may vary widely depending on the combinations of maltreatment types experienced at specific developmental stages. For example, some researchers propose that it is inadequate to assess only one type of childhood maltreatment experience since different forms of childhood maltreatment experiences often co-occur (Higgins & McCabe, 2001). Thus, in the current study, multiple forms of childhood maltreatment experiences were assessed simultaneously. In the current study, however, in specific analyses, other maltreatment types were controlled statistically while psychiatric symptom classes were regressed onto each childhood maltreatment type.

*Childhood experiences of multiple forms of maltreatment will be associated significantly with membership in a subgroup with the most severe patterns of co-occurring psychiatric symptoms (e.g., Higgins & McCabe, 2001)*

The psychiatric symptom classes generated via LPA demonstrated significant positive relations with the severity of childhood maltreatment experiences reported by participants in this sample. Overall, in line with previous research (e.g., Molnar, Buka, & Kessler, 2001), members of the *Low Psychiatric Symptom Class* reported the lowest scores for each type of childhood maltreatment assessed (i.e., Neglect/Negative Home Environment, Sexual Abuse and Physical Punishment). Adolescents classified into the two high psychiatric symptom classes reported significantly higher scores for Neglect compared to the *Low Psychiatric Symptom Class*. Similarly, congruent with previous research studies, the highest scores for childhood sexual abuse and neglect experiences were documented among adolescents classified into the *High Alcohol Symptom Class* (Clark et al., 2005), as well as among the *High Internalizing Symptom Class* (Manly et al., 2001). My findings regarding the co-occurrence of different forms of childhood maltreatment provided additional empirical support to the methodological recommendation, put forward by Higgins and McCabe (2001), to assess multiple forms of childhood maltreatment.

The findings of the current study regarding relations between the severity of childhood maltreatment types and patterns of psychiatric symptoms in adolescence, suggests that these relations are complex, rather than simple and linear in nature. A significant complexity is evident in the general lack of significant differences in scores for childhood maltreatment experiences between the two LPA-generated high

psychiatric symptom classes. Specifically, the *High Alcohol Symptom Class* and the *High Internalizing Symptom Class* did not differ from each other with regard to average scores for self-reported childhood neglect, childhood sexual abuse, or physical punishment. In addition, while the *High Alcohol Symptom Class* reported significantly higher mean scores for sexual abuse and neglect/negative home environment, compared to the *Low Psychiatric Symptom Class*, the *High Internalizing Symptom Class* reported significantly higher mean scores only for neglect/negative home environment, compared to the *Low Psychiatric Symptom Class*. The findings of the current study also indicated that differentiation between the two high psychiatric symptom classes (e.g., alcohol use symptoms, anxiety symptoms, and mood disorder symptoms) was not associated with differences in scores for childhood maltreatment experiences.

It would have been useful to identify additional statistically significant differences in childhood maltreatment experiences between the two high psychiatric symptom classes generated via LPA. The lack of statistically significant differences in childhood maltreatment experiences between the two high psychiatric symptom classes may be due in part to the limited range of forms of childhood maltreatment measured in the current study. In addition, the failure to detect statistically significant differences in childhood maltreatment scores between these the two high psychiatric symptom classes may be due in part to insufficient statistical power related to the small size of the two classes. The lack of differences in childhood maltreatment experiences between the two high psychiatric symptom classes is not likely due to gender as gender was distributed almost evenly across the two high psychiatric symptom classes. Thus, my findings support results of other recent empirical studies regarding complex relations between



multiple childhood maltreatment experiences and subsequent patterns of psychiatric symptoms among adolescents across gender groups (e.g., Clark et al., 2005; Dube et al., 2006).

*Research Question 3: Do members of different psychiatric classes report statistically significant differences in mean scores for specific indices of sexual risk behaviors (SRBs)?*

A main aim of the current study was to evaluate whether membership in different psychiatric symptom classes was associated with significant differences in self-reported behavioral risk factors for HIV/STI exposure. Similar to previous research studies (Tubman et al., 2003; Donenberg, Bryant, Emerson, Wilson, & Pasch, 2003; Potter & Jensen, 2003), the current study's findings revealed that classes defined as reporting the most severe and extensive patterns of psychiatric symptoms also reported the highest mean scores for specific indices of SRB. Univariate analyses documented significant between-class differences in mean scores for SRB indices, suggesting that SRB was associated with membership in the psychiatric symptom classes generated via LPA. Compared to the *Low Psychiatric Symptom Class*, the *High Internalizing Symptom Class* and the *High Alcohol Symptom Class* reported significantly higher mean scores for several SRB variables, indicating higher behavioral risk for exposure to HIV and other STIs among the adolescents in these classes.

