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The Effect of Maltreatment and Trauma on Health Risk Behaviors among Adolescents Involved with the Child Welfare System: The Role of Psychological Symptoms

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The Effect of Maltreatment and Trauma on Health Risk Behaviors Among Adolescents Involved with the Child Welfare System: The Role of Psychological Symptoms

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Dedication

To the residents of Settlement Home's Nelson Cottage (2013-2014). Thank you for opening your hearts and your lives to me and for showing me the incredible strength and hope children who have endured terrible things can maintain.

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The Effect of Maltreatment and Trauma on Health Risk Behaviors Among Adolescents Involved with the Child Welfare System: The Role of Psychological Symptoms

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Childhood maltreatment, including abuse and neglect, remains a pressing social problem in the United States, with retrospective studies finding that up to 40% of adults report having experienced some type of maltreatment during their youth (Finkelhor, Turner, Shattuck, & Hamby, 2013). The consequences of maltreatment are widespread and long lasting, and can include post-traumatic stress disorder, depression, anxiety, aggression, delinquency, substance abuse, and suicidality (Gilbert et al., 2009). Although the effects of various individual forms of maltreatment and of a composite "adverse childhood experience" (ACE) score on rates of individual health risk behaviors in adolescence and adulthood have been documented, the pathway whereby childhood maltreatment leads to later engagement in risk behavior is still not well understood (Anda et al., 2007; White & Widom, 2007), and relatively little is known about the *psychological* factors that link childhood maltreatment to engagement in health risk behaviors.

This study used a subsample of adolescents from the second National Study of Child and Adolescent Well-Being (NSCAW II), a longitudinal study of youth involved with the child welfare system, to examine: 1) the effects of child maltreatment and trauma symptoms reported at baseline on engagement in health risk behaviors measured 36 months later, and 2) whether depressive symptoms and future expectations, measured 18 months after baseline, mediate the effects of maltreatment on health risk behaviors. Using structural equation modeling, this study found that both maltreatment and trauma symptoms were risk factors for later adverse outcomes, but that maltreatment was more consistently and strongly associated with *behavioral* outcomes (i.e. substance use and sexual behavior) while trauma symptoms were more consistently associated with *psychological* outcomes (i.e. depressive symptoms and future expectations). Results overall did not support the hypothesis that the psychological constructs examined mediated the effects of maltreatment and trauma on later health risk behaviors. Findings also identified early substance use as a critical risk factor for youth exposed to maltreatment, as substance use at baseline mediated the effects of maltreatment not only on later substance use but also on sexual risk behavior, as well as increasing risk for subsequent depression.

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Chapter 1: Introduction

In the United States, more than three million referrals per year are received by child protective services agencies, involving more than six million individual children (Children's Bureau, 2012). Although the majority of these referrals do not lead to removal of children from their homes, as of 2012, there were nearly 400,000 children living in foster care (Children's Bureau, 2013). Youth involved with the child welfare system are at increased risk for mental and behavioral health problems, educational difficulties, delinquency, and poor health (Burns et al., 2004; Kortenkamp & Ehrle, 2002). The high rates of exposure to abuse, neglect, and other adversities among children involved with the child welfare system are thought to be a primary contributing factor to these adverse outcomes (Stambaugh, Ringeisen, Casanueva, Tueller, Smith, & Dolan, 2013).

Childhood maltreatment, including physical, sexual, and emotional or psychological abuse, as well as neglect, remains a pressing social problem in the United States, with retrospective studies finding that up to 40% of adults report having experienced some type of maltreatment during their youth (Finkelhor, Turner, Shattuck, & Hamby, 2013). The consequences of maltreatment are widespread and long lasting, and can include post-traumatic stress disorder, depression, anxiety, aggression, delinquency, substance abuse, and suicidality (Gilbert et al., 2009). Exposure to maltreatment and other adverse childhood experiences has also been found to increase adults' risk of developing a wide array of physical health problems, including cancer and heart disease (Felitti et al., 1998). Furthermore, different forms of maltreatment and

childhood adversities tend to co-occur, particularly among children living in high risk environments, and appear to have a cumulative negative impact on adverse outcomes (Anda et al., 2007; Stambaugh et al., 2013).

Among the sequelae of maltreatment are increased rates of engagement in health risk behaviors during adolescence, including substance use, sexual risk behavior, and suicidal ideation and behavior. While these behaviors are actually quite common among adolescents, they are associated with both short and long term consequences, including early mortality and increased risk for mental and physical health problems in adulthood (Keeler & Kaiser, 2010). Just as adverse childhood experiences tend to co-occur, health risk behaviors also tend to be associated (Centers for Disease Control and Prevention [CDC], 2012).

Although the effects of various individual forms of maltreatment and of a composite "adverse childhood experience" (ACE) score on rates of individual health risk behaviors in adolescence and adulthood have been documented, the pathway whereby childhood maltreatment leads to later engagement in risk behavior is still not well understood (Anda et al., 2007; White & Widom, 2007). Research examining general protective factors for youth involved in the child welfare system has tended to focus on relationship and community level factors, finding that parenting competencies, parental or caregiver well-being, and positive peers are related to lower levels of delinquent and risk behavior among youth who have been maltreated (Developmental Services Group [DSG], 2013). Relatively less is known about the psychological factors that link childhood maltreatment to engagement in health risk behaviors. Although community

and family level factors are clearly highly relevant to the behavioral outcomes of "in-risk" youth (youth who have experienced a trauma or severe adversity; DSG, 2013), it is unfortunately not always possible to transform an adolescent's community or even successfully engage the whole family in treatment. Since it is especially important to identify risk modifiers that are amenable to change through intervention (Luthar, Sawyer, & Brown, 2006), there is a need to better understand the psychological processes that could be targeted in individual therapy with youth who have experienced maltreatment.

This study will address this gap using a subsample of adolescents from the second National Study of Child and Adolescent Well-Being (NSCAW II), a longitudinal study of youth involved with the child welfare system. This study will examine: 1) the effects of child maltreatment and trauma symptoms reported at baseline on engagement in health risk behaviors measured 36 months later, and 2) whether depressogenic cognitions, measured 18 months after baseline, mediate the effects of maltreatment on health risk behaviors.

Chapter 2: Literature Review

DEFINITION OF TERMS

Child maltreatment is defined as "any act of commission or omission by a parent or other caregiver that results in harm, potential for harm, or threat of harm to a child" and includes physical abuse, sexual abuse, psychological or emotional abuse, and neglect (Gilbert et al., 2009). Adverse child experiences include both maltreatment and other forms of family dysfunction, including interparental violence, parental substance abuse, parental mental illness, and incarceration of a family member (Felitti et al., 1998).

Health risk behaviors are defined as activities that increase one's chance of negative health consequences (Keeler & Kaiser, 2010). Suicidality, which can be conceptualized as a health risk behavior, refers both to suicidal ideation, or thoughts about suicide, and suicidal behavior, which is any intentional action that could cause a person to die. Non-suicidal self-injurious (NSSI) behavior, used interchangeably with intentional self-harm behavior and self-injurious behavior (SIB), and also often referred to as "cutting" or "self-mutilation", is typically defined as the deliberate, self-inflicted destruction of body tissue without suicidal intent and for purposes not socially sanctioned (Whitlock, 2010). Substance use includes cigarette smoking, alcohol consumption, and the use of all illicit drugs, as well as the intentional consumption of other intoxicants, such as inhalants (CDC, 2012). Sexual risk behavior refers to sexual activities that increase the risk of transmission of sexually transmitted diseases and/or of unwanted pregnancy, and includes unprotected sexual intercourse, early initiation of sexual activity, and having sex with multiple and/or high risk partners (CDC, 2012).

In the context of cognitive theory, cognitive schemas are defined as internally stored representations of stimuli, ideas, or experiences and include beliefs about the self, the world, and the future (Beck, 1967; Beck & Haigh, 2014). Self-schemas or self-

schemata are defined as "cognitive generalizations about the self, derived from past experience, that organize and guide the processing of self-related information contained in the individual's social experience" (Markus, 1977, p. 64). Depressogenic cognitions refer to negative schemas and beliefs, such as "I am worthless" or "I am unlovable." Self-esteem and self-worth, which will be used interchangeably, refer to one's overall evaluation of his or her worth or value as a person (Harter, 2012). In this way, beliefs of unlovability or worthlessness can be conceptualized as representing negative self-esteem or self-worth.

CHILD MALTREATMENT

Despite increased understanding of its causes and consequences, child maltreatment remains a prevalent and persistent problem in the United States. Maltreatment refers to both acts of commission (i.e. abuse) and acts of omission (i.e. neglect) by parents or caregivers that result in harm or threat of harm (Gilbert et al., 2009). Maltreatment includes: physical abuse, typically defined as the use of physical force or implements against a child that causes or has the potential to cause physical injury; sexual abuse, which includes any completed or attempted sexual act, sexual contact, or non-contact sexual interaction with a child by an adult; psychological or emotional abuse, defined as intentional behavior that conveys to a child that he/she is worthless, flawed, unloved, unwanted, endangered, or valued only in meeting another's needs; and physical and/or emotional neglect, which is the failure to meet a child's basic physical, emotional, medical, or educational needs, to provide adequate nutrition, hygiene, or shelter, or to ensure a child's safety (Gilbert et al., 2009).

Each year, more than 3 million referrals are received for child abuse and neglect allegations, involving around 6 million individual children. As of 2010, there were an

average of more than four child deaths per day caused by abuse or neglect, a rate that has increased steadily from 3.13 in 1998 (United States Government Accountability Office, 2011). In 2011 alone, 1,570 children were confirmed to have died as a direct result of maltreatment in the U.S. (Children's Bureau, 2012). While the majority of the referrals to child protective services (CPS) agencies made in a given year do not result in "confirmed" or "substantiated" cases of maltreatment, a recent study utilizing synthetic cohort life tables and official maltreatment data found the cumulative prevalence of confirmed maltreatment to be 12.5% (Wildeman et al., 2014). Even these rates are underestimates; retrospective self-reports suggest a much higher prevalence of maltreatment than that which is investigated by CPS, with two recent studies finding that more than 40% of adults report having experienced some form of maltreatment before age 18 (Finkelhor et al., 2013; Hussey, Chang, & Kotch, 2006; Turner, Shattuck, & Hamby, 2013).

Consequences of maltreatment

Although recent research has begun to consider the co-occurrence and cumulative impact of multiple forms of maltreatment and other adverse childhood experiences, much of the literature on the immediate and long-term impacts of these experiences either considers them individually or combines them categorically (i.e. maltreated vs. not). These bodies of literature illustrate the wide array of behavioral and emotional problems that all of these experiences have been linked to during childhood, adolescence, and adulthood, including virtually every DSM-IV disorder, from ADHD to depressive disorders and post-traumatic stress disorder (PTSD; Perry, 2008).

Maltreatment in childhood has immediate impacts and consequences across the lifespan in virtually every domain of functioning. Maltreatment in general, and each type

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of abuse and neglect individually, are associated with mental health symptoms and disorders. Physical abuse, sexual abuse, and neglect are all associated with post-traumatic stress disorder (Gilbert et al., 2009). Physical abuse during childhood has been associated with increased rates of depression and aggression in children (Herrenkohl & Herrenkohl, 2007; Johnson et al., 2002) and decreased rates of prosocial behavior (Prino & Peyrot, 1994). Adolescents who were physically abused as children display higher levels of depression, anxiety, social problems, and aggression than their non-abused peers (Lansford et al., 2002; Springer, Sheridan, Kuo, & Carnes, 2007) and are at higher risk for suicidal thoughts and behaviors (Evans, Hawton, & Rodham, 2005). Childhood sexual abuse has been linked with internalizing and externalizing symptoms in adolescence (Herrenkohl & Herrenkohl, 2007). Research has found that these associations remain statistically significant even after accounting for contextual factors such as socioeconomic status and family functioning (Brown, Cohen, Johnson, & Smailes, 1999; Fergusson, Boden, & Horwood, 2008).

The adverse effects of maltreatment persist into adulthood, with depression the most widely noted long-term impact. Adults who were physically abused display higher levels of depression and suicidal behavior than adults who were not maltreated as children (Brown et al., 1999; Chapman et al., 2004). Sexual abuse is associated with increased lifetime risk for PTSD, anxiety disorders, depression, suicidal behavior, eating disorders, sexual risk behavior, and academic difficulties (Chen et al., 2004; Evans, Hawton, & Rodham, 2005; Paolucci, Genuis, & Violato, 2001). Childhood psychological or emotional abuse has also been associated with depression, anger, and low self-esteem in adulthood (Briere & Runtz, 1990; Harper & Arias, 2004). A qualitative review of studies examining the impact of early maltreatment on later functioning concluded that past maltreatment led to a two- to five-fold increase in the risk for later depressive

disorders (Harkness & Lumley, 2008). This increased risk means that around a quarter to a third of individuals who were maltreated as children meet diagnostic criteria for major depression by their late 20s (Gilbert et al., 2009). Furthermore, meta-analysis has demonstrated that a history of childhood maltreatment is strongly associated with developing recurrent and persistent depression in adulthood, as well as with having treatment resistant depression (Nanni, Uher, & Danese, 2012).

Maltreatment also has significant social costs beyond the distress of those who experience it. Children who are maltreated have lower educational attainment and are more likely to receive special education services than their non-maltreated peers (Boden, Horwood, & Fergusson, 2007; Lansford et al., 2002). Adults with documented histories of maltreatment are significantly more likely to be in menial or semi-skilled occupations, and are less likely to have been steadily employed (Widom, 1998). Physical abuse and sexual abuse have both been shown to increase rates of delinquency in adolescence and crime perpetration in adulthood (Maas, Herrenkohl, & Sousa, 2008).

Although neglect is the category of maltreatment most frequently recorded by child protective agencies, it has been the subject of considerably less research than other forms of child maltreatment, likely because, as an act of omission, it is more difficult to specifically define and document than abuse (Gilbert et al., 2009). Studies of children removed from neglectful situations have demonstrated that severe neglect has profoundly negative impacts on young children, causing serious developmental, intellectual and social delays (Perry, 2008; Read, Perry, Moskowitz, & Connolly, 2001). Neglected children show elevated levels of depression and social withdrawal (Prino & Peyrot, 1994), deficits in emotion knowledge (Sullivan, Carmody & Lewis, 2010), and internalizing problems in adolescence (Herrenkohl & Herrenkohl, 2007).

Interrelatedness and cumulative impact of maltreatment and other adverse childhood experiences

As described above, much of the extant literature examining the effects of maltreatment either considers maltreatment types in isolation or simply classifies individuals as maltreated vs. not. Such an approach has been criticized for several reasons. First, maltreatment types often co-occur. Second, their impact on functioning appears to be cumulative, with individuals experiencing multiple types at increasingly higher risk for poor developmental outcomes. The landmark Adverse Childhood Experiences (ACE) Study, conducted among a large sample of adult HMO members in California, was one of the first studies to document the interrelatedness and cumulative impact of different forms of maltreatment and other types of family dysfunction (Dong et al., 2004; Felitti et al., 1998). Among a subsample of 8,629 participants from this study, each of the 10 categories of experiences examined (e.g. abuse, domestic violence, parental incarceration; referred to as "ACEs") was statistically significantly associated with each other category. If a person reported that they had experienced any one category of ACE, they were 2 to 18 times more likely to report another category than persons reporting no ACEs (Dong et al., 2004).

Other research supports the finding that different types of traumatic childhood experiences are highly interrelated. High rates of co-occurrence have been found among all types of child maltreatment, with most studies examining co-occurrence finding that the majority of children exposed to one type are exposed to at least one other (Saunders, 2003) and that each type of maltreatment is significantly correlated with each other type (Herrenkohl & Herrenkohl, 2007; Ney, Fung & Wickett, 1994). High rates of co-occurrence between physical abuse and psychological abuse have been found, with studies reporting that more than 90% of cases of physical maltreatment also include

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psychological maltreatment (Clausen & Crittenden, 1991; Downs, Capshew, & Brindels, 2004; Ney, Fung, & Wickett, 1994). Results from the National Comorbidity Survey showed that sexual abuse was associated with all other childhood adversities examined, including verbal abuse, physical abuse, witnessing domestic violence, parental mental illness, and parental substance abuse. Furthermore, victims of childhood rape or molestation were likely to report a number of other adversities; among these victims, the most commonly reported number of adversities was five or more (Molnar, Buka, & Kessler, 2001).

Considering multiple types of adverse childhood experiences is critical not only because they tend to co-occur, but also because their effects appear to be graded. Research using the ACE score (an integer count of the number of adverse childhood experiences reported) has found it to be associated with a vast array of negative psychological, behavioral and physical health outcomes in adulthood. The original ACE Study found that as the number of different categories of adverse childhood experiences an individual reported increased, his or her odds of engaging in a wide array of health risk behaviors, of having depression, of having ever attempted suicide, and of having a number of diseases, including cancer, stroke, and diabetes, also increased. This relationship was particularly notable for both lifetime and current depression; individuals reporting two ACEs were 2.4 times as likely to report current depression than those reporting no ACEs and those reporting four or more ACEs were 4.6 times as likely to report current depression (Chapman et al., 2004).

Other research has found similar graded relationships between traumatic experiences or childhood adversities and negative psychological and behavioral outcomes in adulthood. Research among community samples of women has found that those who report having experienced multiple kinds of childhood maltreatment, including both

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sexual and physical abuse, report greater mental disability, more physical symptoms, and greater engagement in health risk behaviors (Thompson, Arias, Basile & Desai, 2002; Walker et al., 1999). Similarly, results from a large community survey indicated that the number of lifetime traumas adults had experienced (including eight childhood experiences) was associated with significant graded increases in rates of major depression, rates of substance abuse disorders, and depression symptomatology scores (Turner & Lloyd, 1995). Likewise, chronic exposure to maltreatment is associated with cumulative risk. A longitudinal study of inner-city children involved in a maltreatment investigation found that as the number of maltreatment reports increased (for either the same kind of maltreatment or different kinds) so did prevalence of childhood and adult mental health treatment, substance use, treatment for a sexually transmitted disease, and perpetration of child abuse or neglect towards one's own children (Shin, Hong, & Hazen, 2010).

More recent studies have examined the cumulative impact on children's functioning of victimization in home, school, and community contexts. Several studies have found that children classified as "poly-victims" or "multiple victims" based on their exposure to victimization in multiple contexts are at increased risk for psychological distress—including trauma symptoms, anxiety and depression—as well as greater social difficulty, lower grades, and higher rates of sexual victimization, compared to peers who were either minimally victimized or victimized in only one context (Finkelhor, Ormrod, & Turner, 2007; Holt, Finkelhor, & Kantor, 2007). It is notable that in these studies, there was one exception to this pattern; victims of chronic maltreatment at home had particularly high depression scores, even compared to poly-victims, a finding that indicates that maltreatment in the home context may have a uniquely detrimental impact on youth's psychological functioning (Finkelhor et al., 2007).

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These diverse research findings demonstrate that maltreatment and other types of household dysfunction tend not occur in isolation, but rather as constellations of risk in children's lives. Furthermore, when individual types of trauma, violence, or family dysfunction are examined individually without considering other co-occurring types, the impact of whichever individual factor is being examined is likely to be exaggerated (Finkelhor et al., 2007; Green et al., 2010). However, recent research has indicated that the use of a single linear risk score, such as the ACE score, may oversimplify the effect of childhood adversities on later outcomes. For one, these scores weight each component experience equivalently. Contrary to this assumption, studies using large population samples have indicated that different childhood adversities have varying relative importance in predicting later mental disorders, with those associated with maladaptive family functioning (i.e. abuse, domestic violence, parental psychopathology) having the most consistent and strongest effects on outcomes (Green et al., 2010; Kessler et al., 2010; Schilling, Aseltine, & Gore, 2008). Likewise, these studies have demonstrated that models that include both the number and type of adversities provide a better fit to the data than those including only one or the other (Kessler et al., 2010). Furthermore, high cumulative adversity appears to be confounded with the presence of severe adverse events (i.e. abuse), which are the most likely to occur within the context of other adversities (Kessler, Davis, & Kendler, 1997; Schilling, Aseltine, & Gore, 2008).

