EFFECTS OF MALTREATMENT ON PHYSICAL HEALTH

IN FEMALE ADOLESCENTS AND YOUNG WOMEN

WITH A SUBSTANCE USE DISORDER

by

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Valerie Stacy, Ph.D.

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Child abuse is a ubiquitous phenomenon with deleterious effects on physical health including poor general health, physical disability, medical diagnoses, and surgical procedures. Associated disruption to neurobiological systems may underlie additional health risk behaviors. Individuals abused as children are more likely to engage in antisocial behavior (ASB) and to carry a diagnosis of substance use disorder (SUD). Both ASB and SUD are associated with physical health problems. Although the prevalence of SUD and conduct disorder (CD) is higher in males, females with these diagnoses are among the most impaired. Consequences for females include affiliation with deviant males, intimate partner violence (IPV), risky sexual behavior, pregnancy, prostitution, and sexually transmitted diseases including HIV/AIDS.

This secondary analysis uses data collected from 1990 to 2000 as part of a longitudinal study exploring biobehavioral development in drug-abusing female adolescents. Participants are 189 females with SUD, 14 to 18 years of age at baseline and 19 to 23 at follow-up. Two cross-sectional and one longitudinal hypothesis were tested: 1) At ages 14-18 child abuse -- physical (CPA), sexual (CSA), and emotional (CEA) -- is associated with physical health problems, mediated by ASB and number of SUDs; 2) at ages 19-23 adult violence -- physical (including

but not limited to IPV and reflecting victimization, perpetration, and mutual violence), sexual, and emotional abuse -- is associated with physical health problems, mediated by ASB_2[1] and number of $SUDs_2$; and 3) all predictors and mediators from visits 1 and 2 -- CPA, CSA, CEA, adult physical, sexual, and emotional abuse; $ASB_{1,2}$, number of $SUDs_{1,2}$ -- and physical health problems$_1$ are associated with physical health problems$_2$.

Contrary to expectations, at ages 14-18 only CSA was associated with physical health problems, mediated by ASB_1. At ages 19-23 adult violence was not significantly associated with physical health problems$_2$. ASB_2 evidenced a direct relationship with physical health problems$_2$, mediated by number of $SUDs_2$. In the longitudinal analysis predictors significantly associated with physical health problems$_2$ were physical health problems$_1$ and number of $SUDs_2$. These findings are discussed in light of current literature along with implications for treatment and intervention.

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[1] The subscript "1" or "2" next to a variable denotes visit 1 (ages 14-18) or visit 2 (ages 19-23), respectively.

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PREFACE

who helped me to glimpse the lived world of young women like those described in this dissertation.

1.0   INTRODUCTION

Child abuse has emerged as a serious public health concern with long-lasting and detrimental consequences for women (Centers for Disease Control, 2010; Child Welfare Information Gateway, 2008; World Health Organization, 2009). Female adolescents and young adults with a history of child abuse experience poorer physical health relative to young women without such a history (Clark, Thatcher, & Martin, 2010; Diaz, Simantov, & Rickert, 2002; Hussey, Chang, & Kotch, 2006; Salmon & Calderbank, 1996). In addition to immediate and obvious health consequences of child abuse, it has been suggested that maltreating families foster poor health by creating or exploiting existing vulnerabilities in their children, laying the foundation for psychiatric disorder such as antisocial behavior (ASB) and psychoactive substance use (SU) (*reviewed in* Repetti, Taylor, & Seeman, 2002).

Compared to nonmaltreated peers, female adolescents with a history of child abuse engage in more severe ASB and are more likely to use psychoactive substances (Diaz, Simantov, & Rickert, 2002; Goodkind, Ng, & Sarri, 2006). ASB and SU are risk factors for substance use disorder (SUD) and adult violence (Sung, Erkanli, Angold, & Costello, 2004), as is a history of child abuse (Halpern, Spriggs, Martin, & Kupper, 2009). ASB, SUD, and adult violence are related to poor physical health (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995; Fang, Massetti, Ouyang, Grasse, & Mercy, 2010). There is indication that poor physical health may continue from adolescence to young adulthood because maltreatment, ASB, and SUD persist from adolescence to adulthood (Odgers, et al., 2008).

There are tremendous costs associated with sequelae of child abuse and neglect including juvenile delinquency and lost productivity to society (Bonomi, Anderson, Rivara, Cannon, Fishman, et al., 2008; Wang & Holton, 2007). Estimated annual direct costs exceed $33 billion,

and indirect costs approach $71 billion (figures are based on 2007 US dollars) (Wang & Holton, 2007). Although the economic impact is immense, the psychological toll exacted by protracted maltreatment, SUD, and chronic poor health and disability cannot be quantified. Elucidating relationships between maltreatment, ASB, SUD, and physical health in young women provides an opportunity to identify causal factors and disrupt this downward trajectory.

Although associations between child abuse, SUD, and physical health have been explored in adults, studies of adolescents are scarce. This may be due in part to the age-related nature of alcohol-induced health problems including liver disease, cardiomyopathy, and neurological insults (*reviewed in* Arria, Dohey, Mezzich, Bukstein, & van Thiel, 1995). Studies of adolescents abused as children generally focus on health-compromising behaviors as opposed to physical health per se. Compared to adolescents without a history of child abuse, adolescents with such a history are more likely to engage in health-risk behaviors such as ASB (Goodkind, Ng, & Sarri, 2006; Green, Russo, Navratil, & Loeber, 1999; Hahm, Lee, Ozonoff, & Van Wert, 2010), early-age initiation of substance use (Dube, et al., 2006), SUD (Bergen, Martin, Richardson, Allison, & Roeger, 2004), and risky sex (Clark, Lesnick, & Hegedus, 1997; Fang & Corso, 2007; Jaffe, Caspi, Moffitt, & Taylor, 2004). Compared to males, female adolescents experience more severe health consequences associated with ASB and SUD including pregnancy and HIV/AIDS (Bergen, Martin, Richardson, Allison, & Roeger, 2004). Females' involvement with deviant males places them at increased risk for continued maltreatment and thus poor physical health (Mezzich, Tarter, Giancola, Lu, Kirisci, et al., 1997). Without intervention these young women are likely to maltreat their own children, perpetuating the cycle of abuse (*reviewed in* Serbin & Karp, 2004).

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In order to explicate the impact of maltreatment on physical health via ASB and SUD in young women, it is important to study comprehensively the concurrent impact of abuse on physical health as well as its influence from adolescence to young adulthood, controlling for physical health problems in adolescence. Data collected from 1990 to 2000 as part of the Female Adolescent Study ("FAS") (Mezzich, 1989b) will be analyzed to determine associations among maltreatment, ASB, and SUD, and physical health problems in young women. This secondary analysis contains three assessments -- two cross-sectional and one longitudinal -- as outlined in Section 4.1. This is one of few investigations employing a longitudinal design to explore the continuity of maltreatment and physical health problems in young women with SUD. Cross-sectional analyses will explore associations among maltreatment, ASB, number of SUDs, and physical health problems at ages 14-18 and 19-23, respectively ("maltreatment" at ages 14-18 consists of childhood physical, sexual, and emotional abuse; at ages 19-23, adult physical, sexual, and emotional abuse). The longitudinal analysis will permit causal inferences about the effects of maltreatment$_{1,2}$, ASB$_{1,2}$, number of SUDs$_{1,2}$, and physical health problems$_1$ on physical health problems$_2$. The variable "physical health problems" will be controlled for due to the potentially confounding influence of physical health problems at ages 14-18 on physical health problems at ages 19-23. Socioeconomic status (SES), age, and ethnicity will be controlled for in all studies.