Youth from the two high symptom classes showed idiosyncratic HIV/STI behavior risk differences from each other compared to the *Low Psychiatric Symptom Class*. The *High Internalizing Symptom Class* reported higher scores on more independent SRB indices. In contrast, the *High Alcohol Symptom Class* reported less

HIV/STI exposure risk in terms of number of sex partners, as well as total unprotected intercourse episodes. One reason for the differential behavioral risk between the high psychiatric symptom classes could be related to their unique patterning of psychiatric symptoms. Specifically, among youth in the *High Internalizing Symptom Class*, the combination of depression and anxiety symptoms can explain the class' increased behavior risk for HIV/STI exposure (Matos et al., 2004). In addition, high scores for externalizing symptoms combined with internalizing symptoms can also be an alternative etiological explanation for higher levels of SRB. In terms of maltreatment, the main difference between the two high symptom classes is related to the high scores for childhood sexual abuse among youth assigned to the *High Alcohol Symptoms Class*. Among youth assigned to the *High Internalizing Symptom Class*, neglect was the most severe childhood maltreatment form. Compatible with recent research (Dunn et al., 2007; Klein et al., 2007) on the diverse maladaptive consequences related to child neglect, youth assigned to classes with high scores for childhood neglect experiences were documented to report significantly higher scores for internalizing and externalizing psychiatric symptoms, as well as greater behavioral risk for HIV/STI exposure.

One additional factor that may partially explain differential HIV risk between the classes in the current study is gender. Given the disproportionate representation of female adolescents in the *High Alcohol* (42%) and the *High Internalizing* (51%) *Symptoms Classes*, one could hypothesize that child maltreatment risk sequelae would differently impact classes with proportionately more female members. However, gender was controlled statistically in the analyses that compared specific classes for each of the SRB indices. Thus, regardless of the specific levels and patterns of psychiatric

symptoms or type of child maltreatment experienced, the combination of the two factors (i.e., psychopathology and maltreatment) created the substrate for enhanced HIV/STI exposure risk subgroups within this clinical sample of adolescents (Ammon, Sterling, Mertens, & Weisner, 2005). Further investigation is needed to determine how specific psychosocial and behavioral HIV/STI risk factors are influenced by childhood histories of maltreatment, as well as related psychopathology (e.g., Donenberg et al., 2003).

The findings of the current study are supported by previous research studies that documented that anxiety symptoms are a potential risk factor for SRB participation among youth (Lehrer et al., 2006). In contrast to previous research based on a community sample that suggested that anxiety may serve as a protective factor for SRB participation (Tubman et al., 1996), findings in the current study showed that adolescents from the *High Internalizing Symptom Class* reported significantly higher scores for co-occurring sex and alcohol use, co-occurring sex and drug use, number of sex partners, total number of unprotected episodes and mean proportion of unprotected sex episodes compared to adolescents from the *Low Psychiatric Symptom Class*. However, the common co-occurrence of affective and anxiety symptoms among children and adolescents documented in previous research (e.g., Bernstein, 1991), as well as in the current study, prevents the findings of the current study from being conclusive regarding the relation between anxiety symptoms and SRB.

In my sample of adolescents receiving AOD treatment services, two separate high psychiatric symptom subgroups were identified that reported distinct patterns of SRB participation. While compared to all classes the *High Internalizing Symptom Class* showed significant risk on more of the indices, the *High Alcohol Symptom Class* showed

significantly higher behavioral risk on several SRB indices. For example, compared to the *Low Psychiatric Symptom Class*, youth in the *High Alcohol Symptom Class* reported significantly higher scores on total number of sexual intercourse episodes. In contrast, mean differences on specific SRB indicators with the *High Internalizing Symptom Class* failed to achieve statistical significance. The findings highlighted the multidimensional nature of behavioral risk for HIV/STI exposure, as well as the variable degree of SRB participation across the group of adolescent receiving AOD treatment services (Cooper, 2002; Kotchick et al., 2001; Varghese et al., 2002). Several unique childhood maltreatment experiences and psychiatric symptom patterns characterized the *High Alcohol Symptom Class* which may partially explain its unique HIV/STI exposure risk profile. In terms of childhood adversities, compared to the *Low Psychiatric Symptom Class*, sexual abuse experiences were most severe among the *High Alcohol Symptoms Class*. These findings confirmed previous research studies that documented relations between alcohol problems, sexual abuse and SRB (Clark et al., 2005; Dube et al., 2006).