HEALTH RISK BEHAVIORS

Over the past twenty years, the critical contributing role of health risk behaviors such as smoking, alcohol use, and physical inactivity to mortality in the United States has been well documented (Mokdad, Marks, Stroup, & Gerberding, 2004). More than 70% of all deaths among youth and young adults aged 10 to 24 years result from three causes:

motor vehicle crashes and other unintentional injuries (40.7%), homicide (15.9%), and suicide (16%; Heron, 2013). Among adults aged ≥25 years, 57% of all deaths in the United States result from cardiovascular disease (34%) and cancer (23%; CDC, 2012). Risk for all of these causes of death is associated with engagement in health risk behaviors, particularly use of tobacco, alcohol, and illicit drugs. Additionally, sexual risk behavior in adolescence is a serious societal concern, as it leads to both sexual transmitted infections and unwanted pregnancies.

Substance use among adolescents

Alcohol and tobacco use are associated with dramatically increased risk for health problems in the long-term. Excessive alcohol consumption significantly increases the risk for liver cirrhosis, chronic pancreatitis, hypertension and other cardiovascular problems, neurological problems, including stroke and dementia, and several types of cancer, including oral, esophageal, breast, and colon (CDC, 2014a; Corrao, Bagnardi, Zambon, & La Vecchia, 2004). Cigarette smoking, although legal, causes perhaps the greatest direct health harm of any substance of abuse. It is the leading cause of preventable death in the U.S., accounting for approximately 443,000, or one of every five, deaths in the country each year (CDC, 2014b). Smoking is estimated to increase the risk of developing coronary heart disease by 2 to 4 times, stroke by 2 to 4 times, lung cancer by 23 times for men and 13 times for women, and dying from chronic obstructive lung diseases (such as chronic bronchitis and emphysema) by 12 to 13 times (CDC, 2014b).

Alcohol and drug use are also contributing factors to many other causes of death and injury. Excessive alcohol consumption is involved in approximately 32% of all traffic fatalities, 31% of all accidental deaths, 31.5% of homicides, and 22% of suicides in the United States (National Highway and Traffic Safety Administration, 2010; Smith,

Branas, & Miller, 1999). Use of alcohol and amphetamines has also been shown to increase risk for engaging in violent behavior (Owen, Sutter, & Albertson, 2014), including interpartner violence and sexual coercion among teens. Current estimates are that approximately half of all sexual assaults among adolescents and young adults involve alcohol (Windle, Sales, & Windle, 2013).

Substance use in the teen years is particularly problematic. In the United States, lifetime users of alcohol, cigarettes, and marijuana typically initiate their use of these substances in adolescence, and early onset substance use is associated with greater severity of addiction, increased early mortality, and use of multiple substances (Anthony & Petronis, 1995; Palmer et al., 2009). Youth who start drinking before age 15 years are five times more likely to develop alcohol dependence or abuse later in life than those who begin drinking at 21 years-old or older (Office of Applied Studies, 2004).

Despite their well-known negative consequences, these behaviors remain quite common among U.S. adolescents. According to the National Survey on Drug Use and Health, in 2008, 22.9% of adolescents aged 12 to 17 had smoked a cigarette at least once in their lifetime and 11.4% were current tobacco users. In this same age group, 16.5% reported having ever used marijuana, and 9.3% reported current illicit drug use. Use of alcohol was even more common among youth ages 12-17, with 38.3% reporting having ever drank alcohol. Additionally, 26.4% of youth aged 12 to 20 reported drinking alcohol in the past month, with 17.4% reporting binge drinking and 5.5% reporting heavy drinking (Office of Applies Studies, 2009a & 2009b).

Sexual risk behavior among adolescents

Sexual risk behaviors are considered those that increase risk of contracting sexually transmitted infections and/or having an unwanted pregnancy, and are common

among U.S. teenagers. Nearly half of all new cases of sexually transmitted infections contracted in the U.S. each year are among teenagers (Weinstock, Berman & Cates, 2004). A 2008 CDC study found that approximately one in four teenage girls in the U.S. had an STD, while nearly half (48%) of African American girls had at least one of the most common STDs (Forhan et al., 2009). In 2009, there were 517,174 new cases of chlamydia, gonorrhea, and syphilis, and 2,036 new cases of human immunodeficiency virus (HIV) diagnosed among youth aged 15 to 19 years. Additionally, each year approximately 410,000 teen girls age 19 and under give birth. The vast majority of teen pregnancies (82%) are unintended. Teen mothers are less likely to complete high school, and children born to teen mothers are at risk for a wide array of short and long term adverse outcomes, including premature birth, low birth weight, cognitive deficits, lower academic achievement, unemployment, incarceration, and becoming teen parents themselves (CDC, 2011). In addition to increasing immediate health risks, sexual risk behavior in adolescence is associated with continued sexual risk in adulthood. Longitudinal research has found that earlier initiation of sexual intercourse predicts a higher number of lifetime sexual partners measured ten years later (Strachman, Impett, Henson, & Pentz, 2009).

According to the Youth Risk Behavior Surveillance System survey, 47.4% of high school students reported ever having intercourse, while 33.7% reported being currently sexually active. More than six percent of students reported having intercourse for the first time before 13 years of age. Nearly 40% of currently sexually active students reported that they did not use a condom during their last sexual intercourse, and 12.9% reported not using any method to prevent pregnancy (CDC, 2012).

Suicidal and self-injurious behavior among adolescents

For youth ages 10 to 24, suicide is the third leading cause of death in the United States, resulting in approximately 4,600 deaths each year in this age group (Heron, 2013). An additional 157,000 youth receive medical care for self-inflicted injuries at emergency departments each year (CDC, n.d.). The 2000 National Household Survey on Drug Abuse (NHSDA) estimated that almost 3 million youths ages 12 to 17 were at risk for suicide (either endorsed seriously considering or attempting suicide) during the past year. Of youth at risk for suicide, 37% actually tried to kill themselves during the previous year (Office of Applied Studies, 2002). In 2008, 15.8% of high school students in a nationwide survey had seriously considered attempting suicide during the 12 months before the survey. Nearly eight percent had attempted suicide one or more times, and 2.4% had made a suicide attempt that resulted in an injury, poisoning, or overdose that had to be treated by a doctor or nurse (CDC, 2012).

Self-injurious behavior or non-suicidal self-injury (NSSI) is commonly defined as deliberate, self-inflicted destruction of body tissue that is not for socially sanctioned purposes (e.g. piercing) or suicidal intent. Prevalence estimates range from 12 to 37.2% among high school students and 12 to 20% among late adolescents and young adults (Whitlock, 2010). Among inpatient adolescent samples, prevalence is as high as 40 to 60% (Muehlenkamp & Gutierrez, 2007). Although it seems clear that NSSI and suicide represent distinct behavioral phenomena, they have a high rate of co-occurrence within individuals. Studies among college students have found that more than 40% of those reporting NSSI also report having seriously considered or attempted suicide (Whitlock & Knox, 2007). In an inpatient sample of adolescents, 70% of those engaging in NSSI had a lifetime history of at least one suicide attempt (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006).

Co-occurrence among health risk behaviors in adolescents

Health risk behaviors among adolescents tend to co-occur and are posited to be conceptually related via common etiologies and effects on each other (Jessor, 1992; Keeler & Kaiser, 2010). Research has consistently shown that use of cigarettes, alcohol, and other drugs are associated. Studies examining the correlations among alcohol, cigarettes, and marijuana has found that users of each substance are between 8 and 12 times as likely as non-users to use the other substances (i.e., Farrell et al., 1992; Fergusson, Lynskey, & Horwood, 1994; Hammer & Vaglum, 1990). Findings from the 2008 National Survey on Drug Use and Health show that the rate of current illicit drug use was more than nine times higher among youths aged 12 to 17 who smoked cigarettes in the past month (49%) than it was among non-smoking youth (5.3%; Office of Applied Studies, 2009a). Similarly, a study comparing adolescent smokers and non-smokers found significantly higher rates of alcohol and marijuana use among smokers, finding that approximately one-third of smokers engaged in binge drinking and that about half used marijuana and/or alcohol. Smokers who drank alcohol also had heavier use rates compared to non-smokers who drank alcohol, including binge drinking episodes, total drinks, and number of daily drinks (Duhig, Cavallo, McKee, George, & Krishnan-Sarin, 2005). Use of illicit drug use is particularly prevalent among heavy drinkers. More than two-thirds of 12 to 17 year olds who reported being heavy drinkers also reported using illicit drugs, compared to only 4.3% of nondrinkers (Office of Applied Studies, 2009a).

Substance use is also positively associated with sexual risk behavior and suicidal and self-injurious behavior. Research using the Youth Risk Behaviors Surveillance Survey have found that illegal drug use is significantly associated with an earlier onset of sexual intercourse and with having multiple sexual partners, and that heavy alcohol use is predictive of having sex with multiple partners in the past sixty days and having sex

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while intoxicated or high on drugs (Windle, Sales, & Windle, 2013). For college students, use of alcohol and methamphetamine is strongly associated with not using a condom during sexual intercourse, even after controlling for demographic and other risk factors (Baskin-Sommers & Sommers, 2006). Across samples, substance use has been identified as a significant risk factor for acquiring an STD, including HIV (Windle, Sales, & Windle, 2013). Use of cigarettes, marijuana, alcohol, and methamphetamines have all been found to be associated with an earlier age of first pregnancy, particularly among early pubertal girls (Windle, Sales, & Windle, 2013).

Likewise, substance use proximal to sexual activity has been shown to increase high-risk sexual behaviors, such as having sex with multiple partners and not discussing risk for STDs with one's partner (Windle, Sales, & Windle, 2013). This association is important given that many adolescents report using substances when engaging in intercourse. According to the CDC's Youth Risk Behavior Survey, among the 33.7% of currently sexually active students nationwide, 22.1% had drunk alcohol or used drugs before their last sexual intercourse (CDC, 2012). Sexual minority (lesbian, gay, and transgender) adolescents appear to be particularly likely to engage in high-risk substance use and sexual behaviors, likely due to the stigma and discrimination associated with their minority status (Windle, Sales, & Windle, 2013).

Substance use also appears to increase suicidal ideation and self-injurious behavior in youth. Youths surveyed in the NHSDA were more likely to endorse seriously considering or attempting suicide if they reported using alcohol or drugs in the past month (19.6 vs. 8.6% for any alcohol; 25.4 vs. 9.2% for any illicit drug; 29.4 vs. 10.1% for any illicit drug besides marijuana; Office of Applied Studies, 2002; Whitlock, 2010). Cigarette smoking has also been shown to be positively associated with suicidal ideation and attempts among high school students (Jiang, Perry, & Hesser, 2010).

It is important to note that while these behaviors all have the potential to lead to negative health consequences, they may also serve normative developmental functions (Keeler & Kaiser, 2010). Engagement in these behaviors may serve the developmental functions of role experimentation and social approval needed for healthy identity formation (Harter, 1990), and may even lead to positive outcomes for youth, such as acceptance by peers or the release of stress (Jessor, 1991). It has been argued that experimental engagement in health risk behaviors can provide adolescents the opportunity to progressively "master those situations that are potentially detrimental to their health or impose specific threats" (Michaud, 2006, p. 481). Thus, it has been suggested that studies of adolescent risk behavior distinguish occasional risk taking, which is part of normal developmental processes, from frequent risk taking, which is more likely to lead to adverse health outcomes (Desrichard & Denarie, 2005; Keeler & Kaiser, 2010).

RISK FOR HEALTH RISK BEHAVIORS: THE ROLE OF MALTREATMENT

Across samples, experiencing child maltreatment and other adverse childhood experiences is associated with increased likelihood of lifetime engagement in and early initiation of health risk behaviors, including alcohol use, use of other substances, sexual risk behavior, and suicidality/self-injurious behavior. In the ACE Study, the ACE score was strongly and significantly associated with all of the health risk behaviors assessed in the study. Specifically, compared to those who reported no ACEs, individuals who reported four or more of these experiences were 2.2 times more likely to be a current smoker, 7.4 times more likely to consider themselves an alcoholic, 4.7 times more likely to have ever used illicit drugs, 10.3 times more likely to have ever injected drugs, 3.2 times more likely to have had 50 or more lifetime intercourse partners, and 2.5 times

more likely to have ever had a sexually transmitted disease (Felitti et al., 1998). Other research indicates that all types of child maltreatment are associated with substance abuse, sexual risk behavior, and suicidality in adolescents.

The effects of maltreatment and trauma on substance use

Cross-sectional and longitudinal research indicates that physical abuse, sexual abuse, and witnessing domestic violence are associated with earlier initiation of alcohol use and higher rates of alcohol use disorder among adolescents (Clark, De Bellis, Lynch, Cornelius, & Martin, 2003; Hamburger, Leeb, & Swahn, 2008; Kilpatrick et al., 2000). Similarly, children who experience abuse or neglect are more likely to be binge drinkers as adolescents, even after controlling for parental alcoholism (Shin, Edwards, & Heeren, 2008).

A history of maltreatment is similarly associated with higher rates of marijuana and hard drug use among adolescents. Youth who report having experienced physical and/or sexual abuse have been found to have significantly higher rates of marijuana and hard drug use, as well as more drug-use related problems, than their non-maltreated peers, even after accounting for other risk factors (Kilpatrick et al., 2000; Thornberry, Henry, Ireland, & Smith, 2010). Consistent with research indicating the cumulative impact of multiple forms of maltreatment, a large study of rural high school students in Oregon found that those who had experienced both sexual and physical abuse were more than 10 times as likely to report illicit drug use than those who had not experienced maltreatment, while those who had experienced one type of abuse were approximately 3 times as likely (Moran, Vuchinich, & Hall, 2004). Both childhood sexual abuse and childhood physical abuse have also been uniquely associated with elevated rates of injection drug use among adolescents (Hadland et al., 2012; Kerr et al., 2009). Sexual

abuse is perhaps the most researched individual type of maltreatment, and has been independently associated with increased risk for use of alcohol, tobacco, marijuana, and other illicit drugs in diverse samples, although some studies have found no significant association while others have found an association for only girls or only boys (Draucker & Mazurczyk, 2013).

Notably, maltreatment has been strongly associated with increased likelihood of using multiple substances during adolescence. A study using a national sample of adolescents found that girls who reported having been sexually abused were more than four times as likely as their non-abused peers to be heavy polysubstance users (Shin, Hong, & Hazen, 2010). Among a sample of adolescents involved in public welfare systems, a full 69% of those who had a history of maltreatment were heavy users of multiple substances, compared to only 14% of those who had not been maltreated. Additionally, this study found that youth who had been maltreated were more likely than non-maltreated youth to move into the heavy polysubstance abuse group over time, and were less likely to move out of it, indicating that maltreatment is a risk factor for persistent use of multiple substances (Shin, 2012).

High rates of comorbidity between PTSD and substance use are well established in adult samples (Brady & Sinha, 2005). Research with adolescents and young adults has linked exposure to trauma and PTSD with concurrent substance use disorders (Ford, Elhai, Connor, & Frueh, 2010), subsequent nicotine dependence and drug abuse among young women (Breslau, Davis, & Schultz, 2003), and alcohol abuse among young men (Danielson et al., 2009).

The effects of maltreatment and trauma on sexual risk behavior

Much of the research on the association between adverse childhood experiences and sexual risk behavior focuses specifically on childhood sexual abuse, which has been consistently linked with sexual risk behavior in diverse samples (Senn, Carey, & Vanable, 2008). A history of sexual abuse has been shown to be associated with younger age at first voluntary sexual intercourse (Buffardi, Thomas, Holmes, & Manhart, 2008; Champion, 2011), a greater number of sexual partners (Champion, 2011; Saewyc, Magee, & Pettingell, 2004), early pregnancy (Young, Deardorff, Ozer, & Lahiff, 2011), higher rates of sexually transmitted infections in adolescence (Buffardi et al., 2008), and lower rates of condom use (Houck, Nugent, Lescano, Peters, & Brown, 2010; Saewyc et al., 2004). While most of the research on the link between sexual abuse and sexual risk behavior has focused on girls, a meta-analysis of studies of sexually abused boys indicate that they are also at significantly increased risk for having unprotected intercourse, multiple sexual partners, and pregnancy involvement (Homma, Wang, Saewyc, & Kishor, 2012).

Research examining the relationship between other types of maltreatment and sexual risk behavior has found significant associations, though not as consistently or as strongly as for sexual abuse. A study using data from the NSCAW found that youth who had experienced emotional abuse were significantly more likely than those who hadn't to have ever had intercourse or be involved in a pregnancy (Leslie et al., 2010). Another study using the same dataset found rates of early sexual initiation (before age 13) and pregnancy among the sample to be much higher than national estimates, and found significant bivariate correlations between these outcomes and abusive caregiver behavior, although this association was no longer significant in multivariate analyses (James et al., 2010). A study using data from the longitudinal Rochester Youth Development Study

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found that any maltreatment in adolescence (physical abuse, sexual abuse and/or neglect) significantly increased youth's risk of engaging in risky sexual behavior and of contracting HIV by early adulthood (Thornberry et al., 2010). Conversely, other research has found no evidence of an additive effect of multiple types of maltreatment on sexual risk behavior, indicating that sexual abuse may have a unique effect on later sexual behavior (Senn & Carey, 2010).

A significant body of literature has examined the prevalence of PTSD symptoms in HIV positive adults and the effects of PTSD on risk behavior among HIV-infected women (Machtinger, Wilson, Haberer, & Weiss, 2012). However, relatively little research has examined the specific role of trauma symptoms in risky sexual behavior among adolescents. Cross-sectional research has shown elevated rates of PTSD comorbid with sexual risk behavior in female college students with abuse histories (Green et al., 2005) and significant associations between PTSD and number of sexual partners in men with childhood sexual abuse histories (Holmes, Foa, & Sammel, 2005).

The effects of maltreatment on suicidality and self-injurious behavior

Notably, the most dramatic relationship observed in the ACE Study was that between ACEs and having ever attempted suicide. Participants with two ACEs were 3 times as likely to have ever attempted suicide as those reporting no ACEs, while those reporting four or more ACEs were 12.2 times as likely (Felitti et al., 1998). Across age cohorts, the risk for attempting suicide increased by 50 to 70 percent for each additional ACE reported (Dube et al., 2003). A history of abuse and neglect in childhood has been demonstrated to have a large effect on suicide attempts in adolescence and adulthood, with consistent evidence indicating that both physical and sexual abuse are associated with a doubling of suicide attempts among young people (Brown et al., 1999; Fergusson

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et al., 2008; Gilbert et al., 2009; Widom, 1998). Rates of suicide attempts among survivors of abuse and neglect are very high, with some studies indicating 20% of previously maltreated youths have attempted suicide by young adulthood (Widom, 1998; Fergusson et al., 2008). The effects of maltreatment on suicidal ideation and behavior persist even after accounting for related risk factors (Fergusson et al., 1996; Johnson et al., 2002; Thompson et al., 2011).

Suicidal ideation and attempts are particularly prevalent among children in child welfare services custody. A Canadian study found that children in child protective services custody were more than twice as likely to attempt suicide and more than three times as likely to complete suicide than children not in care (Katz et al., 2011). One study of CWS-involved youth found that nearly 10% of eight-year-old children in the study reported suicidal ideation, and that suicidal ideation was significantly associated with severity of physical abuse, chronicity of maltreatment, and the presence of multiple types of maltreatment (Thompson et al., 2005).

Maltreatment in childhood has also been associated with higher rates of non-suicidal self-injury (NSSI) or intentional self-injurious behavior (SIB), although the evidence is not as clear as it is for suicidality (Gilbert et al., 2009; Trickett et al., 2011). Adolescents who report having experienced psychological or emotional abuse as children report higher levels of NSSI than their non-abused peers (Buser & Hackney, 2012). Although sexual abuse has been theorized to play an important etiological role in NSSI and individual studies have found that sexually abused adolescents report more NSSI (e.g. Bergen, Martin, Richardson, Allison, & Roeger, 2003), a meta-analysis suggested that this association is not significant after considering other forms of abuse and family risk factors (Klonsky & Moyer, 2008).