2.0   REVIEW OF THE LITERATURE

Using data from the Female Adolescent Study conducted from 1990 to 2000 ("FAS") (Mezzich, 1989b), this secondary analysis seeks to illuminate associations among maltreatment (child abuse and adult violence), ASB, SUD, and physical health in female adolescents and young women. At the time of FAS there was a paucity of research on child abuse in general, and studies exploring the link between child abuse and physical health in female adolescents were almost nonexistent. In 1993 the U.S. National Research Council Panel on Child Abuse and Neglect concluded that "the scientific study of child maltreatment and its consequences is in its infancy" (p. 15) and that "knowledge of the long-term consequences of childhood maltreatment into adulthood is extremely limited" (p. 17) (*as cited in* Greenfield, 2010). It is through this historical lens that the present analysis should be viewed. Generally accepted research findings exist today only because of the foundation laid by studies such as FAS.

2.1   CHILD ABUSE AND PHYSICAL HEALTH

Child abuse is prevalent worldwide. In 2008 over a million children were abused physically, sexually, or emotionally in the United States alone (Centers for Disease Control and Prevention, 2010). Although psychological sequelae are well established in the literature, recent attention has focused on physical health consequences of child abuse. Cross-sectional and longitudinal studies of adults and adolescents have found an association between child abuse and poorer physical health (Afifi, et al., 2007; Diaz, Simantov, & Rickert, 2002; Hussey, Chang, & Kotch, 2006; Moeller, Bachmann, & Moeller, 1993; Sachs-Ericcson, Blazer, Plant, & Arnow, 2005; and Salmon & Calderbank, 1996). A history of child abuse has been associated with poorer general health (Bensley, Van Eenwyk, & Simmons, 2003), greater physical disability, distressing

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physical symptoms (*reviewed in* Arias, 2004; Sachs-Ericcson, Blazer, Plant, & Arnow, 2005; Springer, Sheridan, Kuo, & Carnes, 2007; Walker, et al., 1999), and increased medical diagnoses (Springer, Sheridan, Kuo, & Carnes, 2007), hospital admissions, and surgical procedures (Salmon & Calderbank, 1996).

A review of the National Comorbidity Study found an association between CPA or CSA and past-year serious physical health problems in men and women (Sachs-Ericcson, Blazer, Plant, & Arnow, 2005), and a large Dutch survey revealed a relationship between all types of child abuse -- physical, sexual, psychological and multiple -- and reduced physical health-related quality of life in adults (Afifi et al., 2007). The association with CSA was no longer significant after adjusting for number of physical health conditions, which may be attributable to the exclusion of PTSD measures in the survey (Afifi, et al., 2007). Bensley and colleagues (2003) found that CSA alone and multiple types of abuse doubled the risk of poor physical health in adult women (Bensley, Van Eenwyk, & Simmons, 2003). A sample of female military veterans seen in a primary care clinic found childhood physical or sexual abuse was significantly related to health risk behaviors. Specifically, sexual abuse only and physical abuse only were associated with alcohol abuse and with younger age at first intercourse and at first consensual intercourse (Rodgers, et al., 2004). Sexual abuse only was significantly correlated with current tobacco use and with having driven while intoxicated, whereas physical abuse only was associated with infrequent exercise and smoking during pregnancy (Rodgers, et al., 2004). A cross-sectional study of undergraduate males and females found a relationship between a history of CPA or CSA and increased hospital admissions, operations, and, for females, general practitioner visits (Salmon & Calderbank, 1996).

At the time of FAS, emotional or psychological abuse was rarely investigated. Since then the detrimental impact of childhood emotional abuse has been more widely acknowledged, although research on this type of maltreatment still lags behind investigations of physical and sexual abuse. In a case review of maltreated youth 9 to 12 years of age participating in a longitudinal study on the effects of maltreatment on adolescent development, Trickett and colleagues applied a framework for classifying emotional abuse that identified nearly 50% of the sample as having experienced emotional abuse in contrast to the 9% identified at the time of referral by Children & Youth Services. Emotionally abused children had more reports of maltreatment and experienced more different types of maltreatment and more physical abuse than did nonemotionally abused children (Trickett, Mennen, Kim, & Sang, 2009). In another study Teicher and colleagues (2006) examined the impact of various forms of child abuse including parental verbal aggression (a form of emotional abuse) on different outcome measures including "anger-hostility" and "limbic irritability" among young adults 18 to 22 years old. They found a moderately strong effect size for verbal abuse alone, but the combined exposure to verbal abuse and domestic violence yielded an effect size at least as great as that of exposure to familial sexual abuse (Teicher, Samson, Polcari, & McGreenery, 2006).

Child abuse has been linked to general poor health among adolescents. A prospective longitudinal study of adolescents and young adults discovered a relationship between traumatic events including childhood physical and sexual abuse and poorer health, mediated by anxiety (Clark, Thatcher, & Martin, 2010). In their analysis of the National Longitudinal Study of Adolescent Health, Hussey and colleagues (2006) found an association between child abuse, particularly CSA, and self-reports of overall fair or poor physical health among male and female adolescents (Hussey, Chang, & Kotch, 2006). A cross-sectional study of female adolescents

revealed an association between a history of CPA or CSA and self-reports of fair to poor health; after controlling for grade level, ethnicity, and SES, only CSA remained significant (Diaz, Simantov, & Rickert, 2002).

Child abuse has been associated with symptoms frequently associated with anxiety -- impairment of a functional (versus organic) nature such as irritable bowel syndrome, headache (Moeller, Bachmann, & Moeller, 1993; *reviewed in* Arnow, 2004), gastrointestinal problems (Van Tilburg, et al., 2010; Moeller, Bachmann, & Moeller, 1993), and vague general symptoms not easily diagnosed. Studies have found higher rates of child abuse among women with fibromyalgia, for example, compared to arthritis, arthritis having a more organic etiology (*reviewed in* Arnow, 2004). Child abuse, particularly emotional abuse, has been associated in adults with earlier age of migraine onset, chronic migraine, continuous daily headache, and severe headache-related disability (Tietjen, et al., 2009). Among adolescents CPA has been associated with migraine diagnosis as well as frequency and severity of headache (Fuh, et al., 2010). In their reanalysis of an earlier study that had found no significant association between CSA and unexplained somatic symptoms (Walker, et al., 1989), Walker and colleagues (1992) identified a relationship between severe CSA and medically unexplained physical symptoms in adult women (Walker, et al., 1992). This suggests that such an association may be overlooked in studies that do not consider severity of abuse.

There has been a tendency to identify symptomatology resulting from maltreatment as somatization disorder -- the "tendency to experience and communicate somatic distress in response to psychosocial stress and to seek medical help for it" (Lipowski, 1988, p. 1358). Although Salmon and Calderbank (1996) found higher levels of hypochondriasis and psychosomatic ailments among abused individuals, this was unrelated to increased levels of

health care utilization (Salmon & Calderbank, 1996). Evidence from the fields of developmental traumatology and neurobiology suggests instead that unexplained medical symptoms might be better understood as the result of disruption to multiple interrelated neurobiological systems including the central nervous system, immune system (Clark, Thatcher, & Martin, 2010; Shirtcliff, Coe, & Pollak, 2009), catecholamine system (*reviewed in* DeBellis, 2001; Shea, Walsh, MacMillan, & Steiner, 2004; *reviewed in* Teicher, Andersen, Polcari, Anderson, & Navalta, 2002; Teicher, Andersen, Polcari, Anderson, Navalta, & Kim, 2003), and hypothalamic-pituitary-adrenal (HPA) axis (Carpenter, et al., 2009; *reviewed in* DeBellis, 2001; Heim, et al., 2000; MacMillan, et al., 2009; Teicher, et al., 2003).