#### *Implications for HIV/STI Prevention*

Among sexually active adolescents receiving AOD treatment services, the presence of co-occurring psychiatric disorders is associated with greater participation in SRBs (Elkington et al., 2008; Oshri et al. 2008). However, even the subgroup of clients who reported the lowest levels of psychiatric symptoms (i.e., the *Low Psychiatric Symptom Class*) reported levels of specific risk factors for HIV/STI exposure (i.e., unprotected sex, multiple sex partners) that may warrant significant prevention efforts. Therefore, this sample contained multiple homogenous subgroups presenting with specific, unique patterns of risk and protective factors for HIV/STI exposure and

transmission. The documented heterogeneity of psychiatric symptom patterns in the current sample has important implications for prevention intervention treatment manuals. Some researchers challenge the external validity of manualized interventions and argue that the most psychiatrically complex cases (e.g., youth with significant comorbidity) often are not included in general efficacy trials (Addis & Waltz, 2002; Henggeler, 2004). The current study's findings support recent research findings that advocate for the enhancement of communications and sharing of ideas between empirically-based research and the adaptation of treatment modalities (Henggeler, 2004; Noar, 2007; Toth, Manly, & Nilsen, 2008). In AOD treatment, clients at increased risk for HIV/STI exposure, similar to those in the two *High Symptom* classes, require that their maltreatment histories, as well as their AOD use problems are addressed in the context of HIV prevention programming. In contrast, counseling for HIV/STI risk reduction for adolescents in the *Low Psychiatric Symptom Class* would focus on maintaining consistent condom use, reducing concurrent substance use and sex, and increasing motivation for partner reduction, with developmentally and culturally appropriate presentations of these health behavior change strategies (Burrow, Tubman & Gil, 2007).

My findings regarding positive relations between high internalizing symptoms scores and increased SRB participation strengthen emerging research on the potential synergic impact of comorbidity between internalizing and externalizing symptoms on a range of health risk and problem behaviors (Clingempeel, Britt, & Henggeler, 2008; Clingempeel, Henggeler, Pickrel, Brondino, & Randall, 2005; Elkington et al., 2008). For example, Clingempeel et al. (2008) evaluated treatment condition effects in order to

examine the impact of comorbid forms of psychopathology on the mental health, physical health, and criminal behavior of 80 substance-abusing delinquents approximately five years later in emerging adulthood. The results revealed that emerging adults with comorbid disorders during adolescence scored higher on psychopathology, criminal behavior, and health problems. The Clingempeel et al. (2008) study is particularly relevant to the potential clinical implications of the current study given its findings that substance-using youth manifesting both internalizing and externalizing disorders exhibited more negative outcomes than youth with a comorbid externalizing disorder alone. In addition, Clingempeel et al. (2008) strengthens the current study's clinical implications as it suggested the need to create evidence-based HIV risk reduction interventions by incorporating psychiatric symptom complexity, which is related to child maltreatment experiences. Thus, the current study has the potential to provide information on psychiatric and developmental issues for HIV risk reduction programs that may have real-world implications for policy makers, program funders, and ultimately, for the health of adolescents and young adults (Toth, Manly, & Nilsen, 2008).

Members of other classes were distinguished from the *Low Psychiatric Symptom Class* by significant differences in their maltreatment histories, behavioral risk factors for HIV/STI exposure (i.e., AOD use before or during sex, unprotected intercourse), as well as by their significantly higher scores for self-reported psychiatric symptoms. Similarly, compared to the *Low Psychiatric Symptom Class*, clients classified as having the highest scores for alcohol use symptoms reported significantly more types of maltreatment experiences than the *High Internalizing Symptom Class* (i.e., neglect and

sexual abuse). While the presence of psychiatric symptoms may exacerbate adolescents' vulnerability to impulsivity and unplanned sexual activity, substantial empirical evidence suggests that enhancement of specific behavioral skills and cognitive competencies results in both short- and long-term reductions in specific behavioral indices of risk for HIV/STI exposure (DiClemente, Salazar, & Crosby, 2007; Ingram, Flannery, Elkavich & Rotheram-Borus, 2008; Jemmott & Jemmott, 2000). In addition, evidence suggests that AOD treatment has positive effects on the HIV/STI risk behaviors of many subgroups of multi-problem youth (e.g., Joshi, Hser, Grella, & Houlton, 2001).

It is crucial that HIV/STI prevention strategies, such as addressing specific trauma experiences and comorbid psychiatric disorders, be integrated into HIV prevention programs in health care and other settings (Thomas, 2003; Noar, 2007). For example, Sikkema et al. (2008) compared HIV risk reduction treatment efficacy between two treatment modalities among HIV-positive men and women with a history of CSA. Study findings revealed that a group intervention that addressed strategies for coping with past CSA was significantly more effective than an intervention that did not address CSA in reducing SRB among HIV-positive men and women with histories of sexual trauma. Sikkema et al.'s findings suggested that HIV/STI prevention efforts need to be tailored clinically in order to enhance potential HIV prevention effectiveness.