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THE EFFECTS OF MALTREATMENT ON HEALTH RISK BEHAVIOR: PSYCHOLOGICAL PATHWAYS

The mechanisms through which childhood maltreatment leads to adverse developmental outcomes, including health risk behaviors, are undoubtedly multiple. Indeed, there is evidence that maltreatment influences health through behavioral, social, cognitive, and emotional pathways, all of which interact, forming a complex matrix (Kendall-Tackett, 2002). Increased understanding of risk and protective factors in each of these domains is critical to designing prevention and intervention efforts for youth who have experienced maltreatment. As Luthar, Sawyer, and Brown (2006) argue, it is especially important to identify risk modifiers that are malleable or amenable to change through interventions. Despite the well-established evidence base for cognitive-behavioral therapy for depression, including with youth (see Beck, 2005 for a review), relatively few studies have specifically examined the role of depressogenic cognitions in processes of risk and resilience among adolescents who have experienced maltreatment. Central to the cognitive model is the concept of core beliefs about the self, the world, and the future, which guide how individuals perceive and interpret their experiences; when core beliefs are negatively valanced, they contribute to emotional distress and psychopathology (Beck, 1967).

The effects of maltreatment on depressogenic cognitions

The influence of maltreatment on an individual's beliefs about the self and the future can be understood through attachment theory. Attachment theory, first elaborated by Bowlby (1958), posits that a child's relationship with his or her primary caregiver in the first years of life forms the basis for "internal working models" that influence how individuals see themselves and relate to others throughout life. The primary tenets of attachment theory and its utility in predicting a diverse array of developmental outcomes

throughout the lifespan have been supported by decades of empirical evidence (see Cassidy & Shaver, 2008). According to this theory, it is through the primary attachment relationship that individuals develop representations of themselves, via the internalization of their caregiver's mirrored appraisals. If a caregiver is consistently available and responsive to a child's needs and signals, the child will develop an internal working model of the self as worthy, valued, and effective; of others as responsive; and of the world as predictable. In contrast, if the parent is inconsistent, unresponsive, rejecting, or abusive, the child will internalize a view of the self as unworthy, flawed, and incompetent; of others as unresponsive; and of the world as unpredictable and frightening (Ainsworth, 1979; Bowlby, 1973; Bretherton, 1993; Crittenden & Ainsworth, 1989). Maltreatment and related caregiver non-contingency can also prevent children from developing a sense of agency or self-directedness, since they do not see their needs or desires reflected in the actions of their caregiver (Carlson, Egeland, & Sroufe, 2009).

Schema theory, elaborated by Young (2003), integrates attachment theory with Beck's cognitive theory (Beck, 1967, 1976). Cognitive theory states that negative core beliefs or schemas about the self, the world, or the future (i.e. worthlessness, helplessness, and hopelessness) lead to depression and other psychopathology by influencing how one perceives and interprets their day-to-day experiences (Beck, 1967, 1976). Schema theory proposes childhood maltreatment and its disruption of the attachment relationship is a powerful source of these negative core beliefs, or "early maladaptive schemas" (Young & Brown, 1994; Young, Klosko, & Weishaar, 2003). Young details 18 of these schemas, which are divided into five domains. The disconnection/rejection domain has been identified as the most relevant to childhood maltreatment, and includes the following schemas: abandonment/instability, mistrust/abuse, emotional deprivation, and defectiveness/shame (Crawford & Wright,

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2007; Messman-Moore & Coates, 2007; Roemele & Messman-Moore, 2011; Young, Klosko, & Weishaar, 2003). The link between attachment patterns and cognitive schemas is supported by research indicating that adults with insecure attachment styles have more early maladaptive schemas than those classified as having a secure attachment style (Mason, Platts, & Tyson, 2005) and that adults classified as having a disorganized attachment style endorse the highest levels of these schemas (Stanojevic & Nedelijkovic, 2012). Furthermore, recent research indicates that early maladaptive schemas may be a critical mechanism whereby insecure attachment leads to psychopathology (Bosmans, Braet, & Van Vlierberghe, 2010).

The deleterious effects of maltreatment on self-representations and self-esteem have been well documented by empirical research. Maltreated children demonstrate low self-esteem, more negative representations of both self and caregiver, impaired growth in self-esteem over the course of childhood, and an impaired perception of their own competence (Bolger & Patterson, 2001; Bolger, Patterson, & Kupersmidt, 1998; Cicchetti & Rogosch, 1994; Kim & Cicchetti, 2006; Toth, Cicchetti, Macfie, & Emde, 1997). Maltreated children are also more likely to be rated by their mothers and teachers as having low self-esteem and less positive self-concept (Bolger, Patterson, & Kupersmidt, 1998; Kinard, 1999; Toth et al., 1997).

Furthermore, retrospective studies indicate that adults who were maltreated as children have impairments in self-esteem (Goodman & Dutton, 1996; Harper & Arias, 2004; Stein, Leslie, & Nyamathi, 2000). The effects of childhood maltreatment on adults' self-relevant cognitions have been demonstrated at both the implicit and explicit levels; adults who report a history of maltreatment have been shown to have more negative automatic self-associations (van Harmelen et al., 2010) and more negative explicit self-constructions and beliefs of a worthy self (Harter & Vanecek, 2000). A number of studies

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examining the effects of individual types of maltreatment on cognitive styles have found that emotional maltreatment, but not physical or sexual abuse, is associated with the development of a more internal, global, stable attribution of negative events (Gibb, 2002). However, when multiple types of abuse are examined together, multiple maltreatment appears to be associated with a more negative inferential style (Gibb, 2002; Gibb, Alloy, Abramson, & Marx, 2003). Research specifically examining the development of early maladaptive schemas has indicated that childhood sexual, physical, and emotional abuse are all associated with the schemas in the disconnection/rejection domain (Roemele & Messman-Moore, 2011) and that negative schemas, including defectiveness/shame and vulnerability to harm mediate the effects of childhood emotional abuse on anxiety and depression (Wright, Crawford, & Del Castillo, 2009). Similarly, among a sample of women who had been recent victims of violence, a broader measure of maladaptive cognitions about the self was found to fully mediate the effect of childhood abuse on depression and anxiety (Kaysen, Scher, Mastnak, & Resick, 2005).

Rose and Abramson's (1992) extension of the hopelessness theory provides a framework for considering the effects of maltreatment on beliefs about the future. Consistent with the cognitive theory, the hopelessness theory of depression proposes that individuals who tend to attribute negative events to stable and global causes are vulnerable to developing a sense of hopelessness, which in turn leads to depression (Abramson, Metalsky, & Alloy, 1989). Applying this theory to child maltreatment, Rose and Abramson proposed that when a negative event such as maltreatment occurs, the child initially tends to make hopefulness-inducing (i.e., unstable and specific) attributions about its cause. However, when the negative events are recurrent, the child may come to make hopelessness-inducing (i.e. stable and global) attributions and inferences about its cause. This theory has been supported by empirical research with diverse samples of

adolescents indicating that those with a history of sexual abuse report significantly more hopelessness than their non-abused peers (Bergen et al., 2003; Martin et al., 2004; Pharris, Resnick, & Blum, 1997). Similarly, in two different college student samples, Gibb and colleagues found that college students who reported having been emotionally abused in childhood and those who reported multiple types of maltreatment scored significantly higher on a measure of hopelessness than their peers (Gibb et al., 2001; Gibb et al., 2003).

The effects of depressogenic cognitions on health risk behaviors

Just as maltreatment has been linked to the development of maladaptive beliefs about the self and the future, depressogenic cognitions have been linked to engagement in health risk behaviors.

Suicidality

Among the risk behaviors examined in this study, beliefs of worthlessness and hopelessness may be most salient to suicidality. Indeed, suicide can be conceptualized as both the ultimate act of self-derogation and as the ultimate surrender to hopelessness (Wenzel & Beck, 2008). In their conceptualization of a cognitive model of suicidal behavior, Wenzel and Beck explain that in individuals with dispositional vulnerability factors (i.e. psychiatric disorders), suicidal behavior is provoked when suicide-relevant cognitive processes, including hopelessness, are activated in the context of life stress.

The importance of beliefs of worthlessness and hopelessness to suicidal ideation and behavior have been extensively documented. Research examining the role of self-esteem in suicide risk has consistently found that low self-esteem is predictive of suicidal ideation and behavior among adolescents (McGee & Williams, 2000; Groholt, Ekeberg, Wichstrom, & Haldorsen, 2005). Notably, low self-esteem has been found to be

particularly predictive of suicide for high-risk adolescents reporting low family support (Sharaf, Thompson, & Walsh, 2009), while low self-esteem in the family context has been found to differentiate adolescents who actually attempt suicide from those who report ideation (Wild, Flisher, & Lombard, 2004). Furthermore, feelings of worthlessness have been found to be associated with suicidal ideation in Hungarian adolescents with depression (Liu et al., 2006) and with suicide attempts in Korean adults with a history of serious trauma (Jeon et al., 2009). Research specifically examining the role of early maladaptive schemas in suicidality has found that adults with a past suicide attempt report more of these schemas and that several specific schemas, including defectiveness/shame and vulnerability to harm are associated with risk of repetitive suicide attempts (Dale, Power, Kane, Stewart, & Murray, 2010). While the role of cognitions in non-suicidal self-injury is less well documented, research conducted with an adolescent and young adult sample indicated that those engaging in NSSI had significantly higher scores on a measure of EMSs, including several in the disconnection/rejection domain (Castille et al., 2007).

Hopelessness has been identified as a key risk factor for suicide risk (Hall, Platt, & Hall, 1999; Kovacs, Beck, & Weissman, 1975). Among adolescents with a history of childhood maltreatment, hopelessness has been found to be significantly associated with suicide attempts, and to mediate the effects of sexual abuse on suicidal ideation (Bergen et al., 2003; Martin et al., 2004). Among college students, hopelessness has been identified as a martial mediator between childhood emotional abuse and suicidal ideation (Gibb et al., 2001).

Substance use and sexual risk behavior

The role of depressogenic cognitions in adolescent substance abuse and sexual risk behavior are less clear. However, maladaptive cognitions are known to be a primary feature in depression, which is in turn posited to be a key risk factor for engagement in risk behaviors. The self-medication hypothesis posits that individuals who have difficulty tolerating strong negative affect and lack internal coping mechanisms engage in substance use as an external way to modify their emotions (Khantzian, 1977). In this way, substance use can be thought of as a maladaptive coping skill. Theories of self-medication have also been applied to sexual behavior, although not as consistently as to substance abuse. In this context, sexual behavior can be thought of as a form of emotion-focused coping in which individuals use sex as a means to avoid and alleviate negative affect (Folkman, Chesney, Pollack, & Phillips, 1992; Lazarus & Folkman, 1984). Furthermore, individuals prone to avoidance styles of coping may be more likely to engage in high-risk sexual behavior, as they may engage in "cognitive disengagement", or active avoidance of thoughts about risk (McKirnan, Ostrow, & Hope, 1996).

Another way in which maladaptive cognitions may lead to these risk behaviors is through peer processes. Specifically, youths with low levels of self-esteem may be more likely to conform to social norms and yield to peer pressure in an effort to obtain validation from peers (Zimmerman, Copeland, Shope, & Dielman, 1997). Furthermore, Kaplan's (1980) self-derogation posits that individuals with low self-esteem are especially prone to engage in delinquent activities, including substance use, in an attempt to both reject the conventional order, which is seen as the source of negative evaluations, and to seek out potential new sources of positive evaluations.

In spite of these theoretical links, findings regarding the effects of beliefs about the self on substance use and sexual risk behavior are less conclusive than those for

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suicidality. Some research investigating the role of self-esteem in substance abuse risk has indeed found significant effects. Specifically, longitudinal research has linked low self-esteem in adolescence to higher rates of nicotine dependence, alcohol dependence, and illicit drug dependence in young adulthood (Boden, Fergusson, & Horwood, 2008) and low self-esteem in college to the later development of an alcohol use disorder in women (Walitzer & Sher, 1996). In cross-sectional studies, low self-esteem has been associated with more alcohol use among high school students (Scheier, Botvin, Griffin, & Diaz, 2000) and more pathological reasons for drinking and more alcohol related problems among young adults (Backer-Fulghum, Patock-Peckham, King, Roufa, & Hagen, 2012). Likewise, high self-efficacy has been associated with less poly-drug use among inner-city adolescents (Epstein, Botvin, & Doyle, 2009). However, other studies have found either null or small effects of self-esteem on substance use (Scheier, Botvin, Griffin, & Diaz, 2000). Research conducted among adults seeking treatment for a substance use disorder has indicated that substance abusers score significantly higher on measures of early maladaptive schemas than their non-treatment seeking partners, parents, and community controls (Brotchie, Meyer, Copello, Kidney, & Waller, 2004; Shorey, Anderson, & Stuart, 2012).

More generally, cross-sectional and longitudinal studies with both adolescent and adult samples have established high rates of comorbidity for depressive disorders and substance use problems, including problem drinking (Rohde, Lewinson & Seely, 1996), tobacco use (Costello et al., 1999; Ferdinand et al., 2001; McKenzie, Olsson, Jorm & Romaniuk, 2010), cannabis use (Costello et al., 1999), and hard drug use. Depressive symptoms have also been associated with increased engagement in risky sexual behavior in both cross-sectional (Seth et al., 2011) and longitudinal studies (Schuster, Mermelstein, & Wakschlag, 2012; Wickrama & Wickrama, 2010).

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Whether self-esteem more specifically is associated with sexual risk behavior is disputed. Some individual studies have found that low self-esteem in early adolescence is associated with an increased risk for early intercourse and engaging in unprotected sex (Ethier et al., 2006; McGee & Williams, 2000). A study examining early maladaptive schemas and sexual risk behavior in college students found that all of the schemas in the disconnection/rejection domain were associated with participants' number of lifetime sexual partners and that the defectiveness/shame schema was associated with reports of risky behavior with a stranger. Furthermore, these schemas were significant mediators of the effect of reported childhood maltreatment on sexual risk behavior (Roemele & Messman-Moore, 2011). However, a meta-analytic study of self-esteem and sexual behavior concluded that most studies do not find a significant relationship between self-esteem and sexual risk behavior (Goodson, Buhi, & Dunsmore, 2006).

Beliefs about the future may also influence adolescents' likelihood of engaging in substance use and sexual risk behavior. In a general sense, future expectation influence goal setting and planning, helping to guide behavior (Bandura, 2001). Since these behaviors primarily increase risk for negative consequences in the long term, if an individual does not expect to live long or have success in his/her life, these consequences may not seem salient. Conversely, if an adolescent has hopeful future expectations, they are likely to be more concerned about protecting that future (Bolland, 2003).

Despite the strong theoretical link between hopelessness and risk behavior, relatively little research has examined the role of hopelessness in predicting adolescent risk behaviors. Hopelessness is likely to be a particularly salient risk factor for youth living in highly stressful environments. Indeed, Bolland (2003) found that in a large sample of youth living in the inner city, nearly 50% of males and 25% of females reported moderate or severe feelings of hopelessness. Moreover, hopelessness was

significantly associated with all of the risk behaviors examined, with adolescents reporting high hopelessness two to three times as likely to smoke cigarettes, drink alcohol, and use marijuana, and more than six times as likely to use cocaine. Youths reporting high hopelessness were also significantly more likely to engage in sexual risk behavior. Recent research using national samples of adolescents has supported these findings, indicating that youth with more positive future expectations are less likely to smoke cigarettes, less likely to use substances, and less likely to be sexually active (McDade et al., 2011; Sipsma, 2012). Hopelessness has also been found to predict less condom use in male undergraduates (Broccoli & Sanchez, 2009) and inconsistent condom use among African-American young men (Kagan et al., 2012).

STATEMENT OF PURPOSE

This study aims to extend the literature by testing a latent variable structural equation model of the effects of child maltreatment on health risk behavior among a longitudinal sample of adolescents involved with the child welfare system. The primary purposes of this study are to test whether the proposed model fits the data, and to evaluate the effects of child maltreatment and trauma symptoms on depressogenic cognitions and health risk behaviors. Furthermore, this study aims to examine whether the effects of maltreatment on health risk behaviors are mediated by depressogenic cognitions. The results of this study could inform prevention and intervention with child welfare services involved youth by testing one potential psychological mechanism whereby child maltreatment contributes to engagement in health risk behaviors in adolescence.

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Chapter 3: Method

The data for this study were drawn from the second National Survey of Child and Adolescent Well-Being (NSCAW II). The NSCAW II is a longitudinal study of children sampled from child welfare investigations closed between February 2008 and April 2009. The study was sponsored by the Office of Planning, Research and Evaluation, Administration for Children and Families (ACF), U.S. Department of Health and Human Services (DHHS), and was designed to examine the functioning, service needs, and service use of children involved with child-welfare services. The first National Survey of Child and Adolescent Well-Being (NSCAW I), begun in 1999, was the first national study of children involved with child welfare services to collect data directly from children and families. For both NSCAW I and II, interviews were conducted with and measures were completed by caseworkers, primary caregivers, children, and, when applicable and available, teachers.

At baseline, the NSCAW II study sample included 5,873 children (Dolan, Smith, Casanueva, & Ringeisen, 2011). This sample was drawn from children who had contact with the child welfare system in a 15-month period beginning in February 2008 in 81 counties in 30 states. For the present study, a subsample of the entire NSCAW II sample was selected, consisting of children ages 11 to 15 at baseline. This subsample consisted of all children in the NSCAW II sample that were in the target age range for all of the measures being used in the present study at each wave of data collection.

This subsample included 826 children at baseline. The mean age of children in the sample was 13.0 years at baseline, with a standard deviation of 1.43 years. This sample was 54.5% male, and had the following ethnic distributions: 26.3% Black or African-

American; 37.9% white; 24.3% Hispanic; and 11.0% other. The majority of children in this sample (70.7%) were not in out-of-home care at baseline.

PROCEDURES

The overall NSCAW II study sample was selected using a two-stage stratified sample design, in which the United States was divided into sampling strata and, within these strata, primary sampling units (PSUs) were formed and selected. PSUs were defined, in general, as geographic areas encompassing the population served by a single child protective services (CPS) agency. Within PSUs, all children ages 0 to 17.5 with a CPS case in the eligible timeframe were eligible to be randomly sampled, excluding children who had a previous file in the sampling period, were members of the same family as a previously selected child, or were the perpetrator, rather than victim, of the CPS report.

In all but one state, sampled families were contacted directly by a NSCAW field representative and invited to participate in the study. One state required a passive consent procedure, wherein prior to contact by a NSCAW representative, sampled families were notified by the agency and asked to return a postcard if they did not want to be contacted about the study. Approximately 3 to 5 days after sending an introductory letter, NSCAW representatives attempted to contact families via telephone or an in-person visit to schedule an initial interview. Caregivers were informed of the purpose and potential risks of the study, and were asked to consent for themselves and the child respondent (in cases where the caregiver was not the legal guardian of the child, the legal guardian was contacted and asked to consent). Caregivers were also informed that if they disclosed "serious ongoing abuse", the study representative would be mandated to report this abuse to the relevant child welfare agency.

Once participants had consented to participate in the study, face-to-face interviews or assessments were conducted with children, parents, nonparent adult caregivers (e.g., foster parents, kin caregivers, group home staff), and investigative caseworkers. Baseline data collection began in March 2008 and was completed in September 2009. The second wave of the study was initiated 18 months after the close of the NSCAW II index investigation, and began in October 2009 and was completed in January 2011. Data collection for the third wave of the study took place approximately 36 months after the close of the index investigation, and began in June 2011 and was completed in December 2012 (Casanueva, Tueller, Smith, Dolan, & Ringeisen, 2014).

During the first wave of NSCAW II, children, caseworkers, and caregivers were interviewed and administered assessments. Additionally, teachers of school-age children in the study whose parents consented were asked to complete a questionnaire. At Waves 2 and 3, caseworkers were interviewed only in cases when the child or family had received services provided or paid for by the child welfare agency since the previous wave, and caregiver and teacher interviews were not collected for children who had turned 18.