The effects of chronic hyperarousal have been studied in animals and humans. A stressor initiates a hormonal cascade in which ultimately glucocorticoids (in humans, primarily cortisol) are secreted into the bloodstream (*reviewed in* Shea, Walsh, MacMillan, & Steiner, 2004). Cortisol modulates stress responses and adaptation as well as metabolism and immune function (*reviewed in* Neigh, Gillespie, & Nemeroff, 2009). Although in the short term the stress response is adaptive and facilitates survival in a hostile environment (*see review* by Neigh, Gillespie, & Nemeroff, 2009), protracted exposure to corticosteroids has deleterious consequences for psychological and physical well-being. Even prenatal exposure to glucocorticoids has been linked to low birth weight and a sustained increase in corticosteroid levels as well as a diathesis for cardiovascular disease and type-II diabetes (*see review* by Teicher, et al., 2003). A relationship has been observed also between child abuse and compromised immune functioning among adults and adolescents (Clark, Thatcher, & Martin, 2010; Shirtcliff, Coe, & Pollak, 2009).

Overweight status among adults and adolescents has been associated directly and indirectly with child abuse (Bentley & Widom, 2009; Clark, Thatcher, & Martin, 2010; Hussey, Chang, & Kotch, 2006; Rich-Edwards, et al., 2010; Rohde, et al., 2008). Controlling for demographic factors and cigarette and alcohol use, Bentley and Widom (2009) found a significant association between CPA (but not CSA) and increased BMI among adult males and females. Another study linked moderate and severe CSA (but not CPA) to a 34-69% increased risk of type-2 diabetes among women (Rich-Edwards, et al., 2010). Either CPA or CSA has been associated with obesity in middle-aged women (Rohde, et al., 2008) and with overweight status and increased BMI among female adolescents (Clark, Thatcher, & Martin, 2010; Hussey, Chang, & Kotch, 2006). Although studies have produced inconsistent results regarding which type of child abuse has a stronger link to obesity-related outcomes, it is clear that such a relationship exists.

Research on the effects of child abuse on adults and adolescents has found dysregulation of the HPA axis -- either hyperreactivity (Heim, et al., 2000) or hyporeactivity (Carpenter, Tyrka, Ross, Khoury, Anderson, et al., 2009; *reviewed in* Neigh, Gillespie, & Nemeroff, 2009). Hahm and colleagues (2010) found a lower response threshold and greater reactivity to adverse experiences and future stressors among adults who had experienced childhood adversity including maltreatment (Hahm, Ozonoff, & Van Wert, 2010). Heim and colleagues (2000) similarly found that adult women with a history of childhood physical or sexual abuse or both experienced HPA and autonomic nervous system hyperreactivity (Heim, et al., 2000). Carpenter and colleagues (2009), however, discovered a significantly dampened cortisol response among adults 36 years of age and older who experienced child abuse (emotional abuse) (Carpenter, et al., 2009). Although research has noted differential patterns of cortisol regulation among

maltreated children, some investigations have not found such a link. These discrepancies may be due to methodological differences in studies as well as individual differences in vulnerability. It has been suggested that the experience of combined physical and sexual abuse places children at greatest risk for neuroendocrine dysregulation due to severe and chronic maltreatment and the resulting allostatic load and increased hippocampal vulnerability (*reviewed in* Cicchetti & Toth, 2005; *see review* by McEwen, 2008).

In addition to disruptions to the HPA and catecholamine systems, child abuse has been linked to neuroanatomical structural damage to the brain including attenuated left-hemisphere development, diminished corpus callosum size, and resulting decreased hemispheric integration and increased hemispheric lateralization (*reviewed in* Teicher, Andersen, Polcari, Anderson, & Navalta, 2002). Such deformation of brain structures and functions results in emotional, behavioral, and cognitive dysregulation (*reviewed in* DeBellis, 2001). This cluster of symptoms comprising such dysregulated behavior -- labile affect, externalizing behavior, and executive cognitive functioning difficulties -- has been termed "neurobehavioral disinhibition" (Tarter, et al., 2003, p. 126) and is believed to underlie many health risk behaviors. Dodge and colleagues (1995) found that physical abuse by age five was associated with a fourfold increase in conduct problems by grades 3-4 and that the association was mediated by social information processing patterns (Dodge, Bates, Petit, & Valente, 1995). Giancola and colleagues (1998) found the combination of low executive cognitive functioning and difficult temperament was associated with aggressive and nonaggressive ASB among conduct-disordered female adolescents (Giancola, Mezzich, & Tarter, 1998).

For female adolescents with a history of child abuse, health risk behaviors entail substance abuse (including cigarette smoking), SUD, drunk driving, early-onset sexual activity,

sexual risk taking such as SU during sex, inconsistent birth control, multiple sexual partners, sexually transmitted diseases, teen pregnancy, and sexual revictimization (Afifi, et al., 2007; Bonomi, Cannon, Anderson, Rivara, & Thompson, 2008; Cinq-Mars, Wright, Cyr, & McDuff, 2003; Diaz, Simantov, & Rickert, 2002; Fergusson, Horwood, & Lynskey, 1997; Garnefski & Diekstra, 1997; Goodkind, Ng, & Sarri, 2006; Hussey, Chang, & Kotch, 2006; Lansford, et al., 2007; Sachs-Ericcson, Blazer, Plant, & Arnow, 2005; and Stock, Bell, Boyer, & Connell, 1997). A longitudinal study of adolescent males and females found that those who had experienced CPA in the first five years of life were more likely to have been a teen parent and to have been pregnant and unmarried in the past year (Lansford, et al., 2007). A cross-sectional study found a strong association between CSA and adolescent pregnancy, mediated by risky sexual behavior including first intercourse by age 15 and no birth control during last sexual encounter (Stock, Bell, Boyer, & Connell, 1997). One study demonstrated a relationship between *severity* of child and adolescent sexual abuse among adolescents and increased risk of more than one past-year consensual sexual partner (Cinq-Mars, Wright, Cyr, & McDuff, 2003). Being abused by more than one person and/or experiencing penetration or physical coercion were associated with higher odds of sexual activity, greater number of partners, and pregnancy (Cinq-Mars, Wright, Cyr, & McDuff, 2003). This is consistent with other research citing an association between *severity* of abuse and poor physical health outcomes (Bensley, Van Eenwyk, & Simmons, 2003; Salmon & Calderbank, 1996).

Child abuse adversely affects physical health directly and indirectly via health risks including antisocial behavior.

2.2 CHILD ABUSE AND ANTISOCIAL BEHAVIOR

In addition to its direct link to poor physical health, child abuse affects physical health via antisocial behavior (ASB). A strong relationship between child abuse and ASB has been reported frequently (Lansford, Dodge, Pettit, Bates, Crozier, & Kaplow, 2002; Lansford, et al., 2007; Latimer, Kleinknecht, Hung, & Gabor, 2003). Jaffee and colleagues (2004) found that childhood physical abuse prior to age five was a *causal* factor in children's ASB at ages 5-7 (Jaffee, Caspi, Moffitt, & Taylor, 2004). Adolescents maltreated as children are more likely than nonmaltreated peers to engage in ASB (Fang & Corso, 2007). ASB in adolescence is associated with SU and sexual activity, consequences of which may include early and unplanned pregnancy (Mezzich, et al., 1997).

A distinction has been observed between individuals with life course-persistent ASB and those with adolescent-onset, childhood limited, or no ASB (Moffitt & Caspi, 2001). In a longitudinal study Moffitt and Caspi (2001) found life-course persistent ASB to be characterized by early neuropsychological or cognitive deficits and contextual risk factors including poor parenting, maltreatment, other family adversity, and an environment that promotes social deviance (Moffitt & Caspi, 2001). Odgers and colleagues (2008) similarly found that those with life course-persistent ASB scored higher on risk factors including child abuse (Odgers, et al., 2008).