Similarly, my results concur with emerging research that advocates for tailoring HIV prevention programs to be more developmentally appropriate and to address prototypical psychological and social transitions of this period, e.g., with regard to identity, autonomy, and sexuality (DiClemente et al., 2007; DiClemente et al., 2008;

Solomon, Card, & Malow, 2006). For example, HIV prevention sessions can be utilized to guide adolescents toward making commitments to implement HIV/STI or AOD risk-reduction strategies based on their individual circumstances and goals. In addition, when youth are referred for substance use treatment, on the basis my findings, it is advisable to promote the integration of HIV/STI prevention services. However, for such an integration to be effective in engaging adolescent clients, staff training must enhance both the acceptance of adolescent sexuality and comfort discussing specific sexual behaviors with adolescent clients (Auslander, Rosenthal, & Blythe, 2006; Sharpe, 2003).

When offered to clients assessed with significant psychiatric symptomatology, as well as with diverse child maltreatment histories, treatment program's HIV/STI risk reduction goals and strategies for achieving them may need to be adapted to enhance their congruence with clients' specific histories and capacities. For example, to treat clients with co-occurring AOD and mood disorders who present with sexual abuse histories, one may have to consider how the adolescents' affect regulation, emotional security as well as perceived helplessness and hopelessness affects decision-making and their abilities to set future goals (Davies, Winter, & Cicchetti, 2006). To treat clients effectively with child maltreatment histories and an AOD use disorder, a therapist would need to attend to how substance use by adolescents affects their abilities to make thoughtful and informed decisions regarding health risk behaviors. Other combinations of symptom profiles among dually-diagnosed adolescents may present specific challenges for both AOD- and HIV/STI risk reduction that would be more appropriately addressed with specific and carefully defined treatment modalities (e.g., Bender, Springer & Kim, 2006). Thus, assessing multidimensional psychiatric symptom profiles



at baseline can inform the customization of integrated AOD- and HIV/STI risk reduction efforts. Adolescents with specific histories of maltreatment, as well as configurations of psychiatric symptoms may benefit substantially from tailored treatments, the surface and core features of which are congruent with the behavioral, cognitive and emotional features of their constellations of psychiatric symptoms (Noar et al., 2007).

### *Limitations*

The current study had several limitations. First, the cross-sectional design of the study does not permit explicit causal statements regarding relations among child maltreatment experiences, psychiatric symptoms, and behavioral indices for HIV/STI exposure, although the child maltreatment experiences reported are likely to have preceded chronologically the other outcomes assessed. Second, skip patterns in the computerized form of the CIDI used in the current study would tend to generate conservative patterns of psychiatric symptoms since they are likely to miss subsyndromal symptoms of depression, substance use problems, and PTSD (e.g., Peters, Issakidis, Slade, & Andrews, 2006; Wagner et al., 2000). Skip patterns are likely to influence the classification of symptoms while missing important sources of impairment in a treatment sample such as the one used in the current study. Third, while the current study examined a wide range of behavioral indices for HIV/STI risk exposure, important putative risk factors for HIV/STI exposure were assessed (e.g., alcohol-SRB outcomes expectancies, decisional balance factors) that were not included in the study. Thus, while the current study documented relations between adverse childhood experiences, psychiatric symptomatology and SRB, factors that may underlie these relations were not examined.

Fourth, while findings of my study may generalize to other samples of adolescents undergoing outpatient AOD treatment, they may not generalize to the experiences of adolescents undergoing inpatient treatment, or general population samples of adolescents. Last, the analyses summarized here were based on self-report data from a single source with all related limitations, although the instruments used to collect these data demonstrate acceptable reliability and validity. Moreover, self-report instruments for sensitive data such as child maltreatment experiences, substance use, and SRB are often regarded in the literature as the most reliable source (Meston, Heiman, Trapnell, & Paulhaus, 1998). Overall, while the current study has some limitations, it enhances considerably current knowledge about the heterogeneity of psychiatric symptoms in treatment samples of adolescents and their complex relations with multiple forms of childhood maltreatment experiences and behavioral risk for exposure to STIs, including HIV.

Multiple factors, beyond the child maltreatment histories documented herein, may account in part for the degree of heterogeneity documented in the current sample with regard to the endorsement of specific psychiatric symptoms. First, the adolescent participants were referred to AOD treatment from a variety of sources (e.g., self-referrals, community agencies, juvenile diversion programs, the public school system) that reflect diverse paths to accessing treatment services (e.g., arrest for drug possession, individual or family counseling, truancy). Drawing the sample from a AOD treatment facility would explain in part why all participants reported AOD use, but a subgroup (i.e., the *Low Psychiatric Symptom Class*), was distinguished more by the presence of conduct problems than AOD use problems. Second, differences in the experience and

reporting of specific psychiatric symptoms by racial/ethnic, gender or social class groups may have influenced the assignment of participants to classes in the current study (Alegria & McGuire, 2003). Third, the format used to administer questions regarding psychiatric symptoms (e.g., question ordering, use of screener questions) may have influenced systematically the symptoms endorsed by respondents (Jensen, Watanabe & Richters, 1999; Robins & Cottler, 2004).