The NSCAW II data are held by the National Data Archive on Child Abuse and Neglect (NDACAN), housed at Cornell University. There are two versions of the data: the general use version and the restricted release version. The restricted release version is recommended for publication-level research, because it includes more geographic detail and fewer variables have been recoded than in the general use data. However, because it represents a greater risk of loss of confidentiality of participants, it requires preparation of an application and data protection plan, a fee, and a willingness to cooperate with unannounced on-site inspections of the research facility by NDACAN (NDACAN, n.d.). In order to obtain the data, a data protection plan was developed and approved by the

University of Texas Information Security Office. The study was then approved by the Institutional Review Board at the University of Texas at Austin. Following the submission of an application to NDACAN and the required assurances, the data were released to Dr. Timothy Keith. As specified in the data protection plan, student researchers specified on the IRB, including the author of this study, have access to the data. All analysis for this study was performed in the secure data lab set up for the NSCAW II dataset.

This study was conducted in compliance with the ethical standards for research designated by the American Psychological Association, as well as the standards set forth by the University of Texas at Austin.

MEASURES

The NSCAW II caregiver and child instruments consisted of a number of standardized questionnaires and batteries, as well as some modules developed for the study. Sensitive questions asked of adult caregivers and adolescent respondents, such as those regarding abusive behavior, exposure to violence, substance use, sexual activity, and delinquency and criminal activity, were administered via Audio Computer-Assisted Self-Interview (ACASI). Research suggests that the ACASI methodology increases reporting of socially unacceptable, potentially embarrassing, and unlawful behaviors (Lessler & O'Reilly, 1997; Turner et al., 1998). The caseworker instrument consisted primarily of project-developed questions regarding the case investigation and services provided to the family, in addition to the Modified Maltreatment Classification System questionnaire, developed for the Longitudinal Studies of Child Abuse and Neglect (LONGSCAN) consortium (English & the LONGSCAN Investigators, 1997). The teacher instrument consisted of several standardized measures and project-developed

questions. Because teacher interviews were not conducted for a majority of the children in the NSCAW II sample, data from teachers were not used in the present study.

Maltreatment

Questions about maltreatment were included in the caseworker, caregiver, and child instruments. Caseworkers were asked to indicate the type(s) of maltreatment that were alleged in the case investigation, and were asked questions about their perception of the most serious type of maltreatment. Caseworkers were then asked a series of follow up questions about the maltreatment experience that they considered to be most serious. No reliability or validity statistics on this module are available.

Questions about maltreatment perpetrated by caregivers and experienced by children included in the caregiver and child instruments, respectively, were adapted from the Parent-Child Conflict Tactics Scale (CTS-PC; Straus, Hamby, Finkelhor, Moore & Runyon, 1998). The CTS-PC is based on the Conflict Tactics Scale and consists of 22 items that ask about the frequency of specific nonviolent and violent parent-child interactions that have occurred in the past year, organized into three scales (Non-Violent Discipline, Psychological Aggression, and Physical Assault) and three physical assault subscales (minor, severe, extreme). The measure uses an 8-point Likert-type scale (1 time, 2 times, 3 to 5 times, 6 to 10 times, 11 to 20 times, more than 20 times, previously but not in the past 12 months, or never) to measure the frequency and extent to which a parent has carried out specific acts (Straus et al., 1998). The CTS-PC includes optional items about sexual abuse (perpetrated by anyone against the child) and neglect, some of which were included in the NSCAW instruments.

Straus and colleagues (1998) reported moderate internal consistency at .55 for the Physical Assault scale, .60 for the Psychological Aggression scale, and .70 for the

Nonviolent Discipline scale. The authors explain that these moderate reliability coefficients likely reflect the diverse behaviors included in the measure and each subscale (e.g. from spanking through burning) as well as the very low reported frequency of many of the assessed behaviors (Straus et al., 1998). In the NSCAW study, internal consistency was determined to be good for the child and caregiver report. Cronbach's alpha was .97 for the total score on the child report, with subscales ranging from .71 for Nonviolent Discipline to .97 for Total Physical Assault, and .92 on the caregiver report, with subscales ranging from .66 for Psychological Aggression to .95 for Very Severe Physical Assault (NDACAN, 2011).

Participants' self-report of forced sexual intercourse was assessed using a series of questions from the Sexual Activity module, based on the LONGSCAN Adolescent Sexual Experiences questionnaire (LONGSCAN Investigators, 1998). This measure was designed to ask young adolescents for self-report of sexual experiences including a series of questions about whether the adolescent had ever had sexual intercourse that "was forced or against your will." More information about this measure is included below.

Trauma symptoms

Participants' self report of trauma symptoms at baseline was assessed using the Trauma Symptom Checklist for Children (TSCC; Briere, 1996). The TSCC is a 54-item self-report measure designed to assess the effects of child abuse (sexual, physical, and psychological) and neglect, other interpersonal violence, witnessing trauma to others, major accidents, and disasters. The scale measures the impact of trauma as manifest both in the symptoms of posttraumatic stress disorder and related psychological symptoms in children ages 8 to 16. Each symptom item is rated according to its frequency using a four-point scale ranging from 0 ("never") to 3 ("almost all of the time"). Normative data

on the TSCC were derived from large ethnically diverse samples (total N>3,000) of nonclinical children across the United States (Briere, 1996; Singer et al., 1995). Separate norms and t-scores are available according to sex and age (8-12 and 13-16). The reliability of the TSCC has been established by various studies, with alphas in the mid to high 80s for all scales but Sexual Concerns. The TSCC has been shown to have convergent and predictive validity in samples of traumatized and nontraumatized children and adolescents (Briere, 1996).

Depressogenic cognitions

Items proposed as indicators for the Self Beliefs latent variable were drawn from the Youth Self-Report (YSR; Achenbach, 1991) and the Children's Depression Inventory (CDI; Kovacs, 1992). The YSR is a widely used self-report questionnaire designed to assess an array of emotional and behavioral problems in youth ages 11 to 18. Each of the 119 items on the YSR are rated as 0 (not true), 1 (somewhat or sometimes true), or 2 (very true or often true). The total and subscale scores produced by the YSR have been shown to have good reliability, with mean rs ranging from .79 to .88 (Achenbach & Rescorla, 2001). The convergent, discriminant, and construct validity of all YSR subscales have been extensively documented, and each individual item has been shown to discriminate between clinically referred and non-referred children (Achenbach & Rescorla, 2001). The YSR has been demonstrated to be valid across diverse cultural groups of youth (Ivanova et al., 2007).

The CDI was developed as a downward extension of the Beck Depression Inventory (BDI), designed in 1967 to assess depression in adults and based on Beck's cognitive model of depression. The CDI is designed for children ages 7 to 17, and has 27 items rated on a three-level scale, from (e.g. "I feel like crying once in awhile", "I feel

like crying many days", "I feel like crying everyday"). The internal consistency estimates of the CDI ranged from .75 to .94 in community samples and .71 to .89 in clinical samples (Saylor, Finch, Spirito & Benett, 1984; Weisz & Weisz, 1988). At a one-week interval, the test-retest reliability of the instrument was .83 in a community sample and .87 in a clinical sample (Saylor et al., 1984). The CDI has been shown to have correlations in the .56 to .78 range with other validated measures of depression in children (Bartell & Reynolds, 1986; del Barrio, Colondron, de Pablo, & Roa, 1996; Reynold, Anderson, & Bartell, 1985). Conflicting evidence about the dimensionality of the CDI exists, with factor analyses producing different numbers of factors, ranging from one to eight (Garcia, Alujo, & del Barrio, 2008). A recent study using item response theory indicated that, in an adolescent sample, there is a single higher-order factor to which all items relate (Lee, Krishnan, & Park, 2011). In the NSCAW II sample, the internal consistency of the CDI appears good, averaging .81 for 7- to 12-year-olds and .87 for 13-to 15-year-olds (NDACAN, 2011).

Participants' hopes for the future were assessed using the NSCAW II Future Expectations module. This module was based on the Future Events Questionnaire, developed for the LONGSCAN (Knight et al., 2008) and the Expectations About Employment, Education, and Life Span section of the AddHealth Study (Bearman, Jones, & Udry, 1997). The FEQ consists of 12 items intended to assess an adolescent's future expectations in the realm of education, employment, and family. Adolescents are asked to respond with how likely it is that a specified outcome will occur in their future using a five point scale (1="very unlikely" to 5="very likely"). A factor analysis showed that the internal consistency for the Future Event Questionnaire-derived subscales using the LONGSCAN sample was moderate to excellent (ranging from .65 to .84; Knight et al., 2008).

Health risk behaviors

Adolescents' engagement in health risk behaviors was measured using items from the child instrument Substance Abuse and Sexual Activity modules.

Substance use

The NSCAW Substance Abuse module was based on the Youth Risk Behavior Survey (YRBS; CDC, 2004), the CRAFFT Screening Interview (Children's Hospital Boston, 2009), and the National Longitudinal Study of Adolescent Health (AddHealth; Carolina Population Center, n.d.). The CDC has conducted two studies on the reliability of the YRBS questionnaire. In the first study, approximately three-fourths of the questions were rated as having a substantial or higher test-retest reliability (kappa, κ = .61–1.00), and no statistically significant differences were observed between the prevalence estimates for the first and second times that the questionnaire was administered. In the second study, most questions related to substance use behaviors had substantial reliability, with questions related to tobacco use having a mean kappa of .68 and questions related to alcohol and other drug use having a mean kappa of .63 (Brener et al., 2002). All of the questions shown by this study to have less than moderate reliability were revised or deleted from subsequent versions of the survey (CDC, 2013). AddHealth was initiated in 1994 in response to a mandate from the U.S. Congress for a national study of adolescent health, and is the largest, most comprehensive longitudinal survey of adolescents ever undertaken (Harris, 2013). The AddHealth questionnaire was constructed using items from a large number of existing measures and surveys, with additional questions added by the agencies funding the study. The survey was extensively pilot tested, but its reliability and validity were not systematically assessed (Udry, 2001). The CRAFFT has been shown to have good reliability (Levy et al., 2004) and excellent

sensitivity for identifying substance use disorders among adolescents (Cook, Chung, Kelly, & Clark, 2005).

Sexual risk behavior

The NSCAW Sexual Activity module was based on the LONGSCAN Adolescent Sexual Experience measure. This measure asks adolescents to self-report on their sexual behavior, including age at first intercourse; number of sexual partners; use of protection; pregnancy, childbearing and paternity history; self-efficacy regarding sex; and perceptions of friends' attitudes about sexual behavior. The majority of the items were project developed based upon a review of existing measures on adolescent sexual behavior and piloting with twelve-year olds (Knight et al., 2008). The theoretical basis of the measure was informed by the Culturally Based Survey Instrument (Stanton et al., 1996; NDACAN, 2011b). The NSCAW II used questions from this measure regarding history of consensual and non-consensual sex, age at first intercourse, number of sexual partners, use of protection, pregnancy, and childbearing and paternity history.

Suicidality

Three items were proposed to assess adolescent self-report of suicidal ideation and NSSI ideation and behavior in the present study: Item 9 on the CDI ("I want to kill myself") and Items 18 and 91 on the YSR ("I deliberately try to hurt or kill myself" and "I think about killing myself").

Covariates

In order to account for demographic and social factors relevant to the constructs in the model, several covariates were proposed, including child gender, child age (at baseline), child race/ethnicity, child cognitive ability, and whether the child was living in out-of-home care at baseline. Child race/ethnicity was represented by a dichotomous

variable (majority/non-majority) based on the child's self report. The child's cognitive ability was measured using a calculated variable that is the normalized score of the sum of the child's scores on the Vocabulary and Matrices subtests of the Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman, 1990).

Additionally, participants' reported levels of engagement in health risk behaviors at baseline were included in the model in order to control for initial levels of engagement in these behaviors. Table 1 lists the proposed constructs in the model and the instruments used to measure each.

HYPOTHESIZED MODEL

The hypothesized conceptual model is shown in Figure 1. This model is designed to test the effects of maltreatment and trauma symptoms on beliefs about the self and the future, and in turn, on health risk behaviors among adolescents.

A more detailed version of the model will be analyzed using latent variable structural equation modeling (SEM), which has several advantages. This approach allows for simultaneous confirmatory factor analyses of the constructs of interest and a path analysis of their effects on one another. Because latent variables combine multiple measures of a construct, they reduce measurement error and therefore provide more reliable and valid estimates of the relations among constructs (Keith, 2006). Measured indicators of the latent variables are not included in the conceptual model.

In latent variable SEM, latent variables are inferred from the measured variables, and are represented by circles or ovals. Measured variables, also referred to as observed or manifest variables, are the actual scores or items used to measure the construct of interest, and are represented by rectangles. Additionally, latent variable SEM models include residuals for each measured variable and disturbances for all endogenous

variables, both represented by small circles. These residuals represent all of the other sources of variance for each measured variable beyond what is included in the model, including unreliability and invalidity; the disturbances represent all other influences on the variables in the model (Keith, 2006). Residuals and disturbances are not included in the proposed conceptual model.

DATA ANALYSIS

Preparation of the data and preliminary analyses were conducted using SPSS 22.0. Items and scales used in the analyses were recoded and made into composites as necessary (e.g. a series of items were combined to determine whether youth endorsed ever having had forced sexual intercourse). Descriptive statistics, including means, standard deviations, and correlations, were computed for all items used in the study. Items proposed as indicators for the latent variables were examined for excessive skew and kurtosis, and any items displaying excessive skew or kurtosis were transformed using a logarithmic transformation in order to achieve a more normal distribution, as outlined by Kline (2010).

A power analysis was performed in order to determine the minimum sample size necessary to test the model for fit, using a program developed by Preacher and Coffman (2006). The analysis indicated that a minimum sample size of 42 would be needed to achieve 80% power for a model with 196 degrees of freedom, given a RMSEA null value of .05 (good fit), a RMSEA alternative value of .10 (poor fit), and an alpha significance level of 0.05.

The latent variable model was analyzed using MPlus 7.11 (Muthén & Muthén, 2012). The weighted least squares with adjusted means and variances (WLSMV) estimation was used. This method provides more robust estimates than maximum

likelihood estimation when using data that are not normally distributed, such as dichotomous data (Kline, 2010). The model was analyzed in two steps following the procedures outline by Keith (2006).

First, the measurement model was analyzed. The measurement model, which serves as a confirmatory factor analysis of the constructs involved in the model, includes correlations among, but not paths between, the latent variables. The measurement model was tested for goodness of fit to the data, and theoretically justifiable modifications were made to the model if it had poor fit. Modified models were compared to the original model, and the measurement model with the best fit to the data was retained. The fit of the hypothesized model was assessed using several different fit statistics, including chi-square, root mean square error of approximation (RMSEA), Tucker-Lewis index (TLI), the comparative fit index (CFI), and the weighted root mean square residual (WRMR). RMSEA values of .05 or below suggest that the model is a good fit, and CFI and TLI values above .90 suggest an adequate fit, while values above .95 suggest a good fit (Keith, 2015; Kline, 2011). The WRMR statistic was developed by Muthén and Muthén, the developers of Mplus, and uses a variance-weighted approach specifically designed for models whose variables are measured on different scales or have widely unequal variances (Muthén, 2004). Muthén suggests that smaller values on the WRMR indicate a better fit, and simulation studies have suggested a cutoff value of WRMR<1.0 for models with non-normal data (Muthén, 2004; Yu, 2002).

The structural model, which serves as a path analysis of the constructs involved, was then analyzed. Again, theoretically justified modifications were made to improve the fit of the model to the data. Once an adequate fit was obtained, the direct and indirect effects of the constructs in the model were examined according to the following research questions.

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RESEARCH QUESTIONS AND HYPOTHESES

Research Question 1: What are the effects of multiple maltreatment and trauma symptoms on child-welfare involved adolescents' engagement in health risk behaviors?

Hypothesis 1: It is expected that multiple maltreatment and trauma symptoms will have direct and indirect statistically significant positive effects on adolescents' engagement in the health risk behaviors considered in this study (substance use, sexual risk behavior, and suicidality).

Research Question 2: What are the effects of multiple maltreatment and trauma symptoms on child-welfare involved adolescents' beliefs about themselves and the future?

Hypothesis 2: It is expected that multiple maltreatment and trauma symptoms will have direct significant effects on adolescents' beliefs about themselves and the future. Specifically, it is anticipated that higher scores on the multiple maltreatment variable and more trauma symptoms will be associated with more negative beliefs about the self and less hopeful expectations about the future.

Research Question 3: Do multiple maltreatment and trauma symptoms have indirect effects on health risk behaviors through beliefs about the self and the future?

Hypothesis 3: It is expected that the effect of multiple maltreatment and trauma symptoms on health risk behaviors will be partially mediated by adolescents' beliefs about themselves and the future. Specifically, it is anticipated that higher scores on the multiple maltreatment variable and more trauma symptoms will be associated with more negative beliefs about the self and the future, which will in turn be associated with greater engagement in health risk behaviors. These indirect effects are expected to be statistically significant.

Research Question 4: How are health risk behaviors associated among youth involved in the child welfare system?

Hypothesis 4: It is anticipated that the different health risk behaviors examined in this study will be significantly associated with one another; that is, youth who engage in any of the health risk behaviors examined are expected to have a higher likelihood of engaging in the other behaviors.

Chapter 4: Results

DATA PREPARATION

Preparation of the data, calculation of preliminary statistics, reliability analyses, and correlations were conducted using SPSS 22. All preliminary analyses were performed on the subsample both without and with sample weights. Because MPlus is unable to estimate models with missing values on the sample weight variable, data for participants with a missing value on this variable were deleted, producing a final subsample size of n = 787. Descriptive statistics (means, ranges, and standard deviations) were computed using this final subsample. Further information on descriptive statistics is provided in the next section.

All data were checked for excessive skew and kurtosis. Curran, West, and Finch (1996) recommend skew values less than 2 and kurtosis values less than 7, and describe skew values between 2 and 3 as moderately non-normal. Kline (2011) suggested that kurtosis values above 10 indicate severely non-normal data. The majority of variables considered for inclusion in this model had skew values below 3 and kurtosis values below 7. Several of the proposed indicators for the latent variables representing self beliefs, substance use, and sexual risk behavior, and all of the proposed indicators for the latent variable representing suicide, displayed excessive skew and kurtosis. More details regarding the transformations performed on these variables and their outcomes are below in the Determination of Variables section.

DETERMINATION OF VARIABLES

In order to determine which variables to use as measured variables and as factor indicators for the latent variables in the model, a series of preliminary analyses was conducted using SPSS 22.

Maltreatment and trauma

Preliminary analyses revealed low agreement among child, parent, and caseworker reports of maltreatment types, which is consistent with other studies of child welfare services-involved samples (Izzo, Smith, Eckenrode, Biemer, & Christ, 2009). Given such low agreement, latent variable analysis of these variables was deemed inappropriate. Instead, a multiple maltreatment score was summed for each participant, from 0 to 4, with one point each accorded for physical abuse, sexual abuse, psychological abuse, and neglect. Participants were assigned a score of "1" for each category if any reporter (child, parent, or caseworker) endorsed the maltreatment type, consistent with the method reported by Eckenrode et al. (2007). For parent and child reports of physical abuse, psychological abuse, and neglect as assessed by the CTS-PC, only past year prevalence reports were used, since this is the typical use of this scale, and reliability data for the scale are based on this use (Straus et al., 1998). In contrast, questions about sexual abuse assessed lifetime prevalence. Although this method may increase the risk of Type 2 error (false positive reports), it is considered preferable to the alternative of requiring all three reporters to agree for several reasons. First, all three sources had significant proportions of missing data, and the caseworker reported on only what they considered the most severe type of maltreatment, thus making their reports mutually exclusive for maltreatment types. Second, research suggests that all three sources are more likely to underreport than overreport (Femina, Yaeger, & Lewis, 1990; Hardt & Rutter, 2004; Smith, Ireland, Thornberry, & Elwyn, 2008; Stockhammer, Salzinger, Feldman, Mojica, & Primavera, 2001). Additionally, several measures were taken to increase the stringency of the criteria used, which are detailed below.