Studies of inmates (Miller & Knutson, 1997) and incarcerated adolescents (Fraser, 2002) have reported a higher prevalence of child abuse. A case-control study of young children in residential care found that children with a history of maltreatment including emotional abuse showed greater delinquency and somatic symptoms (Carrasco-Ortiz, Rodriguez-Testal, & Hesse, 2001). Longitudinal studies have corroborated these results, indicating that maternal maltreating

parenting predicts offspring's problem behaviors during childhood (Eckenrode et al., 2001) as well as arrests in young adulthood (Grogan-Kaylor & Otis, 2003). Longitudinal studies have found that CPA occurring by age five is associated with increased juvenile arrests for violent and nonviolent offenses (Lansford, et al., 2007) as well as higher levels of aggression, delinquent behaviors, and school absences (Lansford, et al., 2002). Aggression, delinquency, and school absences were especially pronounced for minority students and females (Lansford, et al., 2007).

The association between child abuse and ASB is strong among female offenders and among women in the general population. A cross-sectional study of SUD female offenders (22-58 years of age, mean age 35) found that CPA, CSA, and "family violence" were associated with early traumatic events which predicted adolescent conduct problems and adult criminal behavior (Grella, Stein, & Greenwell, 2005). Adolescent conduct problems, along with CSA and African American ethnicity, predicted criminal behavior, and drug and property crimes were associated with adolescent substance abuse (Grella, Stein, & Greenwell, 2005). A general population study determined that the lifetime prevalence of ASB among women physically or sexually abused in childhood was four times that of women without a history of child abuse -- 4.1 and 4.7%, respectively, compared to 0.6 and 0.9% (MacMillan, et al., 2001). Among female adolescents a cross-sectional analysis of Canada's National Longitudinal Survey of Children and Youth revealed an association between parental physical abuse and delinquency (Latimer, Kleinknecht, Hung, & Gabor, 2003).

In female adolescents a history of child abuse has been associated with earlier initiation and greater intensity of ASB. Green and colleagues (1999) found that female adolescents with a history of CPA exhibited CD symptoms two years earlier than nonmaltreated females (Green, Russo, Navratil, & Loeber, 1999). Two community studies found that female adolescents with a

history of childhood sexual abuse were 3-4 times more likely to engage in "serious to extreme" ASB and twice as likely to engage in aggressive-criminal behavior as those without an abuse history (Bergen, Martin, Richardson, Allison, & Roeger, 2004; Garnefski & Diekstra, 1997). Fang and Corso (2007) found that a childhood physical abuse was associated with a greater than 6% increase in the likelihood of youth violence perpetration among female adolescents (Fang & Corso, 2007) and other studies have found elevated levels of truancy, "conning," running away, destroying property, stealing (Goodkind, Ng, & Sarri, 2006), fighting, selling drugs (Green, Russo, Navratil, & Loeber, 1999; Hahm, Lee, Ozonoff, & Van Wert, 2010), and overall delinquent behaviors (Goodkind, Ng, & Sarri, 2006).

A dose-response relationship has been observed between child maltreatment and ASB, linking multiple types of abuse to more detrimental consequences (Green, Russo, Navratil, & Loeber, 1999; Hahm, Lee, Ozonoff, & Van Wert, 2010). Hahm and colleagues (2010) found a relationship between number of types of maltreatment and proportion of sexual risk and delinquency outcomes among young adult females (Hahm, Lee, Ozonoff, & Van Wert, 2010). Young women who experienced any form of child abuse were more likely to have an SUD diagnosis, to have had sex before age 15, to express sexual regret after alcohol use, and to have had multiple sexual partners. Experiencing two or more types of maltreatment was related to having sex for money, and experiencing three types was related to owning a gun and belonging to a gang (Hahm, Ozonoff, & Van Wert, 2010).

2.3   ANTISOCIAL BEHAVIOR AND PHYSICAL HEALTH

Antisocial behavior appears to be a risk factor for poor health in adolescence and adulthood, and this relationship is particularly evident in females. Longitudinal studies have demonstrated that females with ASB develop into women with higher rates of sexually transmitted diseases,

pregnancies (Lansford, et al., 2007), and complications thereof (Serbin, Peters, McAffer, & Schwartzman, 1991; Bardone, et al., 1998). Moreover, the latter study also found that these young women reported more medical disorders compared to females with no adolescent psychiatric disorder. Studies of physical health problems of female criminals also are useful, as most report adolescent ASB. Nearly 50% of this population report acute or chronic medical problems, including gynecological disorders, gastrointestinal problems, or infections. Over half of female adolescents in juvenile justice facilities who have demonstrated ASB have concurrent physical disorders such as asthma, sexually transmitted diseases, pelvic inflammatory disease, gastrointestinal disorders, respiratory disorders, anemia, and headache.

Female adolescents who exhibit antisocial behavior are often involved in relationships that are mutually violent. In a review of the National Longitudinal Study of Adolescent Health (Add Health), Fang and colleagues (2010) found that a diagnosis of CD in males or females created a risk factor of 1.49 for perpetrating IPV without injury and 2.82 for IPV with violence (Fang, Massetti, Ouyang, Grasse, & Mercy, 2010). There was a direct effect of youth violence perpetration on IPV perpetration in both males and females, and the relationship was stronger for females than males, with youth violence perpetration increasing the likelihood of IPV by 9.5% for females and 7.7% for males.

2.4 ANTISOCIAL BEHAVIOR AND SUD

There is a relationship between ASB, SU, and SUD (Costello, Erklani, Federman, & Angold, 1999; Disney, Elkins, McGue, & Iacono, 1999; Elkins, King, McGue, & Iacono, 2006; Grella, Stein, & Greenwell, 2005). Conduct disorder (CD) often precedes and contributes to SUD (Costello, Erkanli, Federman, & Angold, 1999; Disney, Elkins, McGue, & Iacono, 1999; Elkins, King, McGue, & Iacono, 2006; Shrier, et al., 2003). SUD further dysregulates stress response

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systems, exacerbating cognitive and emotional difficulties and leading to escalation of ASB (*see review* by DeBellis, 2002).

A cross-sectional analysis of Canada's National Longitudinal Survey of Children and Youth found delinquent youth more likely to use drugs than nondelinquent youth (Lattimer, Kleinknecht, Hung, & Gabor, 2003). Utilizing data from the Minnesota Twin Study, Disney and colleagues (1999) found that males and females with a diagnosis of conduct disorder (CD) consistently demonstrated higher rates of substance use and abuse compared to controls (Disney, Elkins, McGue, & Iacono, 1999). Females with CD were about 3.5 times more likely to currently use nicotine, alcohol, or marijuana and about 5-7 times more likely to have an SUD compared to controls (Disney, et al., 1999). Compared to age peers without an SUD, female adolescents with an SUD have been shown to display greater delinquency, violence, affiliation with deviant adult male partners, risky sexual behaviors, and pregnancy (Mezzich, et al., 1997).