#### *Direction for Future Research*

The current study was designed to serve as a preliminary cross-sectional documentation of the complex relations between different forms of childhood maltreatment experiences, adolescent psychopathology and behavioral risk for HIV/STI exposure. Future research may benefit from the current study's findings to design additional studies that examine, both experimentally and longitudinally, the nature of HIV/STI risk among youth with AOD problems. Specifically, future research can utilize the current classification methodology with longitudinal data to examine the long-term implications of psychiatric heterogeneity for health risk behaviors. Emerging research has generated empirical support for using advanced multivariate person-centered model-based classification methods with longitudinal data to account for unobserved heterogeneity in a wide range of forms of psychopathology or maladjustment (Mun et al., 2008; von Eye & Bogat, 2006). In addition, the current study collected self-report data on childhood maltreatment experiences. Future research may benefit if studies are designed to examine the sequelae of child maltreatment experiences from childhood to young adulthood, while accounting for related diversity in both psychopathology and health risk behaviors. Sexual risk behavior is but one of many forms of risk taking

behavior that endangers the health of our nation's youth. However, future investigations of other forms of health risk behavior (e.g., drinking and driving, substance abuse) and their complex relations with child maltreatment and adolescent psychopathology can enhance significantly current efforts to reduce rates of adolescent morbidity and mortality.

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## APPENDICES

APPENDICES

Table 1  
*Bivariate Correlations among Variables Included in the Structural Model*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	<i>M</i>	<i>SD</i>
1. Number of Partners	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.00	7.57
2. Total Sex Episodes	.04**	-	-	-	-	-	-	-	-	-	-	-	-	-	25.94	31.85
3. Total Unpr. Episodes	-.04	.75**	-	-	-	-	-	-	-	-	-	-	-	-	12.41	23.86
4. Av. Prop Unprt. Epis.	-.04	.74**	.99**	-	-	-	-	-	-	-	-	-	-	-	0.07	0.14
5. Sexual Abuse Score	-.02	.06	.08	.15**	-	-	-	-	-	-	-	-	-	-	1.22	0.46
6. Punishment Score	-.00	.04	.03	-.01	.17**	-	-	-	-	-	-	-	-	-	2.51	0.73
7. Neglect Score	-.02	.01	.13**	.09	.38**	.45**	-	-	-	-	-	-	-	-	2.15	0.78
8. AA/AD Symp. †	.04	.11*	.08	.09*	.22**	.12*	.25**	-	-	-	-	-	-	-	1.52	2.21
9. DA/DD Symp. †	.10*	.15**	.15**	.15**	-.08*	.04	.17**	.46**	-	-	-	-	-	-	4.36	3.54
10. Total Anxiety Symp.	.04	.01	.11*	.12**	.09	.09	.21**	.25**	.29**	-	-	-	-	-	7.71	5.46
11. Total Affect Symp.	.10*	.07	.10*	.05	.20**	.18**	.46**	.41**	.38**	.49**	-	-	-	-	2.89	3.98
12. Total Exter. Symp.	-.01	.05	.06	.04	.06	.12*	.25**	.31**	.37**	.42**	.32**	-	-	-	18.37	8.62
13. Sex w/ co-occur Alc	.26**	.22**	.15**	.13**	.05	.05	.06	.40**	.37**	.18**	.20**	.27**	-	-	2.06	1.11
14. Sex w/co-occur Drg.	.19**	.26**	.17**	.16**	.01	.04	.12*	.29**	.49**	.23**	.29**	.24**	.47**	-	2.51	1.37
15. Age	.11*	.25**	.18**	.18**	-.19**	-.05	-.03	.03	.23**	.08	-.00	.05	.14**	.23**	16.31	1.16

Note. \* $p < .05$ ; \*\* $p < .01$ . †AA: Alcohol Abuse Symptoms; AD: Alcohol Dependence Symptoms; DA: Drug Abuse Symptoms; DD: Drug Dependence Symptoms.

Table 2

*Model Fit Statistics for Two-, Three- and Four-Part Latent Class Solutions*

Model	Lo-M-R.	<i>p</i>	PBLR-T	<i>p</i>	AIC	BIC	BIC-Adj.	Entropy
Two-Class	231.80	.01	236.00	.00	11,123	11,240	11,148	.931
Three-Class	158.74	.37	161.68	.00	10,980	11,132	11,011	.945
Four-Class	93.31	.07	95.00	.00	10,902	11,091	10,942	.953

*Note.* Lo-M-R = Lo-Mendell-Rubin; PBLR-T = Parametric Bootstrapped Likelihood Ratio-Test; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BIC-Adj. = BIC Sample Size Adjusted.