For all caseworker reports, the maltreatment type was counted only if the caseworker indicated that it was the most severe type and that the evidence for the

allegation was "probably sufficient" or "clearly sufficient." For the parent and child reports of physical and psychological aggression, only items classified as severe or very severe physical aggression (Straus et al., 1998) and severe psychological aggression (Straus & Field, 2003) were considered indicative of each maltreatment type. While items assessing sexual and physical maltreatment were considered positive if they were reported as occurring at least once, items assessing parent and child reports of psychological maltreatment and neglect were only considered positive if they were reported as occurring three or more times in the past twelve months. This criteria was applied because both psychological maltreatment and neglect are typically defined as involving repeated patterns of caregiver behavior rather than discrete instances (APSAC, 1995; Child Welfare Information Gateway, 2003; English & the LONGSCAN Investigators, 1997). This method is also consistent with retrospective research on adults' exposure to adverse childhood experiences, in which reports of neglect and psychological abuse are considered positive if they are reported as having occurred "often" or more frequently (Dong et al., 2003). In the absence of established guidelines for cut-off scores, the lowest threshold suggested in the CTS-PC scoring guidelines was used (Straus, 2001). Since there were no questions about experiencing neglect on the NSCAW II child instrument, neglect was assessed based only on parent and caseworker reports.

In order to more directly account for the effects of trauma symptoms, the measured variable representing each participant's standardized total score at baseline on the TSCC was included in the model. This variable was allowed to correlate with the maltreatment score variable, and was treated as an additional independent variable.

Depressogenic cognitions

Initially, all items for the Negative Self-Esteem and Ineffectiveness scales of the CDI (excepting one item about suicidality), as well as four theoretically consistent variables from the YSR, were proposed as indicators for the proposed self belief variable. However, examination of the correlation matrix for the proposed variables revealed that although the correlations between these measured variables and the proposed independent and outcome variables were mostly in the expected direction, the magnitude of the correlations was small, and in some cases, negative (ranging from r = -.051 - .247). Thus, it was determined that these proposed variables would not provide a robust test of the conceptual model in multivariate analyses, and were therefore replaced by a more traditional and broader measure of depressive symptomatology, represented by the CDI total score and the YSR Anxious/ Depressed scaled score. As discussed in more detail below, the correlations between these variables and the variables of interest were more consistent and stronger.

The six items on the NSCAW II Future Expectations module did not all have consistently positive and strong intercorrelations and thus were examined using principal axis factoring (PAF) with 250 iterations in order to determine which would be appropriate indicators for the future beliefs latent variable. Items with a factor loading of .40 or greater on the first factor were retained. Three items were retained: "What are the chances you will live to be 35?"; "What are the chances you will graduate from high school?"; and "What are the chances you will have a good job by age 30?" The three items that were dropped (about getting married, having children and raising a family, and having children before age 18) had either low or non-significant correlations with the retained items, indicating they represent a different underlying construct. Results of the PAF on these items are presented in Table 2.

Health risk behaviors

For the health risk behaviors variables, items from the third wave child instrument were analyzed separately for substance use, sexual risk behavior, and suicidality/self-injurious behavior. As described above, all proposed indicator variables were first examined for excessive skew and kurtosis. Because the model included baseline measures of all outcome variables, the equivalent Wave 1 variables for each proposed indicator of the latent outcome variables were also examined for excessive skew and kurtosis. As described in the methods section, logarithmic transformations were applied to variables exhibiting excessive skew and kurtosis.

Substance use

Proposed items for the substance use latent variable included all questions on the NSCAW II Substance Abuse module about lifetime and past month use of alcohol, marijuana, and tobacco and the CRAFFT questionnaire total score. Given low reported prevalence of hard drug use, six questions about different types of hard drugs were combined into one dichotomous item representing any hard drug use. Several of the proposed items (past month alcohol use, past month binge drinking and past month marijuana use) displayed excessive skew and kurtosis and were thus transformed. Although this transformation was effective in normalizing all of the proposed Wave 3 variables, it was not effective for the Wave 1 equivalents for the past month binge drinking (kurtosis = 15.29) and past month marijuana use (kurtosis = 14.31) variables, and thus these variables were dropped from the model. The transformation was effective at normalizing both the Wave 3 and Wave 1 versions of the variable past month alcohol use, and thus this variable was retained. All of the remaining variables had significant positive intercorrelations, and thus all were retained for confirmatory factor analyses.

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Sexual risk behavior

Four items were examined for the sexual risk behavior variable, representing all of the domains of the Sexual Activity module. One of these items (unsafe sex) was created using responses to several questions, while three (lifetime number of sexual partners, past year number of sexual partners, and number of pregnancies) were recoded versions of original variables. Unsafe sex was constructed as a dichotomous variable defined as not using a condom during most recent sexual intercourse. The number of pregnancies variable was identified as having excessive skew and kurtosis and was thus transformed; however, the transformed Wave 1 version of this variable still displayed extreme kurtosis (kurtosis = 54.80) and thus this variable was dropped from the model. Because of the conceptual and statistical overlap between lifetime and past year sexual partners, only the lifetime sexual partners variable was retained given its greater correlation with the unsafe sex variable.

Suicidality

As described above, one item from the CDI and two items from the YSR were examined as proposed indicators for the suicidality latent variable. All three items displayed excessive skew and kurtosis, and neither logarithmic transformations nor square root transformations were effective in normalizing the variables. Additionally, confirmatory factor analysis of these variables produced several errors. First of all, YSR Item 18 ("I think about killing myself") consistently produced a Heywood case due to negative error variance. Additionally, because no participants in the subsample responded with a "2" (highest agreement) on CDI Item 9 ("I want to kill myself"), this variable had to be analyzed as a dichotomous variable, using a tetrachoric correlation matrix among the three variables, which consistently produced errors because of empty cells in the bivariate tables. Finally, the proportion of missing values on these variables was

considerably higher than on the other outcome variables (n=404 vs. n=544) and considerably higher than the overall study attrition rates (discussed below). For these reasons, the suicidality variables were dropped from the primary model and analyzed separately.

DESCRIPTIVE STATISTICS

As explained above, because MPlus is unable to estimate models using sample weighting with observations that have a missing value for the sample weight variable, the final subsample used for analyses was slightly smaller than the original subsample (n = 787). The unweighted sample sizes ranged from n=631 to n=637 for Wave 2 variables and from n=538 to n=549 for Wave 3 variables (with the exception of the suicidality variables discussed above). These rates of attrition are comparable to the overall rates of attrition in the NSCAW II sample, which had an unweighted child interview response rate of 80.89% at Wave 2 and 70.56% at Wave 3 (Casanueva et al., 2012; Casanueva et al., 2014).

Descriptive statistics and bivariate correlations were computed on this subsample, using the sample weights used in the primary analyses. The weighted subsample was 38.1% female, with an average age of 12.94 at baseline and a fairly even distribution among ages, 11-15. The average maltreatment score for the weighted subsample was 1.24. Of those with a valid score on the maltreatment score variable, 27.3% reported no maltreatment, 34.5% reported one maltreatment type, 24.1% reported two maltreatment types, 11.5% reported three maltreatment types, and 1.3% reported all four maltreatment types examined (physical abuse, sexual abuse, psychological abuse, and neglect). The most commonly reported maltreatment type was emotional abuse (reported by 45.9% of

the weighted subsample with a valid score on the maltreatment variable), followed by physical abuse (32.6%), neglect (24.0%), and sexual abuse (20.2%).

Means and percentages were computed for selected variables of interest for the full weighted subsample and for each level of reported maltreatment exposure. Descriptive statistics on the latent variable indicators for the complete subsample are presented in Table 3. For the complete weighted subsample, the mean t-scores on the TSCC, CDI, and YSR Anxious/Depressed subscale were all in the typical, non-clinical range (TSCC: 50.4; CDI: 47.98; YSR Anxious/Depressed: 53.74). Mean scores on the future expectations module indicated that the sample as a whole had hopeful expectations about their future, with mean scores ranging from 0.69 to 0.90, corresponding to a response between "pretty likely" and "it will happen" to each of the three items. At Wave 3, the mean score for the weighted subsample on the CRAFFT was 0.91, which is below the cut-off score (2) for a positive screen for substance use related risk behavior. Twenty percent of the sample reported that they were smokers, and 13.1% reported having ever used hard drugs. The mean response to the question about average number of lifetime sexual partners was 1.75 (corresponding to a response between 1 and 2 partners), and 29.5% of the sample reported that they did not use a condom during their last sexual intercourse.

Table 4 presents weighted mean scores and percentages by each level of the maltreatment variable (0-4) for selected measured variables (those that are either dichotomous or measured on meaningful scales). The mean t-scores for the TSCC, CDI and YSR Anxious/Depressed subscales increased for each level of the maltreatment variable, with the exception of those reporting two maltreatment types. Youth who reported all four types of maltreatment at baseline consistently reported the highest rates of depressive symptoms and health risk behaviors at follow-up. The mean response at

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Wave 3 to the number of sexual partners question among this group was 2.97 (corresponding to between "2" and "3-5" partners), and nearly 60% reported not using a condom during their last sexual encounter. More than half (53.1%) of youth in this group reported that they had ever used hard drugs, and the mean CRAFFT score was 2.21, above the cut-off score for a positive screen. The highest rate of suicidal ideation, however, was reported by those reporting three types of maltreatment; more than 23% of this group endorsed suicidal ideation, compared to just over 1% for those reporting no maltreatment.

Most of the correlations among measured variables included in the model were in the expected direction. Correlations among the continuous measured variables in the models are included in Table 5. The maltreatment and trauma symptoms scores were positively correlated with each other and with all of the measured variables representing the depressive symptoms, future expectations, and baseline and Wave 3 substance use and sexual risk behavior latent variables. These correlations were all statistically significant but small in magnitude. The future expectations variables all had small but statistically significant correlations with all of the Wave 3 substance use variables but did not have consistent significant positive correlations with the sexual risk behavior variables. The indicators for depressive symptoms had consistent statistically significant positive correlations with all of the substance use and sexual risk behavior indicator variables (ranging from .098 - .318). Most of the substance use indicator variables had small but statistically significant positive correlations with the suicidality variables. Contrary to expectations and to the hypotheses of this study, however, the correlations between the measured suicidality indicator variables and the measured variables indicating sexual risk behavior were statistically significant and negative, indicating that

participants who reported more sexual risk behavior at Wave 3 reported less suicidal ideation.

MODEL ESTIMATION

The hypothesized structural equation model was analyzed using MPlus 7.11 (Muthén & Muthén, 2012). The model estimation method used for the health risk behaviors model was weighted least squares with means and variances (WLSMV), which is the default method for analyzing models that include both categorical and continuous variables, and is robust to moderate violations of the assumption of normality (Flora & Curran, 2004; Kline, 2011). The suicidality model was analyzed using the maximum likelihood estimation with robust standard errors (MLR), because this method has been shown to be robust to even extreme violations of normality. Listwise deletion was applied to the suicidality model since MLR's robustness has not been established under conditions of both non-normal and missing data. The overall sample size for the suicidality model was n=361.

The models were analyzed using a three-step approach. First, joint confirmatory factor analyses (CFAs) were performed on: 1) the outcome latent variables, 2) the mediator latent variables, and 3) the outcome and mediator latent variables together. Following these joint CFAs, model estimation was conducted using the two-step approach recommended for latent variable structural equation modeling (Anderson & Gerbing, 1988). First, the measurement portion of the model (also known as the confirmatory factor model) was analyzed, in which correlations, and not paths, are estimated among the latent variables and measured exogenous variables. Then the full structural equation model was estimated. The joint CFAs and measurement model were used to estimate the paths from the latent constructs to their measured variable indicators.

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The path from each latent variable to one of its measured variable indicators was set to 1 in order to set the scale of the latent variables (Keith, 2006).

During the CFA and measurement model phases of model specification, theoretically justified modifications to the model were made after analyzing fit statistics, modification indices, and standardized residual covariances. The final measurement model was used as a basis for the full structural equation model, in which paths between the latent variables and the exogenous measured variables were estimated. Modifications were made to the full structural equation model following the same process used with the measurement model. After the final structural equation model was determined, additional analyses were conducted in which competing models were estimated and fit statistics were compared.

Evaluation of model fit

As discussed above, because the health risk behaviors model included both dichotomous and continuous variables as factor indicators, it was analyzed using weighted least squares with adjusted means and variances (WLSMV) estimation. Chi-square was analyzed for all the models; however, since chi-square is sensitive to sample size and does not perform well as a stand-alone test of model fit with large samples, it was used only to compare the fit of nested models (Keith, 2006). With WLSMV estimation, chi-square values cannot be compared in the typical way, but must be analyzed using the difftest command available in MPlus. The AIC and BIC statistics, which are often used to compare the fit of competing models, are not available when using WLSMV estimation. The statistics that are produced by MPlus when using WLSMV include RMSEA, CFI, TLI, and the Weighted Root Mean Square Residual (WRMR). As discussed above, RMSEA values of ≤.05 and CFI and TLI values of ≥.95

indicate a good fit, and values of WRMR < 1.0 suggest a good fit (Keith, 2014; Yu, 2002).

The suicidality model was analyzed using maximum likelihood estimation with robust standard errors (MLR), and thus all typically used fit statistics were available, including chi-square, AIC, BIC, RMSEA, CFI, TLI, and the Standardized Root Mean Square Residual (SRMR). The AIC and BIC statistics are used only to compare competing models, with lower values indicating relatively better model fit, and not as stand-alone tests of model fit (Keith, 2014). Values of ≤.08 on the SRMR indicate a good fit, although ≤.06 has been suggested as a more stringent criterion (Keith, 2014).

Because examination of the descriptive statistics for the variables of interest at each level of the maltreatment variable suggested that this variable may have a curvilinear or quadratic— rather than linear—effect on the outcome variables, this effect was examined in both models. A quadratic term was created by squaring the maltreatment variable. This term was then added to each model as a covariate, and correlated with the other independent variables (maltreatment score and trauma symptoms). Each mediator and outcome of interest was then regressed on both this term and the original maltreatment score in order to examine whether the quadratic effects were significant.

PRIMARY ANALYSES: HEALTH RISK BEHAVIORS MODEL

Joint confirmatory factor analyses

As discussed earlier, the latent variable representing suicidality was dropped from the primary model due to persistent problems with the measured variables proposed as indicators for this variable. The remaining proposed latent variables were retained in the

model (substance use, sexual risk behavior, depressive symptoms, and future expectations).

The proposed factor structure of the constructs included in the model was tested using confirmatory factor analysis. First, a two-factor solution was compared to a one-factor solution for the outcome variables (Substance Use and Sexual Risk Behavior). The two-factor solution displayed a better fit to the data than the one-factor solution, and was thus retained, with a statistically significant correlation between the two latent variables. Next, a two-factor solution was compared to a one-factor solution for the mediator variables (Depressive Symptoms and Future Expectations). Again, the two-factor solution fit the data better than the one-factor solution and was retained, with a statistically significant correlation between the two latent variables. Finally, a CFA was estimated for all of the latent variables of interest together, including the modifications made in the previous steps. This model displayed good fit and was thus retained. Fit statistics for each of these CFAs are listed in Table 6. Because the mediator latent variables did not include any categorical variables, these CFAs could not be performed using WLSMV and were thus performed using MLR.

Measurement model

In the first step of the measurement model, the latent variables were included with all measured exogenous variables and proposed covariates, as well as baseline versions of the Substance Use and Sexual Risk Behavior factors. In this model, the factor loadings of these baseline variables were set to be equal to the factor loadings for the outcome Substance Use and Sexual Risk Behavior factors. Estimation of this model produced persistent errors in which the model would not converge, which was determined to be a result of the included scale scores (CDI total score, YSR scale score, trauma symptoms

total score, and the proposed covariate IQ score) having a much different scale (i.e. t-scores with a mean of 50) than the majority of variables in the model (e.g. three-level Likert scales, from 0-2). Thus, the scale of these variables was transformed by dividing each score by 10, which allowed the model to converge. In the initial measurement model, the proposed covariates out-of-home status and race/ethnicity were not statistically significantly correlated with any of the variables of interest, and were thus dropped from the model. None of the three remaining proposed covariates (gender, age, and IQ) were statistically significantly correlated with both the dependent and independent variables, and were thus also dropped in order to simplify the model.

The fit statistics for the initial measurement model (MM1) indicated that the model had less than adequate fit according to the CFI and TLI. Correlated errors were added between the baseline and Wave 3 versions of each of the indicators for the Substance Use and Sexual Risk Behavior latent variables, as well as a correlated error between the smoking and hard drugs indicators, which was suggested by modification indices and was deemed theoretically justified. These modifications resulted in a better fitting model (MM2); however, this model produced an error. All correlated error terms that were non-significant were removed, resulting in a model (MM3) with comparable fit to the less restrictive model, but that produced the same error. Examination of the possible sources of this error suggested that it might indicate that measurement invariance across time could not be assumed, and thus the restriction on the baseline factor loadings (to be equal to the factor loadings estimated for the Wave 3 variables) was removed. This model (MM4) displayed adequate fit and did not produce an error, and was thus retained. Fit statistics for these models are listed in Table 7 and this final measurement model is depicted in Figure 2.

Structural model

Fit statistics for the health risk behaviors structural models are listed in Table 8. The initial version of the structural model (SEM 1), reflecting the modifications made in the measurement model analyses, displayed adequate fit on the RMSEA and WRMR but less than adequate fit on the remaining indices. Future Expectations did not have a significant direct effect on either of the outcome variables (Sexual Risk Behavior or Substance Use), and maltreatment did not have a significant direct effect on Future Expectations. Because it was not significantly associated with either the outcome variables or primary baseline variable of interest, and in order to more directly test the effects of Depressive Symptoms and simplify the final model, the Future Expectations latent variable was dropped. The fit statistics for this simplified model (SEM 2) indicated an adequate fit based on the RMSEA and the WRMR, but a suboptimal fit on the CFI and TLI. Examination of modification indices and correlations from the measurement model suggested significant correlations between the baseline Substance Use factor and the mediating Depressive Symptoms factor and between baseline Substance Use and Wave 3 Sexual Risk Behavior. These paths were added and the resulting model (SEM 3) displayed improved fit over SEM 2. Notably, results from this model indicated that once the path from baseline Substance Use to Depressive Symptoms was added, the direct effect of the maltreatment score on Depressive Symptoms at Wave 2 was no longer significant. Paths that were not statistically significant were dropped from the model and correlations among the relevant latent variables were set to 0. The resulting model (SEM 4) displayed as good or better fit than SEM 3. In this model, the path from baseline trauma to Wave 3 Sexual Risk Behavior was no longer significant, and thus this path was set to 0. The resulting model (SEM 5) displayed as good fit as the less restrictive model and was thus retained. This model is depicted in Figure 3.

In order to control for the effect of baseline levels of depressive symptoms and provide a more conservative test of the effects of baseline Substance Use on subsequent depression, a Wave 1 version of the Depressive Symptoms latent variable was added to the model. This model (SEM 6) displayed comparable fit to SEM 5. In this model, the correlation between baseline Depressive Symptoms and baseline Sexual Risk Behavior was non-significant, and was thus set to 0. The resulting model (SEM 7) did not display a significantly worse fit than SEM 6 and was thus retained. In this model, the path from trauma symptoms to baseline Substance Use was non-significant and was thus set to 0; the resulting model (SEM 8) displayed a statistically significant worse fit and was thus rejected in favor of SEM 7. Although the values for the CFI and TLI were still below the recommended .95 threshold, SEM 7 was retained as the final model given its excellent RMSEA, good WRMR, and CFI and TLI close to .95 and above the criteria for adequate fit of .90.

For comparison purposes, standardized results for both SEM 5 (no baseline depression) and SEM 7 (baseline depression) are presented in Figures 4 and 5. Standardized estimates of direct and indirect effects on the variables of interest for SEM 7 are presented in Tables 9, 10, and 11. Because the scales of many of the latent variables are not practically meaningful (e.g., their scales were changed in standardize the variance among variables so that MPlus could run), only the standardized estimates were interpreted with respect to the research questions and hypotheses.