Self-report data from a national Canadian survey show that females constituted 44% of all youth engaging in delinquent behavior (Lattimer, Kleinknecht, Hung, & Gabor, 2003). Females were less likely than males to commit serious violent or sexual offenses but were equally likely to be minor offenders and to engage in drug trafficking (Lattimer, Kleinknecht, Hung, & Gabor, 2003). ASB has been found to create a greater risk for alcohol and marijuana use and SUD among females after age 14 compared to males (Boyle and Offord, 1991; Costello, et al., 1999; Fergusson, Horwood, & Lynskey, 1997; Sung, Erkanli, Angold, & Costello, 2004). A review of the National Longitudinal study of Adolescent Health (Add Health) found that the use of alcohol, marijuana, or other drugs was associated with violence among female adolescents (Blum, Ireland, & Blum, 2003). One study of adolescent males and females probed for adult ASB symptoms in addition to CD, which is assessed only until age 15. Although only about

one-quarter of CD-diagnosed males and females had a concomitant SUD, among those with additional ASB symptoms, 65% of males and 94% of females had an SUD (Disney, Elkins, McGue, & Iacono, 1999). A recent study of over 4,000 adolescents in treatment for SUD found that females reported significantly more severe disturbance on nine of ten scales of the Drug Use Screening Inventory Revised (DUSI-R) compared to males, including health status and behavior pattern (Tarter R. , Kirisci, Mezzich, & Patton, 2011). Although the prevalence of ASB may be lower in females compared to males, females may be more likely to experience comorbid SUD and more severe consequences. These findings support Keenan and colleagues' concept of the "gender paradox" (Keenan, Loeber, & Green, 1999, p. 8) -- the phenomenon in which a disorder manifests as more virulent in the gender in which it is less prevalent. It would seem, then, that female adolescents with ASB who develop an SUD might represent the most extreme segment of antisocial youth.

2.5   SUD AND PHYSICAL HEALTH

Women with SUD are at increased risk for poor health because of the increased morbidity and mortality associated with alcohol and drug consumption, their frequent history of child abuse, and their ongoing involvement in ASB and adult violence. Analysis of the British "National Surveys of Sexual Attitudes and Lifestyles" undertaken in 1990 and 2000 revealed that women but not men who retrospectively reported "being drunk" as their main reason for first intercourse were more likely to report having sex before age 16 (Aicken, Nardone, & Mercer, 2010). As mentioned previously, early sexual debut is itself associated with many health risks. In addition, women whose main reason for first intercourse was being drunk were more likely than other women to report all adverse circumstances surrounding first intercourse (Aiken, Nardone, & Mercer, 2010).

Although the literature on female adolescents with SUD is scant, similar results have been found in that population. A recent study confirmed that although the prevalence of SUD is higher among males, substance-abusing female adolescents experienced more severe consequences in various domains (Tarter, Kirisci, Mezzich, & Patton, 2011). This was true regardless of concurrent involvement with the criminal justice system. Specifically, females reported poorer health status and greater behavior problems and psychiatric disturbance compared to males). In addition females reported less social competence, poorer school adjustment, and more family system problems than males (Tarter, Kirisci, Mezzich, & Patton, 2011). In one of the few studies specifically examining physical health effects of SUD on adolescent alcohol abusers, Arria and colleagues (1995) found that male and female alcohol abusers had greater liver injury, more general health symptoms, poorer diet, and less regular exercise compared to controls (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995). Females with SUD experienced greater general health problems, oral/nasal, cardiopulmonary, gastrointestinal, endocrine/hematologic, neurologic, and genito-urinary symptoms compared to controls (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995). Adolescent female alcohol abusers fared worse on some health measures compared to their male counterparts, particularly dermatologic, visual, cardiopulmonary, orthopedic and genito-urinary health (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995).

The Arria (1995) study is one of few to explore direct health consequences of SUD in adolescents, perhaps in part because many health consequences are age related and do not appear until later in life. Many studies of adolescents instead discuss indirect health consequences of SUD. In addition to being a risk factor for SUD, psychoactive substance use has been linked to affiliation with deviant partners and unprotected sex in both casual and chronic substance

abusers (CDC, 2006). One cross-sectional study of female adolescents found that early victimization, behavioral dysregulation, and negative affectivity contributed to internalizing and externalizing behavior, affiliation with older deviant males, SUD, and risky sexual behavior (Mezzich, et al., 1997). A study of 18- to 25-year-old college students found a significant association between both excitement seeking and social deviance proneness and alcohol use and also between excitement seeking and risky sexual behavior (Justus, Finn, & Steinmetz, 2000). The review of British population surveys mentioned previously found that individuals whose main reason for first intercourse was being drunk were more likely to report unreliable contraception on that occasion (Aicken, Nardone, & Mercer, 2010). Bonomo and colleagues (2001) found that 10% of adolescents surveyed reported sex under the influence of alcohol and later regretting it, and 10% reported having unsafe sex. They also found more alcohol-related accidents and fights, especially with higher levels of drinking (Bonomo, et al., 2001). Some consequences of unprotected sex are sexually transmitted diseases including HIV/AIDS (CDC, 2006). One literature review found an association between problematic alcohol consumption and STDs (Cook & Clark, 2005). Women are the fastest growing demographic of HIV/AIDS cases, with the Centers for Disease Control reporting heterosexual transmission of HIV/AIDS including exchanging sex for drugs accounting for 80% of new cases among women and IV drug use approximately 20% (CDC, 2006). Although females comprised only 14% of individuals living with AIDS in 1992, by 2004 this figure rose to 23% (CDC, 2006).

2.6   CHILD ABUSE AND ADULT VIOLENCE

Intimate partner violence (IPV) is highly prevalent in our society (Bensley, Van Eenwyk, & Simmons, 2003; Coker, Smith, Bethea, King, & McKeown, 2000; Halpern, Spriggs, Martin, & Kupper, 2009). In their review of the National Longitudinal Study of Adolescent Health (Add

Health), Halpern and colleagues (2009) determined that 17% of young women have experienced male partner physical violence by adolescence and 44% by young adulthood (Bensley, Van Eenwyk, & Simmons, 2003; Halpern, Spriggs, Martin, & Kupper, 2009). Another study found that over half of adult women seeking primary health care in family health practices reported ever having experienced intimate partner violence, 40% in the form of physical violence and 13.6% in the form of psychological abuse and that health effects associated with psychological IPV were as severe as those associated with physical IPV (Coker, Smith, Bethea, King, & McKeown, 2000). As most research has focused on physical IPV, this suggests psychological IPV may be underreported and its prevalence underestimated.

There is a strong association between child abuse and IPV (Bensley, Van Eenwyk, & Simmons, 2003; Halpern, Spriggs, Martin, & Kupper, 2009). Bensley and colleagues (2003) found that experiencing or witnessing physical abuse (interparental) in childhood was associated with experiencing intimate partner physical violence and emotional abuse in adulthood. CSA was not significantly associated with physical IPV but was associated with emotional abuse by an intimate partner. Four-fifths of the women who reported physical IPV also reported emotional IPV (Bensley, Van Eenwyk, & Simmons, 2003). Childhood sexual abuse (CSA) has been associated with psychological, physical, and sexual IPV (Daigneault, Hebert, & McDuff, 2009; Walker, et al., 1992). Walker and colleagues (1992) found the positive predictive value for later adult sexual abuse victimization of women who reported severe childhood sexual abuse to be 79% (Walker, Katon, Hanson, Harrop-Griffiths, Holm, et al., 1992).

Women with a history of child abuse are at increased risk not only for IPV victimization but also for IPV perpetration. A childhood history of physical abuse has been associated with an

almost 10% (9.71%) increased risk of IPV perpetration among female adolescents (Fang & Corso, 2007).

2.7   SUMMARY

Child abuse has been linked directly to poor physical health in adults and adolescents and indirectly through adolescent health risk behaviors such as antisocial behavior, psychoactive substance use, and SUD. Although adolescents engage in ASB and SUD regardless of abuse history, the prevalence is higher among individuals abused as children. Compared to males, consequences of ASB and SUD are more severe for females. It has been suggested that neurobehavioral disinhibition may underlie some antisocial acts.

For female adolescents ASB typically precedes and contributes to psychoactive substance use. Female adolescents with ASB who use psychoactive substances generally affiliate with older deviant males who provide entrée to a wider range of antisocial behavior including using more harmful drugs, facilitating the rapid transition to SUD. Further, female adolescents' involvement with antisocial males places them at increased risk for adult violence -- victimization, perpetration, and mutual violence – as well as risky sexual behavior, prostitution, pregnancy, and sexually transmitted diseases including HIV/AIDS.