Table 3

*Three-Part Latent Class Solution, Including Most Likely Latent Class Membership and Average Latent Class Probabilities*

Resulted Latent Classes	<i>n</i>	Proportion	One-class Probability	Two-class Probability	Three-class Probability
Low Symptom Class	314	0.769	0.989	0.009	0.003
High Alcohol Class	60	0.147	0.057	0.938	0.005
High Internalizing Class	34	0.083	0.035	0.036	0.930

*Note.*  $N=408$ .

Table 4

*Mean Scores for Psychiatric Symptoms for the Three-Part Latent Class Solution*

	<i>Low Symptom Class</i>		<i>High Alcohol Class</i>		<i>High Internalizing Class</i>		<i>Total</i> <i>N=408</i>
	<i>(n = 314)</i>		<i>(n = 60)</i>		<i>(n = 34)</i>		
<i>Psychiatric Symptom categories</i>	<i>M</i>	<i>S.E.</i>	<i>M</i>	<i>S.E.</i>	<i>M</i>	<i>S.E.</i>	
Alcohol Use	0.63	0.09	5.70	0.41	2.31	0.86	
Drug Use	3.72	0.20	6.50	0.52	6.54	0.80	
Anxiety	6.04	0.20	8.94	0.81	21.42	3.33	
Affective	2.01	0.22	4.06	1.53	9.14	1.59	
Externalizing	16.93	0.49	23.15	1.05	23.32	1.51	
Age	16.31	1.16	16.13	1.15	16.56	1.15	
Female ( <i>n=121</i> )	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>%/N</i>
	78	24.8	25	41.7	18	52.9	29.7

*Note.* *M*=Mean; *S.E.* = Standard Estimate; *C.R.* = Critical Ratio; Est. = Estimate; *C.R.* > 1.96 is equivalent to  $p < .05$ ;

Table 5

*Mean Scores for Childhood Maltreatment for the Three-Part Latent Class Solution*

	<i>Low Symptom Class</i> ( <i>n</i> = 314)		<i>High Alcohol Class</i> ( <i>n</i> = 60)		<i>High Internalizing Class</i> ( <i>n</i> = 34)		<i>Test Statistic</i> ( <i>N</i> =408)
	<i>M</i>	<i>S.E.</i>	<i>M</i>	<i>S.E.</i>	<i>M</i>	<i>S.E.</i>	<i>C.R. = Est./S.E</i>
Sexual Abuse	1.15 <sub>a</sub>	.32	1.49 <sub>b</sub>	.80	1.35 <sub>ba</sub>	.53	1.96*
Neglect	2.01 <sub>a</sub>	.71	2.60 <sub>b</sub>	.88	2.60 <sub>b</sub>	.72	3.50**
Punishment	2.46	.68	2.70	.90	2.58	.80	0.30

*Note.* \* $p < .05$ ; \*\* $p < .001$ . *M*=Mean; *S.E.* = Standard Estimate;  
*C.R.* = Critical Ratio; *Est.*= Estimate; *C.R.* > 1.96 is equivalent to  $p < .05$ ;