As described above, in order to test for a possible quadratic effect of the maltreatment score on the outcomes, a squared version of this variable was added to the model as a covariate. The full model would not converge with this term added, and thus the term was included in a simplified version of the model including just the primary baseline, mediator, and outcome variables of interest. This model did converge, and

results indicated that the quadratic term did not have statistically significant effects on any of the latent variables of interest (Wave 2 Depressive Symptoms and Wave 3 Substance Use and Sexual Risk Behavior). Therefore it was concluded that the linear effects from the models estimated above could be interpreted. It is notable, however, that the correlation between the quadratic maltreatment term and the trauma symptoms variable was statistically significant, indicating a curvilinear relationship between these two variables.

PRIMARY ANALYSES: SUICIDALITY MODEL

Measurement model

First, a measurement model was estimated with the latent variables proposed for the model (Suicidality, Depressive Symptoms, and Future Expectations) and the two independent variables of interest (maltreatment and trauma symptoms). This model displayed adequate fit but produced an error in which the residual variance of one measured variable (YSR Item 18) was negative. Because this residual variance was small and not statistically significant, it was set to 0. The resulting model (MM1) ran with no errors and displayed adequate fit with no additional modifications made to the proposed factor structure. Next, the proposed covariates were added to the model. Just as in the health risk behaviors model, none of the proposed covariates were statistically significantly correlated with both the baseline and outcome variables, and thus none were included in the final model. Next, in order to control for baseline levels of suicidality, a baseline version of the Suicidality latent variable was included (MM2). The inclusion of this variable made the model fit worse (and unacceptable on all fit indices), and the correlation between the Wave 1 and Wave 3 Suicidality factors was not statistically significant (r=.173, p=.196). Thus, MM1 was retained and is shown in Figure 6.

Structural model

The first version of the structural model (SEM 1) included direct paths among all the variables of interest. This model displayed adequate fit on most indices; however, several paths were not statistically significant. Paths that were not statistically significant were dropped from the model (with correlations among the relevant variables set to 0). The resulting model (SEM 2) displayed adequate fit on the RMSEA and SRMR, close to adequate fit on the CFI, and a chi-square value that was not significantly different from the less constrained model (SEM 1), and was thus retained for analysis. Fit statistics for the measurement and structural models are listed in Table 12.

Standardized results for Structural Equation Model 2 are depicted in Figure 7. Standardized estimates are presented in Table 13. Again, because the scales of many of the latent variables are not practically meaningful, only the standardized estimates were interpreted with respect to the research questions and hypotheses.

As in the model above, a quadratic maltreatment term was added to test for a curvilinear effect of maltreatment on the mediator and outcome variables. Just as in the health risk behaviors model, there were no statistically significant effects of this quadratic term on either the mediators (Depressive Symptoms and Future Expectations) nor on the Suicidality outcome, and thus it was determined that the linear results from the models above could be interpreted. Again, however, the correlation between the quadratic maltreatment term and trauma symptoms was significant.

TESTS OF RESEARCH QUESTIONS

The research questions below were modified to reflect the change from the more specific self beliefs construct to the more general construct of depressive symptoms, based on the change made during preliminary analyses.

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Research Question 1: What are the effects of multiple maltreatment and trauma symptoms on child-welfare involved adolescents' engagement in health risk behaviors?

Results: It was hypothesized that multiple maltreatment and trauma symptoms would have significant direct and indirect effects on adolescents' engagement in health risk behaviors measured approximately three years later. This hypothesis was only partially supported. After controlling for baseline levels of engagement in health risk behaviors, neither multiple maltreatment nor trauma symptoms had statistically significant direct effects on Substance Use or Sexual Risk Behavior measured three years later. Both multiple maltreatment and trauma symptoms, however, were significantly associated with concurrent Substance Use at baseline. While both effects were significant, the magnitude of the standardized effect of maltreatment on concurrent Substance Use was almost twice that of trauma symptoms ($\beta = .308$ vs. $\beta = .177$). Additionally, the total indirect effects of both baseline maltreatment and trauma symptoms on later Substance Use were statistically significant, but only when including the effects of maltreatment on baseline Substance Use.

Trauma symptoms did not have statistically significant direct or indirect effects on either baseline or later Sexual Risk Behavior. Maltreatment did have a statistically significant indirect effect on later Sexual Risk Behavior, but not via the expected path. Maltreatment was statistically significantly associated with concurrent Sexual Risk Behavior at baseline, but this effect did not result in a significant indirect effect on Wave 3 Sexual Risk Behavior. Instead, the indirect effect of maltreatment on Wave 3 Sexual Risk Behavior through baseline Substance Use was statistically significant.

Results for Suicidality differed from those for Substance Use and Sexual Risk Behavior. Results indicated that baseline maltreatment had a statistically significant direct effect, but no significant indirect effects, on later Suicidality. Trauma symptoms,

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on the other hand, had a significant indirect, but no significant direct effect, on later Suicidality.

Research Question 2: What are the effects of multiple maltreatment and trauma symptoms on child-welfare involved adolescents' depressive symptoms and future expectations measured 18 months later?

Results: It was hypothesized that both cumulative maltreatment and trauma symptoms would have statistically significant effects on adolescents' Depressive Symptoms and Future Expectations. This hypothesis was only partially supported. In all models tested, trauma symptoms, but not maltreatment, were associated with less hopeful Future Expectations 18 months later. Trauma symptoms were also associated with more Depressive Symptoms 18 months later. Maltreatment was also associated with Depressive Symptoms, but less consistently and less strongly than trauma symptoms.

In the final health risk behaviors model (designed to more specifically test the effects on and of Depressive Symptoms), a baseline measure of depressive symptoms was included for reasons described above. Both cumulative maltreatment and trauma symptoms were statistically significantly associated with concurrent depression; however, the magnitude of the effect of trauma symptoms on Depressive Symptoms was considerably greater than that of maltreatment (β =.712 vs. β =.143). The indirect effects of both maltreatment and trauma symptoms on Depressive Symptoms measured 18 months later were also significant when accounting for their association with baseline symptoms. Again, this effect was quite small for maltreatment (b=.106) but substantial for trauma symptoms (β =.473). In the model examining suicidality (which used a smaller subsample than the full health risk behavior model), trauma symptoms, but not maltreatment, had a statistically significant direct effect on later Depressive Symptoms. This effect was again substantial (β =.429).

Taken together, these results indicate that trauma symptoms have consistent and significant effects on adolescents' subsequent future expectations and concurrent and subsequent depressive symptoms. The pattern of effects of maltreatment on depressive symptoms was less clear; in the larger sample used to test the effects on health risk behaviors, maltreatment did have statistically significant effects on concurrent and subsequent depression, while in the smaller sample used to test the effects on suicidality, maltreatment's effects on subsequent depression were not significant.

Research Question 3: Do multiple maltreatment and trauma symptoms have indirect effects on health risk behaviors through depressive symptoms and future expectations?

Results: It was hypothesized that the effects of cumulative maltreatment and trauma symptoms on health risk behaviors measured three years later would be partially mediated by adolescents' depressive symptoms and future expectations. This hypothesis was not supported with regard to Sexual Risk Behavior, and was only partially supported with regard to Substance Use and Suicidality. The initial model indicated that Future Expectations were not statistically significantly associated with either Substance Use or Sexual Risk Behavior 18 months later, and thus could not be a mediator of the effects of maltreatment and trauma symptoms on these health risk behaviors. Likewise, the model examining suicidality indicated that Future Expectations were not statistically significantly associated with subsequent suicidality, again indicating that Future Expectations could not mediate the effects of maltreatment and trauma symptoms on suicidality.

As discussed above, results indicated that trauma symptoms did not have significant direct or indirect effects on Sexual Risk Behavior. Maltreatment did have a significant indirect effect on later Sexual Risk Behavior, but this effect was mediated by

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baseline Substance Use, not Depressive Symptoms. Moreover, neither baseline nor Wave 2 Depressive Symptoms had any effects on later Sexual Risk Behavior and the correlation between baseline Depressive Symptoms and baseline Sexual Risk Behavior was not statistically significant. These results, taken in conjunction with the results discussed above, indicate that the effects of maltreatment on sexual risk behavior measured three years later are not mediated through depressive symptoms. They further indicate that even concurrent depressive symptoms do not appear to be associated with sexual risk behavior in this sample of early adolescents involved with the child-welfare system.

Depressive Symptoms measured at Wave 2 did have a statistically significant direct effect on Substance Use measured 18 months later. The indirect effects of maltreatment on later Substance Use through baseline and Wave 2 Depressive Symptoms, however, were not statistically significant. The indirect effects of trauma symptoms on Substance Use through baseline and Wave 2 Depressive Symptoms were statistically significant, but small in magnitude (b=.088). These results indicate that depressive symptoms do mediate the effects of trauma symptoms—but not maltreatment—on substance use, but only when the effects of trauma symptoms on concurrent depression are considered.

In the model examining suicidality, maltreatment had a statistically significant direct effect on later Suicidality, but no significant indirect effect through Depressive Symptoms. These results indicate that the effects of maltreatment on later suicidality are not mediated by depression. In contrast, trauma symptoms had no significant direct effect on later Suicidality, but did have a significant indirect effect through Depressive Symptoms, indicating that the effects of trauma symptoms on suicidality are indeed fully mediated by depressive symptoms.

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Research Question 4: How are health risk behaviors associated among youth involved in the child welfare system?

Hypothesis 4: It was hypothesized that the different health risk behaviors examined in this study would be significantly associated with one another. Due to the problems described above with the available measures of suicidality, suicidal ideation was not included in the multivariate analyses examining substance use and sexual risk behavior. Bivariate analyses, however, suggested that contrary to expectations, suicidal ideation was negatively associated with concurrent rates of sexual risk behavior within this sample.

In contrast, results indicated that Substance Use and Sexual Risk behavior were indeed positively associated. Factor analyses indicated that the Sexual Risk Behavior and Substance Use measures used in this study were best represented as separate factors. These factors were, however, statistically significantly correlated in both the initial confirmatory factor analysis and the final model (r = .558, p = .003). Additionally, the baseline versions of these latent variables were even more strongly correlated (r = .714, p = .000).

OVERALL INTERPRETATION OF THE MODEL: HEALTH RISK BEHAVIORS

As discussed above, the model including a variable representing baseline Depressive Symptoms along with variables for baseline Sexual Risk Behavior and Substance Use was retained as the final model, given its improved fit compared to other versions of the model and its more conservative test of the effects of baseline substance use on subsequent depression. In this model, neither maltreatment nor trauma had significant direct effects on Wave 3 Substance Use or Sexual Risk Behavior. Maltreatment did have a significant direct effect on both baseline Substance Use (.338)

and baseline Sexual Risk Behavior (.392), which resulted in significant indirect effects on Wave 3 Substance Use (through baseline Substance Use; .220) and Wave 3 Sexual Risk Behavior (through baseline Substance Use; .209). Trauma symptoms had no direct effect on baseline Sexual Risk Behavior, and the direct effect of trauma symptoms on baseline Substance Use was not statistically significant (.129, p=.065), but was retained in the model because when it was set to 0, model fit significantly worsened. Both maltreatment and trauma had statistically significant direct effects on baseline Depressive Symptoms, though this effect was much larger for trauma symptoms (.712) than depression (.143). Including the measure of baseline Depressive Symptoms, however, made the direct effect of trauma symptoms on Wave 2 Depressive Symptoms negative (-.195). The total effects of trauma symptoms on Wave 2 Depressive Symptoms remained positive and statistically significant (.384). Both maltreatment and trauma had statistically significant indirect effects on Wave 2 Depressive Symptoms through baseline depression; again, this effect was much larger for trauma (.555) than maltreatment (.111). Baseline maltreatment and trauma symptoms had a statistically significant intercorrelation (r=.297).

As anticipated, baseline Substance Use had a statistically significant, large direct effect on later Substance Use (.622). In contrast, baseline Sexual Risk Behavior did not have a statistically significant direct effect on later Sexual Risk Behavior, although correlations between the baseline and Wave 3 versions of the latent variable indicators for these variables were statistically significant. Instead, baseline Substance Use had a statistically significant effect on later Sexual Risk Behavior (.619), which was nearly as large as its effect on Substance Use. Indeed, the effects of maltreatment on Sexual Risk Behavior were fully mediated by baseline Substance Use, as the indirect effect of maltreatment on Wave 3 Sexual Risk Behavior through baseline Substance Use was significant (.209) and there was no direct effect of maltreatment on later Sexual Risk

Behavior. Baseline Substance Use also had a statistically significant direct effect on Wave 2 Depressive Symptoms (.178), even after controlling for baseline depression. Baseline Sexual Risk Behavior and Substance Use had a statistically significant, large correlation (r=.714) as did Wave 3 Sexual Risk Behavior and Substance Use (r=.554).

Baseline Depressive Symptoms were statistically significantly correlated with baseline Substance Use (r=.260) but not with baseline Sexual Risk Behavior. As expected, baseline Depressive Symptoms had a statistically significant, large effect on Wave 2 Depressive Symptoms (.779). Neither baseline nor Wave 2 Depressive Symptoms had any significant effects on Wave 3 Sexual Risk Behavior. Wave 2 Depressive Symptoms had a significant direct effect (.159), and baseline Depressive Symptoms had a significant indirect effect (.256; through Wave 2 depressive symptoms) on Wave 3 Substance Use.

OVERALL INTERPRETATION OF THE MODEL: SUICIDALITY

In this model, trauma symptoms, but not maltreatment, had statistically significant direct effects on later Depressive Symptoms and Future Expectations. Trauma's effects on Depressive Symptoms (.429) were larger than its effects on Future Expectations (.197). Trauma did not have a statistically significant direct effect on later Suicidality, but it did have a small but statistically significant indirect effect, through Depressive Symptoms (.102). In contrast, maltreatment had a small but statistically significant direct effect on later Suicidality (.102). Wave 2 Depressive Symptoms and Future Expectations were statistically significantly correlated with each other (.517); however, only Depressive Symptoms, and not Future Expectations, had a significant direct effect on later Suicidality (.237).

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Chapter 5: Discussion

The purpose of this study was to examine the effects of maltreatment and associated trauma symptoms, measured in early to mid adolescence, on depressogenic cognitions and future expectations, measured 18 months later, and on subsequent engagement in health risk behaviors, measured 3 years after baseline, among youth involved with the child welfare system. More specifically, this study was designed to test whether the psychological constructs of depressogenic cognitions and future expectations mediate the effects of child maltreatment and related trauma symptoms on later engagement in health risk behaviors.

Preliminary analyses indicated that the proposed construct of self beliefs was not correlated strongly enough with the independent and dependent variables to provide a robust analysis of the role of depressogenic cognitions in the effects of maltreatment and trauma symptoms on adolescents' later engagement in health risk behaviors. Thus, it was replaced with a broader measure of depressive symptoms. Additionally, the proposed measures of suicidal ideation displayed several statistical limitations as well as negative correlations with some of the other proposed outcome variables (contrary to hypotheses), and thus the original proposed model was separated into two models: one testing the effects of maltreatment and trauma symptoms on substance use and sexual risk behavior, and one testing the effects on suicidal ideation.

Broadly, results of these models only partially supported the hypothesis that psychological symptoms mediate the effects of maltreatment and trauma symptoms on adolescents' engagement in health risk behaviors, although the pattern of results differed for different outcomes. No evidence was found for future expectations as a mediator, as it was not shown to be significantly affected by maltreatment, or to have significant effects

on any of the health risk behaviors examined. Overall, results indicated that depressive symptoms do indeed mediate the effects of trauma symptoms, but not maltreatment, on later substance use and suicidality. Results regarding sexual risk behavior indicated that trauma symptoms do not have either direct or indirect effects on later sexual risk behavior, and that the effects of maltreatment on later sexual risk behavior are mediated by early substance use rather than depressive symptoms or even early sexual risk behavior.

BEHAVIORAL VERSUS PSYCHOLOGICAL RISK PATHWAYS

Perhaps the most interesting result of this study was the finding that the pathways from maltreatment to subsequent engagement in substance use and sexual risk behavior may be behavioral rather than psychological. Indeed, substance use in early adolescence was associated not only with subsequent substance use, but also with subsequent depressive symptoms and sexual risk behavior. The effect of baseline substance use on later depressive symptoms remained significant even after controlling for baseline depressive symptoms. These results are consistent with other research indicating that substance use in adolescence serves as a risk factor for later internalizing disorders, even when controlling for baseline internalizing disorders (Brook et al., 1998; Rao, Daley, & Hammen, 2000; Stice, Burton, Shaw, 2004). It is important to note that although much research supports the temporal precedence of internalizing disorders over substance use disorders, the majority of this research considers only clinically significant disorders and not substance use or depressive symptoms more generally as the present study did (O'Neil, Conner, & Kendall, 2011).

Equally notable are the findings regarding the effects on sexual risk behavior. Not only was sexual risk behavior associated with concurrent substance use both at baseline

and at Wave 3, but the largest influence on Wave 3 sexual risk behavior was that of baseline substance use. And although maltreatment was significantly associated with baseline sexual risk behavior, neither trauma symptoms nor depressive symptoms were significantly associated with sexual behavior at any time point. Taken together, these results suggest that much of the risk for later engagement in risky behaviors conferred by childhood maltreatment may be due to its association with early engagement in substance use rather than depression or even trauma symptoms. Although this study did not examine any of the non-psychological mechanisms linking maltreatment and substance use, other research has suggested that these may include parental substance use (which may increase risk for youth's substance use via both genetic and environmental pathways), parenting factors, and peer associations (Enoch, 2006; Steinberg, Fletcher, & Darling, 1994; Williams & Nelson-Gardell, 2012).

The picture that emerged for suicidality was quite different. Notably, baseline levels of suicidal ideation were not statistically significantly correlated with Wave 3 suicidal ideation. Both maltreatment and trauma symptoms had significant effects on later suicidal ideation; however, depressive symptoms fully mediated the effects of trauma, but not the effects of maltreatment. These results indicate that trauma symptoms lead to later suicidal ideation by increasing risk for depressive symptoms, which in turn increase risk for suicidal ideation. Once trauma symptoms are accounted for, however, maltreatment still appears to increase risk for suicidal ideation, independent of depressive symptoms. In light of results from the other model analyzed in this study, one possible mechanism for this association may be early substance use. Bivariate correlations indicated a positive association between concurrent substance use and suicidal ideation at Wave 3 and other research suggests that substance use may lead to subsequent suicidal ideation.

Unfortunately, the possible effects of early substance use on later suicidal ideation could not be examined in this study since the models were analyzed separately.

FUTURE EXPECTATIONS

Contrary to the hypotheses of this study, future expectations were not associated with any of the health risk behaviors examined. This finding was particularly surprising with regard to suicidal ideation, given the theoretical and empirical link between hopelessness and suicidality and the correlation between concurrent future expectations and depressive symptoms. Future expectations were also not associated with previous maltreatment, although they were associated with trauma symptoms. This finding suggests that the impact of maltreatment on future expectations is likely mediated by trauma symptoms. One possible explanation for the null findings regarding future expectations as measured in this study is that the participants in this sample overall reported quite hopeful expectations for the future, which suggests a possible resilience factor in this sample that is typically considered high risk.

THE IMPORTANCE OF MULTIPLE MALTREATMENT AND TRAUMA SYMPTOMS

In contrast to many studies examining the effects of maltreatment, which either classify youth as maltreated or not or compare types of maltreatment, this study used a measure of multiple maltreatment, which represented the number of types of maltreatment (0-4) to which participants reported being exposed. In all models tested in this study, this multiple maltreatment variable was statistically significantly associated with concurrent trauma symptoms. It was also significantly associated with concurrent and subsequent depressive symptoms, concurrent and subsequent substance use, and subsequent suicidality. Maltreatment was also associated with baseline sexual risk behavior, even though neither depressive symptoms nor trauma symptoms were. These

findings are consistent with other research (e.g. the ACE Study) that has shown that in community samples of adults, childhood adversities have a cumulative, graded effect on adverse outcomes. They also suggest that the impacts of maltreatment on children's functioning cannot be conceptualized purely through the lens of trauma symptoms, since the maltreatment variable had significant independent effects on several outcomes examined in this study even after accounting for trauma symptoms. At the same time, the inclusion of a measure of trauma symptoms in this study showed that trauma had a more consistent and stronger association than maltreatment with the psychological outcomes examined (i.e. depressive symptoms and suicidal ideation).