The social stressor of maltreatment, along with characteristics of ASB and SUD, is related to physical health status in female adolescents and young adults, and the resulting symptomatology is similar regardless of whether the predictor is maltreatment, ASB, or SUD. The literature also suggests that the continuity of maltreatment, ASB, and SUD from adolescence to young adulthood may contribute to the perpetuation of poor physical health.

To elucidate the impact of child abuse and adult violence on physical health problems via ASB and SUD in females, this secondary analysis will determine associations between

maltreatment, ASB, SUD, and physical health problems cross-sectionally in adolescence and young adulthood and longitudinally from adolescence to young adulthood, controlling for age, ethnicity, and SES as well as for continuity of maltreatment, ASB, SUD, and prior physical health problems.

This secondary analysis will consist of three investigations, as follows:

The first investigation will explore relationships between child abuse (physical, sexual, and emotional), ASB, number of SUDs, and physical health problems cross-sectionally among female adolescents (ages 14-18) with SUD. The second investigation will explore associations between adult violence (physical, sexual, and emotional), ASB, number of SUDs, and physical health problems cross-sectionally among young adult females (ages 19-23) with SUD. The third longitudinal investigation will explore the effects of variables at ages 14-18 -- child abuse, ASB, number of SUDs, and physical health problems -- and variables at ages 19-23 -- adult violence, ASB, number of SUDs -- on physical health problems at ages 19-23.

3.0   RESEARCH DESIGN AND METHODOLOGY

This secondary analysis utilizes data from a National Institute of Drug Abuse- (NIDA-) funded prospective study titled, "Female Adolescent Drug Abuse: Biobehavioral Development" ("Female Adolescent Study" or "FAS"), Ada C. Mezzich, Ph.D., M.I.S., Principal Investigator, data collected 1990-2007. A previous analysis employing a subset of participants from FAS revealed strong associations between child abuse and SUD, with 74% of female adolescents with SUD reporting a history of child abuse (Stacy, 2009). In the earlier analysis I also found a strong relationship between CD and SUD, with nearly 84% of SUD females displaying concomitant CD (Stacy, 2009). These findings are consistent with the literature and informed the organization of participants in the current secondary analysis, as follows.

3.1   PARTICIPANTS

In the original study (FAS) participants were divided into five categories: (1) substance use disorder (SUD) only; (2) SUD and conduct disorder (SUD/CD); (3) conduct disorder (CD) only; (4) older sisters of SUD/CD females and SUD females; and (5) controls. Groups were divided into "SUD only" and "SUD and CD" in order determine the existence of a distinct syndrome of CD comorbid to SUD not adequately defined by the DSM-III-R (Mezzich, 1989b, p. 55). As this was not an objective of the current analysis and due to the previously mentioned high rate of CD among SUD female adolescents (84%, Stacy, 2009), I combined the categories of "SUD only" and "SUD and CD" into "SUD" (N=189). The category "older sisters," included in FAS in an effort to identify family environmental factors that might inoculate against PSUD, was not germane to this analysis and was eliminated. As this secondary analysis is not concerned with comparing SUD females to controls but with determining associations between child abuse, adult

violence, ASB, SUD, and physical health problems, I did not include data on the control group included in FAS. Subdiagnostic psychiatric and SUD symptoms as well as nicotine dependence were not exclusionary criteria for controls in FAS. Theoretically, then, controls could possess a full range of psychiatric and SUD symptoms up to the threshold of diagnosis and may have differed from SUD participants only to a matter of degree, rendering a control group superfluous.

FAS consisted of three periods of data collection: baseline, 1990-1995 (ages 14-18), first follow-up, 1995-2000 (ages 19-23), and second follow-up, 2000-2007 (ages 24-28). As the second follow-up explored participants' maltreatment of their own children -- a concern not relevant to this secondary analysis -- this age group (24-28) was not included. The paradigm for the current secondary analysis involves assessment of females with SUD on two occasions -- baseline (visit 1, 14-18 years old) and follow-up (visit 2, 19-23 years old), years of data collection 1990-2000.

Participants are 189 young women who met criteria for a lifetime diagnosis of psychoactive substance abuse or dependence for any drug category in DSM-III-R or DSM-IV except nicotine dependence,[2] with or without comorbid psychiatric disorders (N=189)[3].

3.2   RECRUITMENT

In FAS baseline recruitment implemented a broad-based sampling strategy designed to ensure a heterogeneous sample representative of both SUD and non-SUD female adolescents. Active recruitment sources included medical, psychiatric, drug and alcohol treatment facilities, juvenile court, group homes, community-based organizations, and other research projects. Participants

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[2] Nicotine dependence alone was not sufficient for inclusion in the SUD group, but some participants with another SUD also had nicotine dependence.

[3] Psychosis and other exclusionary criteria are covered in Section 3.4.

recruited from drug and alcohol facilities participated in the study upon the conclusion of their treatment. Participants were also passively recruited via newspaper advertisements, word-of-mouth referrals, and brochures placed in medical clinics, shopping centers, and college campuses. The control group was also actively recruited from the community using a Pittsburgh-based marketing firm. Participants completed necessary consent forms at ages 14-18 (*see* APPENDIX A) and ages 19-23 (*see* APPENDIX B) and were compensated with a $150 gift certificate at the conclusion of their participation.

As mentioned previously, the current secondary analysis employs only participants with SUD. Diagnosis of SUD as a categorical variable is described in Section 3.6, "Ascertainment." Determination of *severity* of SUD as a continuous variable is discussed in Section 3.7.2.2, "SUD."

3.3   DEMOGRAPHIC CHARACTERISTICS

Disparities in health status based on age, ethnicity, and socioeconomic status (SES) have been well documented in the literature. In general health declines with age, and this is more apparent among individuals with an SUD. There is evidence that elements of low SES in childhood become biologically incorporated, reflected in greater physical health problems not only in childhood but throughout the life span (*reviewed* in Conroy, Sandel, & Zuckerman, 2009). Ethnic disparities are widely acknowledged in medical conditions such as cardiovascular disease -- the leading cause of death worldwide (*reviewed in* Mensah & Brown, 2007). Compared to European Americans, African Americans experience higher mortality rates for coronary heart disease, stroke, and other cardiovascular diseases (*reviewed* in Mensah & Brown, 2007). African Americans also experience higher hospitalization rates for angina and congestive heart failure (*reviewed* in Mensah & Brown, 2007) as well as increased rates of hypertension

(Hajjar & Kotchen, 2003), lead exposure (*reviewed* in Hicken, Gragg, & Hu, 2011), and lifetime risk of developing diabetes mellitus (Narayan, Boyle, Thompson, Sorensen, & Williamson, 2003) compared to European Americans. These inequities necessitate obtaining demographic information in order to control for age, ethnicity, and SES in all analyses.

Demographic information was solicited in FAS via a *Demographic Form* (*see* APPENDIX C) that also inquired about socioeconomic status (SES) based on Hollingshead's Four-Factor model (Hollingshead, 1975). Table 1 summarizes demographic characteristics of participants at ages 14-18 and 19-23.