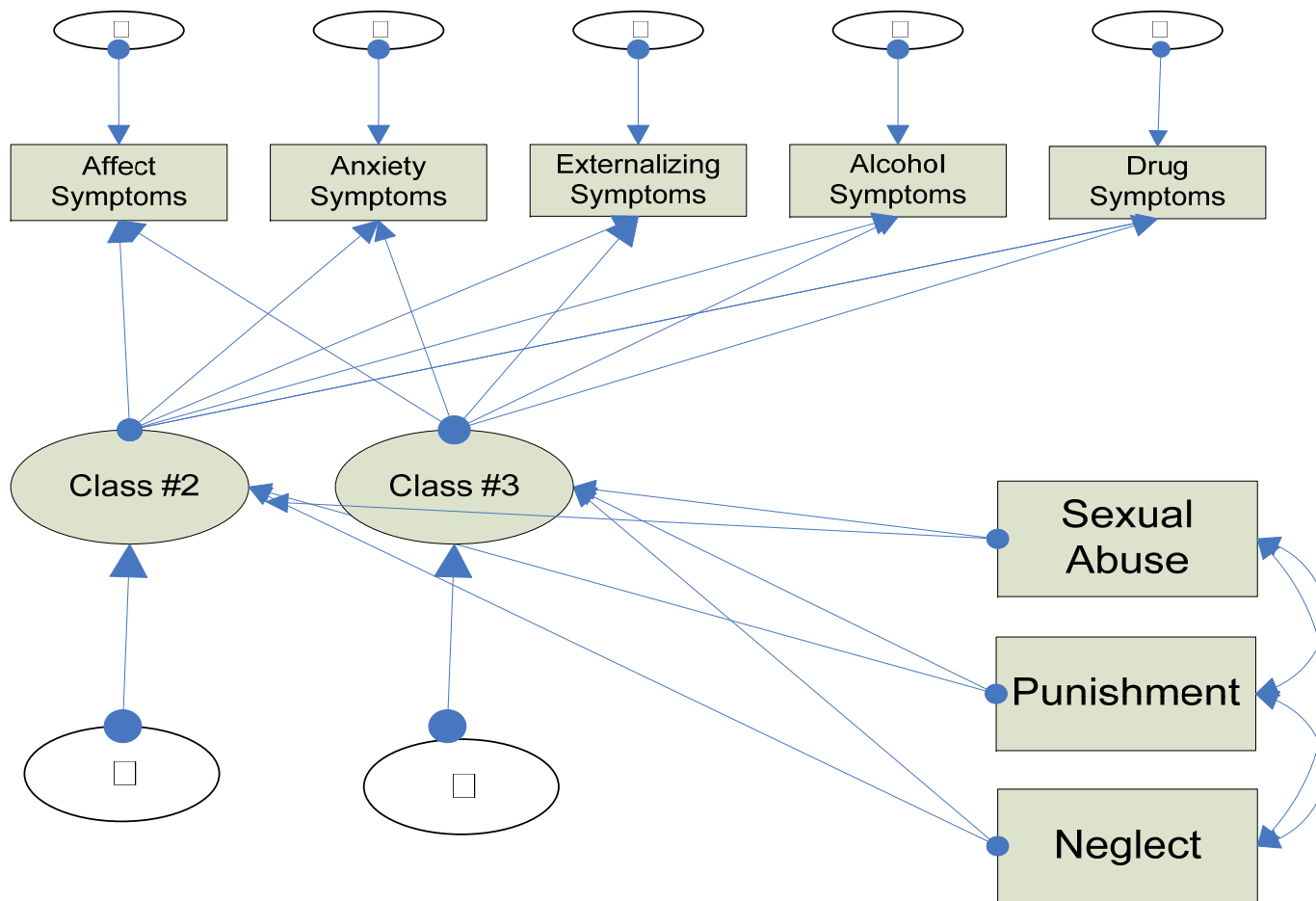
Table 6

*Mean Scores for SRB Indices for the Three-Part Latent Cluster Solution*

SRB Indices	<i>Low Symptom Class (n = 314)</i>		<i>High Alcohol Class (n = 60)</i>		Reg. Test Low vs. Alcohol	<i>Bootstrap Values</i>		<i>High Intern. Class (n = 34)</i>		Reg. Test Low. vs. Intern.	<i>Bootstrap Values</i>	
	<i>M</i>	<i>S.D.</i>	<i>M</i>	<i>S.D.</i>		<i>C.I.</i> <i>Low</i>	<i>Up</i>	<i>M</i>	<i>S.D.</i>		<i>C.I.</i> <i>low</i>	<i>up</i>
Alcohol & Sex	1.88 <sub>a</sub>	1.02	2.68 <sub>b</sub>	1.18	5.40**			0.45	1.11 <sup>††</sup>	2.52 <sub>b</sub>		
Drugs & Sex	2.32 <sub>a</sub>	1.31	3.10 <sub>b</sub>	1.33	4.41**	0.80	0.41 <sup>††</sup>	3.26 <sub>b</sub>	1.42	3.51**	0.32	1.29 <sup>††</sup>
Number of Partners	4.36 <sub>a</sub>	4.21	4.20 <sub>a</sub>	3.85	0.01	-1.05	1.14	5.83 <sub>b</sub>	5.76	2.09*	-0.14	3.83
Total Num. Episodes	23.86 <sub>a</sub>	29.26	31.98 <sub>b</sub>	35.73	2.20*	0.97	20.00 <sup>†</sup>	34.43 <sub>ab</sub>	43.84	1.63	-4.86	26.40
Total Unp. Episodes	10.94 <sub>a</sub>	20.97	14.56 <sub>ab</sub>	28.25	1.04	3.64	-2.77	22.13 <sub>b</sub>	35.95	2.03*	-2.36	22.79
Mean Unp. Ratio	0.05 <sub>a</sub>	0.12	0.08 <sub>ab</sub>	0.16	1.13	-0.17	0.07	0.12 <sub>b</sub>	0.20	2.13*	-0.11	0.13

*Note.* \* $p < .05$ ; \*\* $p < .01$ . <sup>†</sup> indicates significance after bootstrapping at level of  $p < .05$ ; <sup>††</sup> at level of  $p < .01$ ; *M* = Mean; Reg. Test = Regression analysis; C.R. = Critical Ratio; C.R. > 1.96 is equivalent to  $p < .05$ ; C.I. = Confidence Interval set at 95%.