LIMITATIONS

While the use of a multiple maltreatment score, in conjunction with a measure of trauma symptoms, was one of the principal strengths of this study design, this score was nonetheless still a relatively simplified measure of violence exposure. Research studies examining the long-term impacts of maltreatment have shown that a number of factors including chronicity, severity, and relationship of the victim to the perpetrator are related to maltreatment's immediate and long-term effects. Moreover, maltreatment often occurs in the context of other adversities, such as domestic violence, parental substance abuse, and community violence, all of which serve as risk factors for the outcomes examined in this study. A growing body of research has also begun to show that victimization in multiple contexts including not just the home but also school and neighborhood environments appears to be particularly detrimental to youth's well-being (Finkelhor, Ormrod, & Turner, 2007; Holt, Finkelhor, & Kantor, 2007). Although it is important to directly examine the specific risks conferred by maltreatment in the home or family context as was done in this study, models that include both measures of maltreatment and

related risk factors are likely to provide even more powerful tests of the mechanisms whereby childhood adversity leads to later involvement in risky behaviors. Similarly, while it is important to consider the impact of multiple maltreatment because maltreatment types tend to co-occur and do indeed appear to have a graded impact on outcomes, combining maltreatment types sacrifices the specificity that individual types may have on specific outcomes (e.g. sexual abuse on sexual risk behavior). Additionally, examination of the pattern of risk behaviors by maltreatment exposure level suggested that the maltreatment score may have a curvilinear effect on some of these individual outcomes, with exposure to three or four maltreatment types as a threshold for dramatically increased risk for engagement of health risk behaviors. Although this effect was not found in the latent variable models, combining the various outcomes may have obscured such an effect on specific outcomes.

As discussed in the results, this study was initially designed to test the role of depressogenic cognitions (beliefs about the self and the future) in mediating the effects of maltreatment and trauma on adolescents' engagement in health risk behaviors. However, the measures available in this dataset were not designed to specifically measure these constructs and proved to be underpowered in the models proposed. Thus the self beliefs measures were replaced with more general measures of depressive symptoms. Likewise, the future expectations items used in this study were not designed to measure beliefs of hopelessness, but rather specific expectations related to educational attainment, employment, and future relationships. Thus, these questions may have been indicative of participants' reality-based expectations for the future rather than a more general sense of hope or hopelessness. There remains a need for studies that examine the specific psychological mechanisms whereby exposure to violence and maltreatment lead to later emotional and behavioral symptoms.

Similarly, although the NSCAW II sexual activity module included a number of questions about participants' sexual behavior, it did not include many questions specifically measuring sexual risk taking (e.g. how often safe sex is practiced, if participants discuss sexually transmitted infections with their partners, etc.). Thus, the latent measure of risky sexual behavior used in this study included only two items, which may not have adequately captured adolescents' sexual risk behavior. As the mean number of sexual partners reported by study participants was less than 2, the lifetime number of partners variable may not even represent sexual risk, per se.

IMPLICATIONS FOR RESEARCH

One of the most unexpected and interesting findings of this study was the effect of substance use in early adolescence on later sexual risk behavior. This finding—along with the more expected finding that concurrent substance use and sexual risk behavior are correlated with each other—underscores the importance of considering different health risk behaviors together. This finding also highlights the importance of longitudinal studies such as this one that are able to investigate the interrelationships among health risk behaviors in youth over time. Unfortunately the statistical limitations of the measures of suicidal ideation available for use in this study prevented analyzing all of the outcomes of interest together; however the findings from the separate models raise the question of whether early substance use could also increase later risk for suicidality in youth exposed to maltreatment.

The finding that the maltreatment score constructed for this study was indeed statistically significantly associated with nearly all of the variables of interest in the study emphasizes the importance of considering multiple types of maltreatment together, even in a child welfare services involved sample. Additionally, no maltreatment exposure at all

was reported for more than a quarter of the subsample, which strongly suggests that maltreatment exposure should not be assumed based on referral to child welfare services. Moreover, while the maltreatment score and trauma symptoms were statistically significantly correlated, they had differing patterns of effects on the outcomes studied, with a general pattern of maltreatment having a stronger effect on behavioral outcomes and trauma having a stronger effect on psychological outcomes. These findings point to the importance of considering both maltreatment experiences and trauma symptoms when assessing the impact of adverse childhood experiences on youth.

IMPLICATIONS FOR CLINICAL PRACTICE

A large body of research shows that child maltreatment is associated with increased risk for emotional and behavioral disorders, as well as engagement in health risk behaviors, and thus there is a need for trauma-informed interventions and prevention programs for children exposed to maltreatment. Contrary to the hypotheses of this study, depressive symptoms were not the greatest risk factor for later risky behaviors. Instead, early engagement in substance use (which was associated with maltreatment) increased later risk for nearly every outcome examined in this study. These findings suggest that it may be particularly important to develop substance use prevention programs for early adolescents exposed to maltreatment in order to prevent later risk trajectories, and that clinicians working with this population should assess for substance use.

In this sample of children, the number of types of maltreatment reported by participants was indeed associated with trauma symptoms. However, even after accounting for trauma symptoms, maltreatment had independent effects on many of the outcomes examined, including suicidal ideation. These findings indicate that the effects of maltreatment cannot be conceptualized purely through the lens of post-traumatic stress

disorder. In fact, the mean score on the Trauma Symptom Checklist for Children for even those participants reporting all four types of maltreatment assessed was below the clinical cut-off for PTSD. Trauma symptoms, however, had a strong and consistent effect on depressive symptoms in this sample. Taken together, these findings indicate that clinicians should assess trauma symptoms among youth exposed to maltreatment, and that early treatment of these symptoms may prevent later depressive symptoms. These findings also indicate, however, that screening and treating only for PTSD is likely to miss many adolescents who have been exposed to maltreatment and are at risk for emotional and behavioral problems.

Finally, the finding that sexual behavior as assessed in this study was not associated with depressive symptoms or future expectations, and was negatively associated with suicidal ideation highlights the importance of not stigmatizing adolescents' engagement in behaviors that may be risky. Indeed, some degree of engagement in risky behaviors is likely both normative and even adaptive among adolescents and thus clinicians should be careful to not stigmatize these behaviors, particularly when working with "at risk" youth (Desrichard & Denarie, 2005; Keeler & Kaiser, 2010; Michaud, 2006).

SUMMARY

Child maltreatment is a serious social problem in the United States, affecting millions of children each year. Prospective and retrospective studies have found that experiencing abuse and neglect in childhood consistently increases risk for later emotional disorders, substance use problems, other risky behavior (i.e. sexual risk behavior), and suicidal ideation. This study built upon a large body of retrospective research findings that the greater number of adverse childhood experiences (including

abuse and neglect) adults report having experienced, the greater their risk for a wide array of risk behaviors and mental and physical health disorders. Using a longitudinal sample of adolescents with a child welfare services referral, this study examined the effects of multiple maltreatment and associated trauma symptoms on later depressive symptoms, future expectations, substance use, sexual behavior, and suicidal ideation. Results of this study indicated that both maltreatment and trauma symptoms were risk factors for later adverse outcomes, but that maltreatment was more consistently and strongly associated with behavioral outcomes (i.e. substance use and sexual behavior) while trauma symptoms were more consistently associated with psychological outcomes (i.e. depressive symptoms and future expectations). Findings also identified early substance use as a critical risk factor for youth exposed to maltreatment, as substance use at baseline mediated the effects of maltreatment not only on later substance use but also on sexual risk behavior, as well as increasing risk for subsequent depressive symptoms.

Future research on health risk behaviors among child welfare services involved youth should take into account the variance in actual maltreatment exposure among CWS-referred youth, and consider both maltreatment exposure and trauma symptoms when examining the impact of traumatic experiences on later functioning. Next steps in this research include considering maltreatment severity and chronicity as well as exposure to violence in multiple contexts. Additionally, future research should examine risk behavior constellations, including not only substance use, sexual risk behavior, and suicidal ideation but also delinquency and other health behaviors (e.g. nutrition, physical activity, medication adherence) in order to understand the interactions among these behaviors. There is also a pressing need for research that examines resilience factors and their interaction with risk factors.

Appendix A: Figures

Figure 1:   Proposed conceptual model
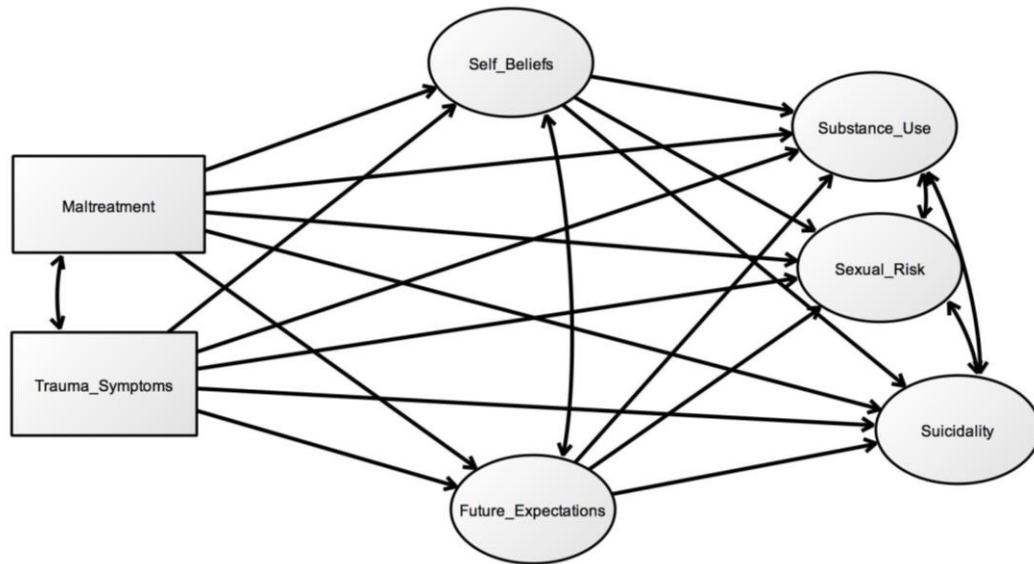
Figure 2: Full health risk behaviors measurement model
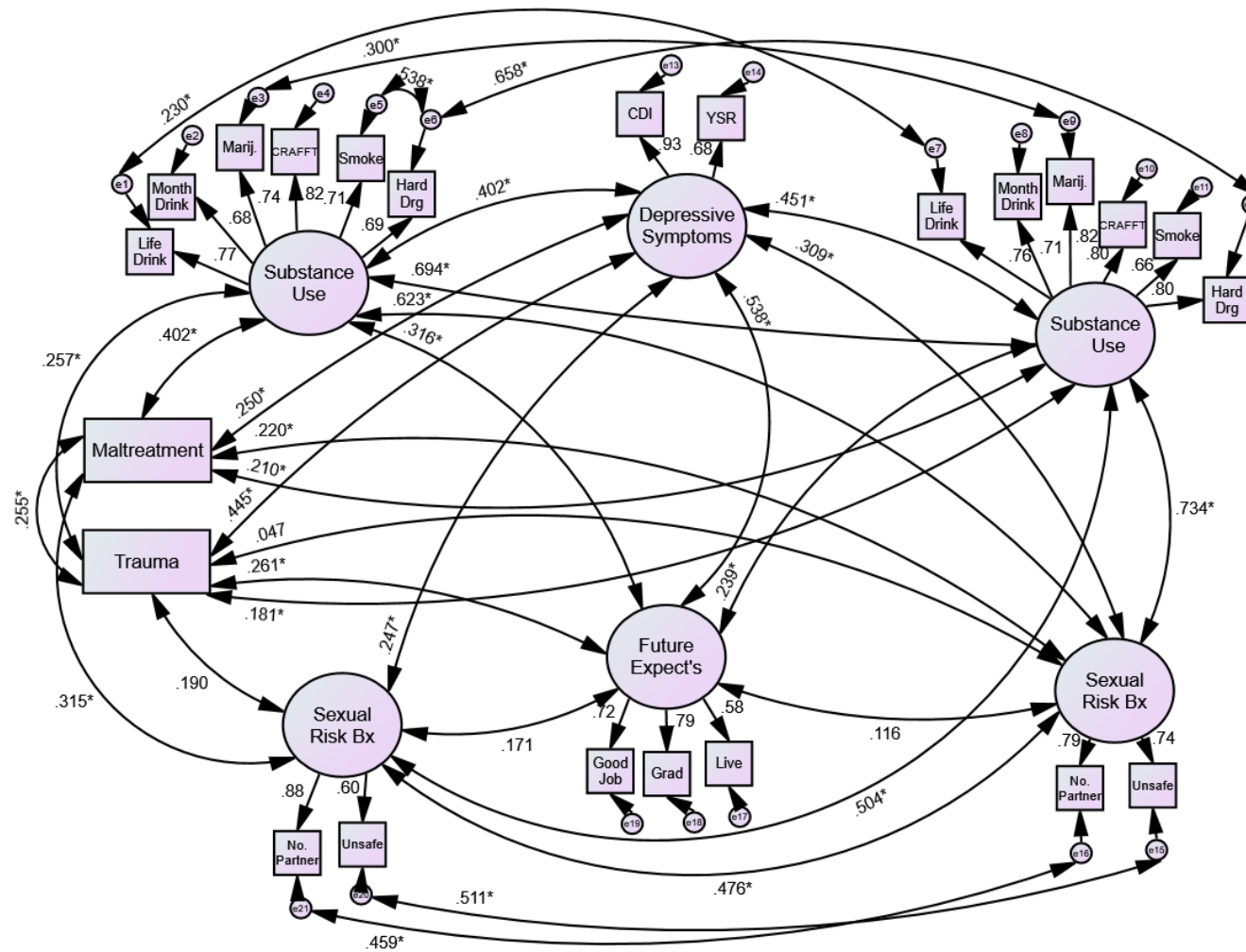
Figure 3: Full health risk behaviors latent variable structural equation model (SEM 5)
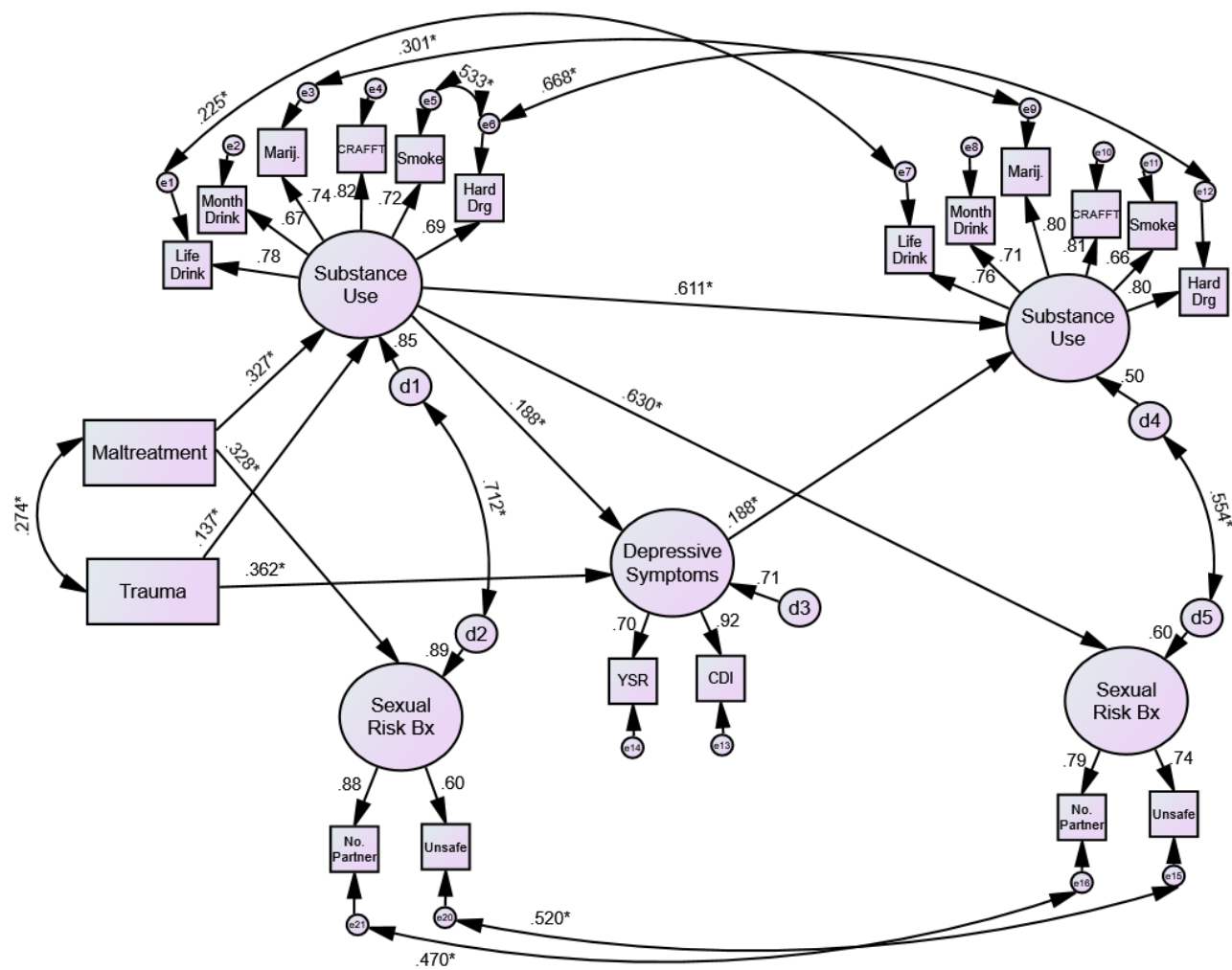
Figure 4:   Full health risk behaviors latent variable structural equation model with baseline depressive symptoms (SEM 7)
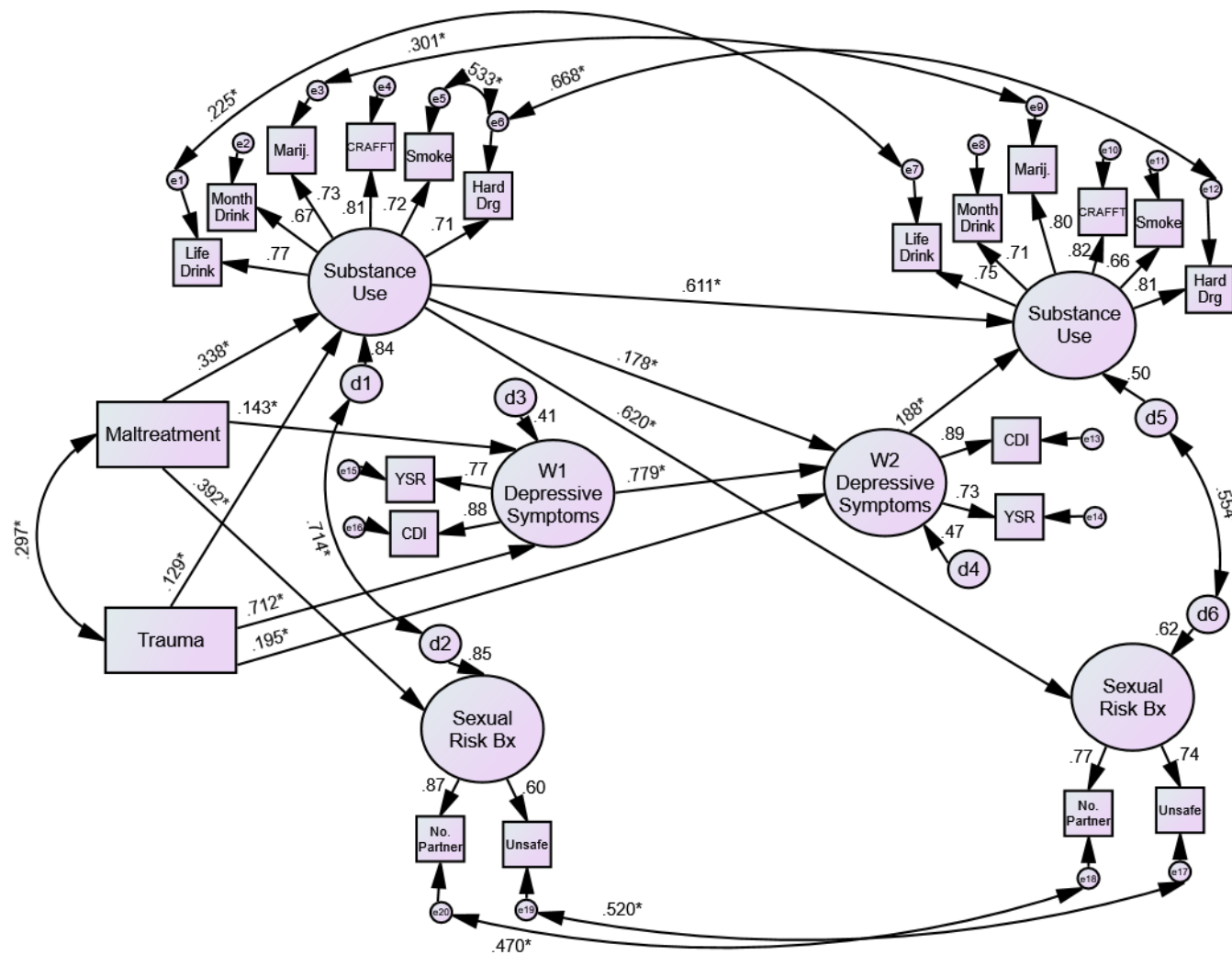
Figure 5:   Full suicidality latent variable measurement model
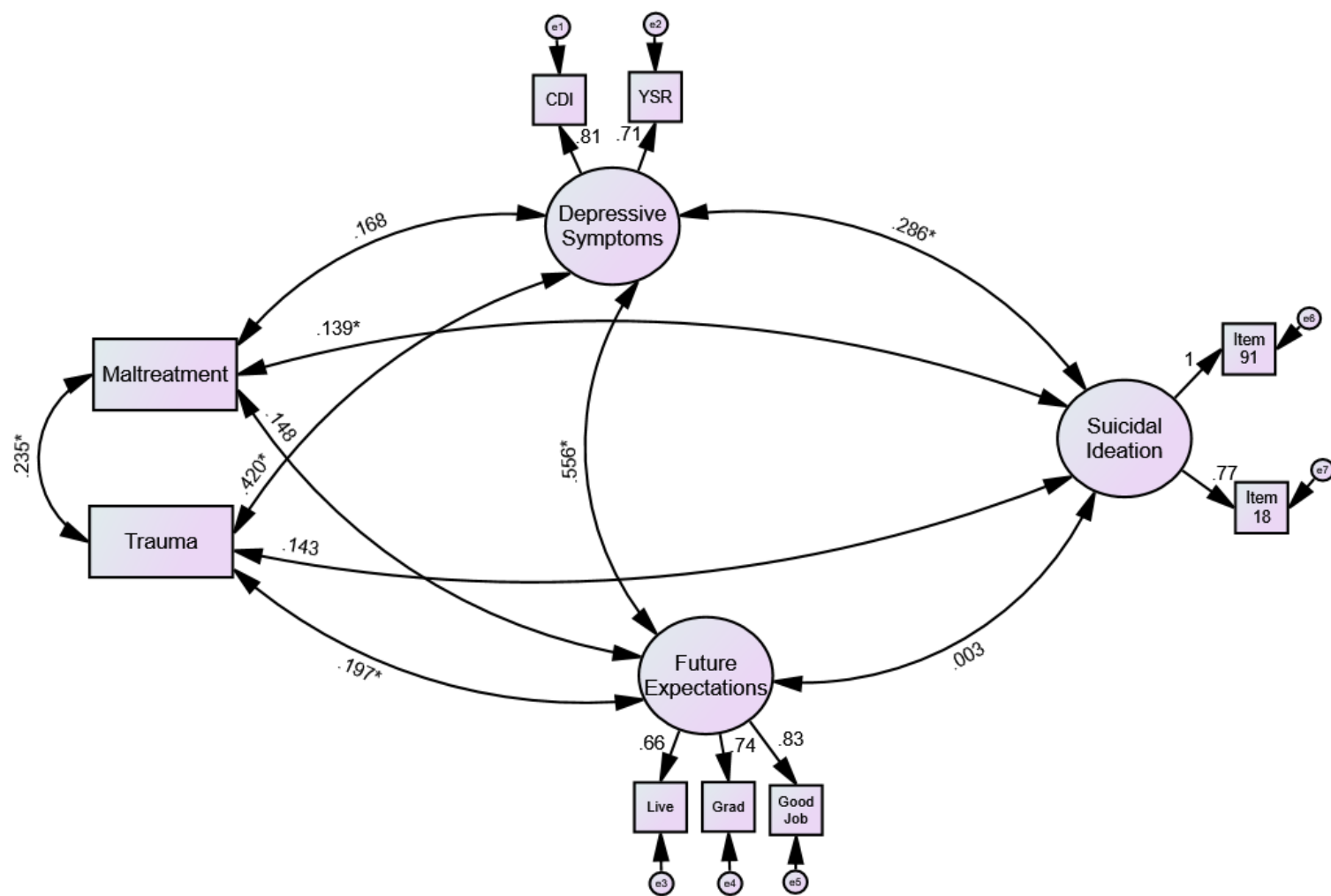
Figure 6:   Full suicidality latent variable structural equation model
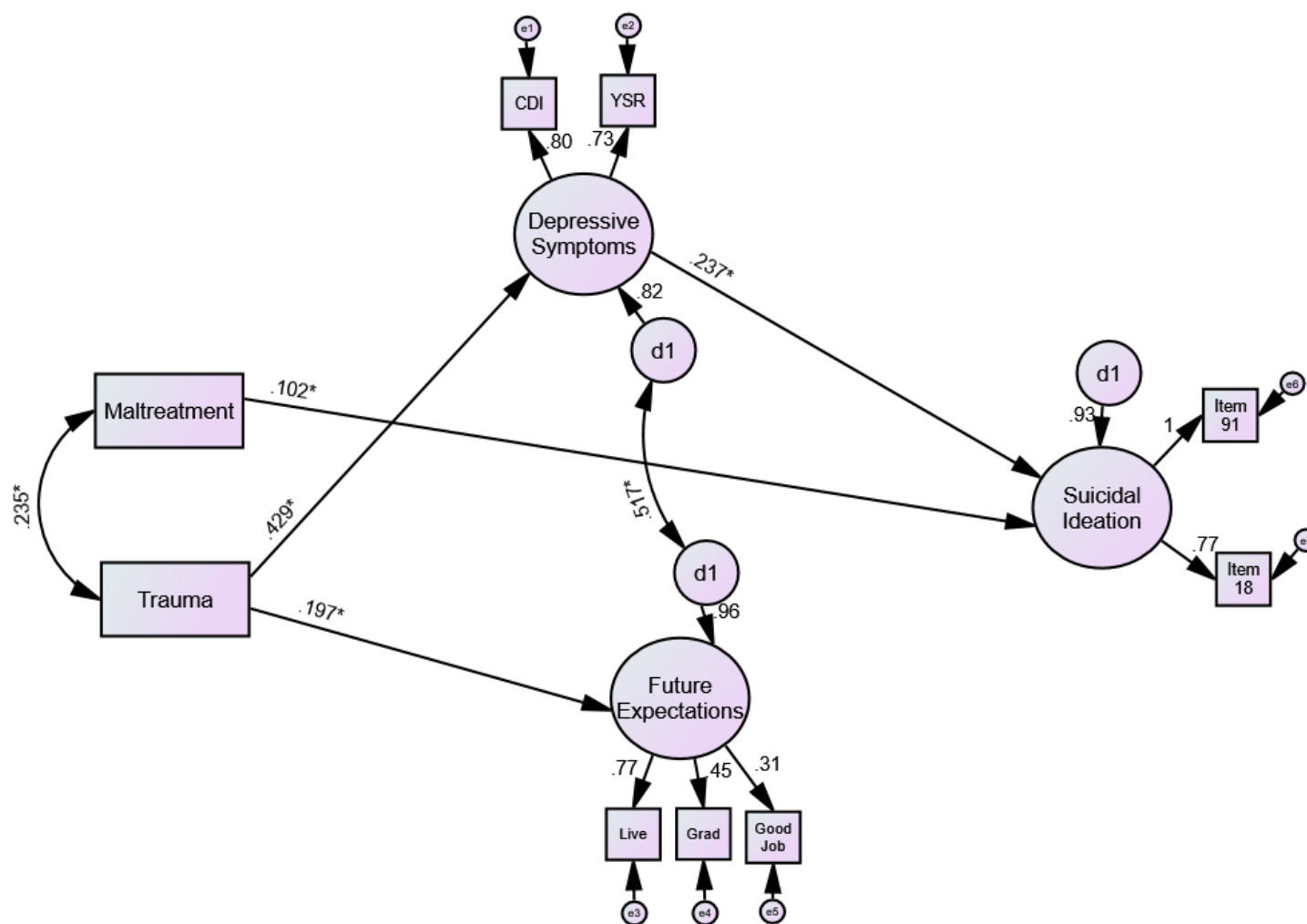
Appendix B: Tables