Table 1: Demographic data

Demographic Variables	Ages 14-18				Ages 19-23			
	M	SD	n	%	M	SD	n	%
Measure								
Age	16.1	1.3			21.2	1.6		
Education, Years	9.7	1.5			12.8	1.6		
SES*	34.6	14.1			35.7	12.0		
Ethnicity								
European American			136	72.3			133	72.7
African American			44	23.4			42	23.0
Other			8	4.3			8	4.4

Note: *SES = socioeconomic status based on Hollingshead (1975)
          Percentages may not total 100% due to rounding

3.4   EXCLUSIONARY CRITERIA

To promote generalizability of findings, exclusionary criteria in FAS were limited to those factors potentially threatening data validity. Exclusionary criteria included past or present psychosis, an IQ below 85, neurological/neuromuscular disease, a history of head injury requiring hospitalization, a life-threatening medical illness, or an uncorrectable sensory handicap. Pregnancy and acute alcohol or drug effects were *temporary* exclusion criteria. All

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participants were asked to abstain from drug use for two weeks and alcohol for 24 hours prior to their appointment. To maximize the accuracy of measurement, it was ensured that participants were alcohol and drug free at the time of testing by conducting a breath alcohol test ("Alco Sensor III Breathalyzer") and a urine screen for drugs ("E-Z Urine Screen," Environmental Diagnostics, Inc.) upon entering the laboratory. If either test was positive, the individual was rescheduled within thirty days. In addition it was important to determine that participants were not pregnant. To that end, a "Clear View Pregnancy Test" (Fisher Scientific) was administered. If the result was positive, the subject was rescheduled six months after birth, abortion, or miscarriage. Also prior to initiation of the research protocol all subjects were administered an expanded version of the *Clinical Institute Withdrawal Scale* (Sullivan, Sykora, Schneiderman, Naranjo, & Sellers, 1989) that taps the range of withdrawal symptoms concomitant to each class of abusable drugs. This was a final check to ensure that no residual drug effects would confound the results. This rating yields an index of withdrawal severity. Withdrawal ratings greater than zero resulted in the participant's being rescheduled. Payment was made to participants after completion of the protocol.

3.5   MEASURES

The following section describes measures used to ascertain the presence or absence of SUD as a categorical variable followed by descriptions of instruments used to operationally define *severity* of SUD and other continuous variables.

3.6   ASCERTAINMENT

As this secondary analysis aims to explore maltreatment and physical health problems in female adolescents and young women with an SUD, proper assessment of SUD is essential. At the commencement of FAS, few published tools were available to assess SUD (Mezzich, personal communication, 2011). Although not published until later, researchers used the "diachronic assessment method" in place at the Center for Education and Drug Abuse Research (CEDAR) in Pittsburgh, later outlined by Clark and colleagues (2001). The primary tenet underlying this assessment method is that substance use is a complex phenomenon that changes over time (Clark, Pollock, Mezzich, Cornelius, & Martin, 2001). FAS participants completed measures outlined by Clark and colleagues (2001), described later in this paper. A diagnosis of SUD was then formulated by the clinical research associate conducting the interview and later verified by an assessment team composed of all three associates and a child clinical psychologist (Ada C. Mezzich, Ph.D., MIS) according to the "best estimate" method outlined by Leckman and colleagues (1982). The best estimate procedure describes the use of multiple data sources including direct interview and family history in order to diagnose SUD reliably (Leckman, Sholomskas, Thompson, Belanger, & Weissman, 1982).

Instruments were administered by experienced clinical research associates who were required to have a master's degree in clinical psychology, counseling psychology, or social work

or a bachelor's degree in one of these areas and at least two years of direct experience with psychiatric patients. Interviewers underwent specific training on evaluation and diagnosis of SUD including: (1) didactic review of topics involving evaluation and diagnostic issues, (2) demonstration of diagnostic assessment skills and appropriate interviewing procedure, and (3) practice sessions during which the clinicians demonstrated evaluative and diagnostic skills with patients. Furthermore, clinicians participated in ongoing seminars about diagnostic issues and evaluation. As part of the diachronic assessment method of SUD, participants completed the following measures:

Drug Checklist (Mezzich, 1989a). (See APPENDIX D). Based on the Drug and Alcohol Chart used in the National Institute of Mental Health Epidemiologic Catchment Area program (NIMH-ECA, 1986), the Drug Checklist includes 40 drugs of abuse such as cocaine, benzodiazepines, MDMA (Ecstasy), alcohol, and caffeinated drinks. FAS respondents ranked their four preferred drugs. Trained research associates then administered modified versions of the Lifetime History of Alcohol Use (see APPENDIX E) and Lifetime History of Drug Use questionnaires (Skinner, 1982, 2002) for each substance (see APPENDIX F). Current (past six months) and most severe past episodes (prior to six months) were assessed to formulate a lifetime history. Drug and alcohol lifetime histories measured substance use patterns (quantity, frequency, context), documented changes in such patterns (increase, decrease, termination) and the reason for such changes, and indicated transition from substance use to abuse and dependence (Clark, Pollock, Mezzich, Cornelius, & Martin, 2001). One of the most significant elements of the lifetime history questionnaires for determining the transition to SUD is determination of consequences related to substance use.

Next participants ages 14-18 were administered an expanded version of the *Kiddie Schedule for Affective Disorders and Schizophrenia Epidemiological Version (K-SADS-E)* (Orvaschel, Tabrizi, & Chambers, 1980) and 19-23-year-old participants, the *Structured Clinical Interview for DSM* (SCID) (Spitzer, Williams, & Gibbon, 1987). The *K-SADS-E* systematically assesses current (past six months) and most severe past episode (prior to the past six months) of SUD and has demonstrated good reliability for diagnosis of affective disorders in children and adolescents (Chambers, et al., 1985; Orvaschel, Puig-Antich, Chambers, Tabrizi, & Johnson, 1982). The SCID was administered to participants ages 19-23 to obtain DSM-III-R and DSM-IV diagnoses of SUD and psychiatric disorders. It has proven psychometric properties among adults, and interrater reliability has been demonstrated among adolescents for individual DSM-IV alcohol symptoms (kappa = 0.84-1.0) and diagnoses (kappa = 0.94) and for other SUD diagnoses (kappa = 0.82-1.0) (Martin, Pollock, Bukstein, & Lynch, 2000). The SCID has been referred to as the "gold standard" by which other instruments are judged and has been shown to perform better with more severe disorders such as alcohol dependence (Blacker, 2005).

As mentioned previously, diagnoses of SUD were formulated by a diagnostic team led by a clinical child psychologist (Ada C. Mezzich, Ph.D., MIS) using the best estimate procedure. This process determined the *existence* of SUD as a categorical variable. Assessment of *severity* of SUD was ascertained by summing the number of SUD diagnoses.

3.7   OPERATIONAL DEFINITIONS

3.7.1   Predictors

3.7.1.1   Child Abuse   "Child abuse" is composed of physical, sexual, and/or emotional abuse occurring before the age of 18.   These measures were derived using a revised version of the *Child Abuse and Neglect Interview Scale* (*CANIS*) in which Sections III, IV, and V were adapted for the Female Adolescent Study (Ammerman & Karpach, 1991).   The *CANIS* is a semi-structured interview administered to each adolescent to collect data about childhood physical, sexual, and emotional abuse history.   The *CANIS* takes 45 minutes to administer and consists of over 100 questions. The interviewer was trained in the mental health or family services fields and had experience working with abusive parents and their families. The *CANIS* has strong preliminary psychometric properties.   Interrater agreement exceeds 85% on all items (Ammerman, Hersen, Van Hasselt, & Lubetsky, 1994), and physical and sexual abuse summary ratings derived from the *CANIS* show interrater agreement of 87.7% (Ammerman et al., 1994). The more stringent kappa was also computed at an acceptable level of .68.

Childhood Physical Abuse   Severity of childhood physical abuse was assessed by a section of the *CANIS* that inquires about physical abuse by either mother or father before the age of 14 including corporal punishment and the outcome of the most severe episode including the necessity of medical treatment.   A sample question from this section reads, "If corporal punishment, thinking of the most severe corporal punishment, did she [or he]: (1) slap you on the hands, (2) spank your buttocks, (3) restrain you, (4) use a paddle, belt, or switch". . . "(8) shake you as an infant or young child, (9) throw your head against the wall, (10) throw objects at you."   Outcome of the most severe corporal punishment by mother or father was

queried, with answers ranging from "bruises" and "marks" to "broken bones" and "unconsciousness." The next question in this section inquired about the necessity of medical treatment, with the choices "no," "yes -- private doctor," and "yes -- emergency room." Severity of physical abuse was indexed as the sum of these items.