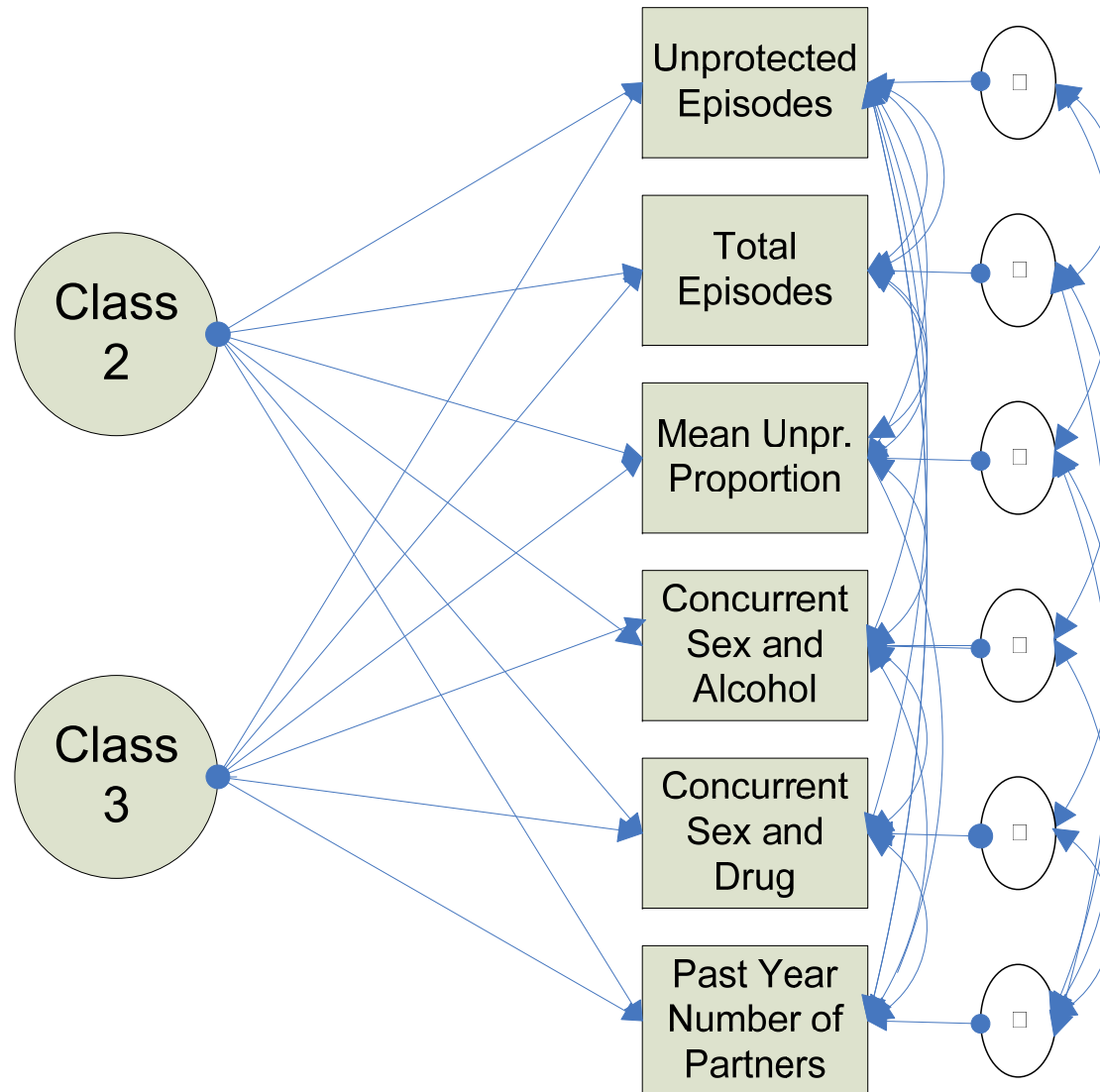
Figure 1



*Note.* Class #2 = High alcohol class; Class #3 = High Internalizing Class



Figure 2



*Note.* Class #2 = High alcohol class; Class #3 = High Internalizing Class

## VITA

### ASSAF OSHRI

- July 8, 2009 PhD candidate, Developmental Psychology  
Florida International University  
Miami, Florida
- 2001-2004 M.S., Developmental Psychology  
Florida International University  
Miami, Florida
- 1997-2000 B.A., in Behavioral Sciences  
Ben Gurion University  
Beer-Sheva, Israel
- 1996-1997 Diploma in French Language and French Civilization  
Sorbonne University  
Paris, France
- 1990-1993 High School Baccalaureate, Biology  
Habsor High School  
Zohar Center Israel

### PUBLICATIONS-

- Oshri, A. (2009). Review of the book *Sexuality in Adolescence: Current Trends*, edited by Susan Moore and Doreen Rosenthal. *Journal Of Adolescent Research*, New York: Routledge, 2006, 294 pp. (paperback).
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