Table 1:   Proposed constructs of interest

Wave	Construct	Informant	Instruments
Wave 1	Maltreatment	Caseworker	Case Investigation Module
		Caregiver	Parent-Child Conflict Tactics Scale (CTS-PC; Caregiver version)
		Youth	Parent-Child Conflict Tactics Scale (CTS-PC; Child version)
	Trauma Symptoms	Youth	Trauma Symptom Checklist for Children (TSCC)
Wave 2	Beliefs about Self	Youth	Children's Depression Inventory
			Achenbach Youth Self Report
	Future Expectations	Youth	Future Expectations Module
Wave 3	Substance Abuse	Youth	Substance Abuse Module
			CRAFFT
	Sexual Behavior	Youth	Sexual Activity Module
	Suicidality	Youth	Children's Depression Inventory
			Youth Self-Report

Table 2:   Principal axis factoring (PAF) results for Future Expectations items

Variable	Item	Factor Loading
FE21a	What are the chances you will live to be at least 35?	.546
FE25a	What are the chances you will graduate from high school?	.676
FE26a	What are the chances you will have a good job by age 30?	.705

Table 3: Minimums, maximums, means, and standard deviations for items used in measurement and structural models (weighted)

Latent Variable	Measured Variable	Min	Max	Mean	SD	Weighted N	(Unweigh N)
W1 Sexual Risk Beh.	Lifetime partners	0	5	.52	1.15	547,147	744
	Unsafe Sex	0	1	.07	.25	552,594	755
W1 Substance Use	Lifetime alcohol use	0	6	.65	1.22	551,950	752
	Past month alcohol use*	0	1.79	.14	.34	552,594	756
	Lifetime marijuana use	0	6	.45	1.22	548,193	750
	Any hard drug use	0	1	.10	.30	554,252	758
	Past month tobacco smoker	0	1	.10	.30	552,417	753
	CRAFFT Score	0	6	.68	1.53	550,007	752
W2 Depressive symptoms	CDI Total Score (*t*-score)	34	89	47.98	10.33	554,097	631
	YSR Anx/Dep Score (*t*-score)	50	86	53.74	6.17	558,790	639
W2 Future Beliefs	Live to be 35	0	4	.69	.95	558,033	635
	Graduate from H.S.	0	4	.73	1.18	557,096	632
	Have a good job	0	4	.90	1.00	558,309	637
W3 Sexual Risk Beh.	Lifetime partners	0	5	1.48	1.76	508,842	538
	Unsafe sex	0	1	.30	.46	508,842	547
W3 Substance Use	Lifetime alcohol use	0	6	1.21	1.60	512,860	549
	Past month alcohol use*	0	1.95	.26	.47	467,360	504
	Lifetime marijuana use	0	6	1.19	2.07	512,270	546
	Any hard drug use	0	1	.13	.34	512,806	549
	Past month tobacco smoker	0	1	.20	.40	511,876	545
	CRAFFT Score	0	6	.91	1.68	509,114	544
W3 Suicidal Ideation	YSR Item 18	0	2	.07	.33	382,394	413
	YSR Item 91	0	2	.14	.41	382,312	412

* *Indicates a variable that was transformed due to excessive skew and/or kurtosis.*

Table 4:   Mean scores and percentages on selected measured variables by level of
             maltreatment score

Maltreatment	0	1	2	3	4
TSCC *t*-score	46.37	50.38	50.33	56.39	57.97
CDI *t*-score	44.64	49.77	46.49	53.36	57.87
YSR Anx/Dep *t*-score	52.59	53.74	52.73	57.73	59.02
CRAFFT score	0.74	0.71	0.79	1.75	2.21
% used hard drugs	10.8	7.0	9.2	30.1	53.1
% past month smoker	19.7	20.3	14.1	25.1	57.4
% unsafe sex	22.3	25.7	30.9	48.9	59.6
% suicidal ideation	1.3	15.9	12.6	23.4	4.3

Table 5: Correlation matrix of measured continuous variables (weighted)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Maltreatment score	1													
2. TSCC score	.256*	1												
3. CDI total score	.206*	.324*	1											
4. YSR Anx/Dep scale score	.192*	.387*	.627*	1										
5. Future: Live to 35	.028*	.196*	.334*	.165*	1									
6. Future: Grad from HS	.054*	.138*	.396*	.270*	.427*	1								
7. Future: Good job	.044*	.217*	.376*	.268*	.449*	.566*	1							
8. Life. alcohol use	.189*	.071*	.277*	.212*	.044*	.163*	.071*	1						
9. Month alcohol use	.139*	.070*	.317*	.198*	.071*	.263*	.090*	.665*	1					
10. Lifetime marijuana use	.154*	.156*	.272*	.214*	.071*	.219*	.185*	.663*	.571*	1				
11. CRAFFT score	.162*	.190*	.333*	.318*	.089*	.115*	.095*	.659*	.620*	.763*	1			
12. Life. sex partners	.128*	.067*	.211*	.148*	.104*	.140*	.018*	.442*	.375*	.526*	.476*	1		
13. YSR 18	.065*	.095*	.083*	.055*	.018*	.027*	-.065*	.249*	.134*	.099*	.133*	-.051*	1	
14. YSR 91	.141*	.139*	.055*	.115*	-.003*	.030*	-.013*	.136*	.062*	-.007*	.065*	-.068*	.749*	1

Correlation significant at the p<.001 level.

Table 6:   Fit statistics for joint confirmatory factor analyses

Model	X^2 (df)	AIC	BIC	RMSEA	CFI	TLI	WRMR	SRMR
Outcomes: 1-factor solution	46.775 (20)	--	--	.049	.921	.889	.586	--
Outcomes: 2-factor solution	31.264 (19)	--	--	.034	.964	.946	.453	--
Mediators: 1-factor solution	79.795 (5)	7960.5	8027.4	.153	.626	.253	--	.084
Mediators: 2-factor solution	2.131 (4)	7757.9	7829.3	.000	1.000	1.023	--	.012
Mediators and Outcomes	67.771 (59)	--	--	.015	.984	.979	.561	--

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Table 7:   Fit statistics for the measurement models (health risk behaviors model)

Model	X² (df)	Δ X² (df)	RMSEA	CFI	TLI	WRMR
MM1	283.053 (210)	--	.021	.936	.923	.952
MM2 (added correlated errors)	248.469 (201)	--	.017	.959	.948	.838
MM3 (removed non-sig. corr. errors)	252.282 (204)	7.387 (3)	.017	.958	.948	.844
MM4 (freed factor loadings at baseline)	253.817 (198)	--	.019	.951	.938	.719

Note: Change in chi-square can only be calculated for nested models. Change in chi-square cannot be calculated in the traditional way for models estimated using WLSMV estimation; Mplus provides a difference testing option ("difftest" command) for calculating change in chi-square with WLSMV.

Table 8:   Fit statistics for the structural models (health risk behaviors model)

Model	X² (df)	Δ X² (df)	RMSEA	CFI	TLI	WRMR
SEM 1	311.147 (205)	--	.026	.907	.886	.913
SEM 2 (removed Future latent var.)	227.678 (149)	--	.026	.929	.909	.802
SEM 3 (added paths from base. sub. use to dep. and W3 sex. risk)	211.219 (147)	--	.024	.942	.925	.722
SEM 4 (set n.s. paths to 0)	211.073 (154)	7.882 (7)	.022	.948	.936	.764
SEM 5 (set n.s. path to 0)**	211.570 (155)	1.857 (1)	.022	.949	.937	.748
SEM 6 (added baseline depression)	254.776 (189)	--	.021	.948	.937	.764
SEM 7 (set n.s. path to 0)**	256.338 (190)	2.956 (1)	.021	.948	.936	.773
SEM 8 (set n.s. path to 0)	260.521 (191)	5.350* (1)	.022	.945	.934	.788

Note: Change in chi-square can only be calculated for nested models. Change in chi-square can not be calculated in the traditional way for models estimated using WLSMV estimation; Mplus provides an difference testing option ("difftest" command) for calculating change in chi-square with WLSMV.
* Statistically significant at the p<.05 level.
** Indicates a model that was retained for analyses.

Table 9:   Standardized direct, indirect, and total effects on Substance Use

Variable	Direct	Indirect (W1 Sub Use)	Indirect (Dep Sym)	Total Indirect	Total Effects
Maltreatment	--	.220***	.018	.238***	.238***
Trauma symptoms	--	.085	.088*	.142*	.142*
W1 subs use	.622***	--	.028	.028	.651***
W1 depressive symptoms	--	--	.124*	--	.124*
W2 depressive symptoms	.159**	--	--	--	.159**

* Significant at p<.05   ** Significant at p<.01   *** Significant at p<.001

Table 10:   Standardized direct, indirect, and total effects on Sexual Risk Behavior

Variable	Direct	Indirect (W1 Sub Use)	Total Effects
Maltreatment	--	.209***	.209***
Trauma symptoms	--	.080	.080
W1 subs use	.619***	--	.619***

* Significant at p<.05   ** Significant at p<.01   *** Significant at p<.001

Table 11:   Standardized direct, indirect, and total effects on Depressive Symptoms
             (health risk behaviors model)

Variable	Direct	Indirect (W1 Sub Use)	Indirect (W1 Dep Sym)	Total Indirect	Total Effects
Maltreatment	--	.060*	.111*	.172**	.172**
Trauma symptoms	-.195*	.023	.555***	.579***	.384***
W1 depression	.779**	--	--	--	.779**
W1 subs use	.178**	--	--	--	.178**

*Significant at p<.05   ** Significant at p<.01   *** Significant at p<.001*

Table 12:   Fit statistics for the measurement and structural models (suicidality)

Model	X² (df)	Δ X² (df)	AIC	BIC	RMSEA	CFI	TLI	SRMR
MM1*	38.263 (20)	--	6426.94	6559.16	.050	.956	.920	.039
MM2 (base. suic.)	76.243 (34)	--	6436.89	6603.15	.059	.912	.857	.081
SEM1	38.263 (20)	--	6426.94	6559.16	.050	.954	.920	.039
SEM 2 (set n.s. paths to 0)*	44.869 (24)	6.606 (4)	6431.88	6548.55	.049	.948	.924	.051

* Indicates a model that was retained for analyses.

Table 13:   Standardized direct, indirect, and total effects on suicidal ideation

Latent or measured variable	Direct	Indirect	Total Effects
Maltreatment	.102*	--	.102*
Trauma	--	.102*	.102*
Depressive symptoms	.237*	--	.237*
Future expectations	--	--	--

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