Childhood Sexual Abuse This section inquired about sexual abuse experienced before the age of 18 years. Following a preface in which the research associate assured the child that these standard questions are asked of all participants and that sometimes adults or older kids "have contact with younger kids," participants were asked: "Has anyone ever done anything to you like this that you wish they would not have done? For example, touching you inappropriately, forcing you to watch or do something sexually?" Participants were then asked to think of the time when they felt worse and the types of sexual behavior that occurred including "fondling (nongenital), fondling (genital/rectal), oral sex, genital penetration, anal sex, observing others in sexual activity." Finally, participants were asked what type of force or coercion took place, if any. Severity of sexual abuse was indexed as the sum of these items.

Childhood Emotional Abuse Emotional abuse was assessed by a section of the *CANIS* that inquires about frequency of psychologically or emotionally abusive incidents in one month perpetrated by either mother or father before age 14 including "screaming mean things at you, telling you they wish you were dead, making up mean jokes about you." Severity of emotional abuse was indexed as the sum of such incidents in one month.

3.7.1.2 Adult Violence Adult violence was composed of adult physical, sexual, and/or emotional abuse and was derived using an adapted version of the *Maltreatment History Self-Report* (MacMillan, Offord, & Racine, 1993) which inquired about physical, sexual, and

emotional abuse after the age of 18. The original instrument, *"Child Maltreatment History Self-Report,"* was part of the Ontario Health Supplement (1990-1991), a community survey evaluating general population prevalence and correlates of psychiatric disorder in Ontario (Mancini, Van Ameringen, & MacMillan, 1995). In the Female Adolescent Study respondents ages 19-23 were asked to report on the occurrence of various types of abusive behaviors after age 18, as described in each section below:

Adult Physical Abuse Questions inquiring about adult physical abuse began, "Since you have been 18, have you or your spouse (or boyfriend/girlfriend) done any of the following things to the other? (a) pushed, shoved, or grabbed the other one, (b) threw something at the other one… (h) physically attacked the other one in some way." Physical abuse by any adult was queried similarly: "How often has any adult (18 years or older) done any of the things on the list below to you since you have been an adult (18 years or older)? (a) pushed, grabbed, or shoved you . . . (h) physically attacked you in some way." Severity of adult physical abuse was indexed as the sum of these items.

Adult Sexual Abuse Adult sexual abuse was determined by asking if any adult 18 years or older had "ever done any of the following things to you against your will since you have been 18? (a) threatened to have sex with you or hurt you sexually? (b) showed the sexual parts of their body to you or forced you to show yours? (c) touched the sexual parts of your body or made you touch the sexual parts of their body? (d) tried to have sex with you or sexually attacked you (oral, vaginal, or anal intercourse?)" Severity of adult sexual abuse was indexed as the sum of these items.

Adult Emotional Abuse Adult emotional abuse was assessed by asking how often any adult had done the following things after the respondent had reached adulthood (18 years or

older): "(i) yelled at you, (j) insulted you. . . (l) tried to make you feel guilty; (m) ridiculed or humiliated you . . . (o) made you feel like you were a bad person." Severity of adult emotional abuse was indexed as the sum of these items.

3.7.2   Mediators

In the current secondary analysis it is hypothesized that antisocial behavior (ASB) and SUD mediate the associations between child abuse (child physical, sexual, and emotional abuse) and physical health problems at ages 14-18 and between adult violence (adult physical, sexual, and emotional abuse) and physical health problems at ages 19-23. Statistical criteria for mediation are outlined in Section 3.7.2.

3.7.2.1   Antisocial Behavior (ASB) Antisocial behavior was measured using *Andrew's Scale of History and Severity of Offenses*, an instrument describing ASBs at visit 1, visit 2 (Andrew, 1974). *Andrew's Scale* is a measure of 65 antisocial offenses ranging from nonviolent (e.g., runaway, truancy) to violent (e.g., rape, assault with intent to commit murder). This variable was indexed as sum of ASBs.

3.7.2.2   SUD As most young women with a diagnosis of SUD abuse multiple psychoactive substances, it is important to assess severity of SUD. After ascertaining an SUD diagnosis categorically as described previously, severity of SUD as a continuous variable was determined by summing the total number of SUDs.

3.7.3   Outcome Variable: Physical Health

"Physical health problems" was measured by the sum of items endorsed on the *Health Problems Checklist* (Schinka, 1989). This is a 236-item questionnaire assessing general health in twelve

domains as well as health behaviors and current functioning: 1) General Health includes sleep, appetite, and general well-being; 2) Dermatology focuses on symptoms such as itching, hair loss; 3) Vision describes vision changes, blurred vision, and problems with night vision; 4) Audition/Olfaction includes 14 items such as ringing in the ears, earaches, nosebleeds, and sinus problems; 5) Mouth, Throat, and Neck is composed of 18 items such as toothaches, difficulty swallowing, sores in and around the mouth, and swollen glands; 6) Cardiopulmonary assesses cardiac and lung functioning; 7) Gastrointestinal consists of 26 items including upset stomach, stomach pain, frequent nausea, frequent vomiting, diarrhea; 8) Endocrine/hematologic contains 12 items pertaining to easy bruising or bleeding, excessive thirst, discomfort with heat or cold, and excessive sweating; 9) Orthopedic consists of 10 items and addresses symptoms such as bone pain, stiff joints, muscle cramps, and frequent back problems; 10) Neurologic identifies 26 symptoms such as problems with concentration, headaches, blackouts or fainting spells, muscle spasms, balance problems, and numbness in extremities; 11) Genito-urinary includes frequent or painful urination and painful and/or irregular menstrual periods; and 12) Health Habits includes diet, smoking, and health care utilization.

The variable "physical health problems" was indexed as sum of physical health problems endorsed on this measure.

3.8   INSTRUMENTATION

Table 2: Summary of instrumentation

Type of Variable/Instrument	Age Group Completing	
	14-18	19-23
Consent Form	X	X
Demographic Form	X	X
Predictors:		
Maltreatment		
Child Abuse		
CANIS (indexed as sum of items for physical and sexual abuse, frequency of items for emotional abuse)	X	
Adult Violence		
Maltreatment History Self-Report (indexed as sum of items for physical and sexual abuse, frequency of items for emotional abuse)		X
Mediators:		
Antisocial Behavior		
Andrew's Scale of History and Severity of Offenses (ASB indexed as sum of ASBs)	X	X
SUD		
The following instruments were used to diagnose SUD as a categorical variable using the diachronic assessment method (Clark, Pollock, Mezzich, Cornelius, & Martin, 2001):		
Drug Checklist	X	X
Lifetime History of Alcohol Use	X	X
Lifetime History of Drug Use	X	X
K-SADS-E	X	
SCID		X
Once SUD was diagnosed categorically, *severity* was determined by summing SUD diagnoses	X	X

4.0   STATISTICAL PROCEDURES

Multiple regression ("simultaneous" method, "Enter" method in SPSS) will be employed to test all hypotheses. The predictor at ages 14-18 is child abuse. "Child abuse" is comprised of severity of physical abuse$_1$ (the sum of items indicating physical abuse by mother$_1$ or physical abuse by father$_1$), severity of sexual abuse$_1$ (the sum of items indicating sexual abuse before age 18) and severity of emotional abuse$_1$ (frequency of items within one month) -- all as measured by the *Child Abuse and Neglect Interview Scale (CANIS)* (Ammerman & Karpach, 1991). The predictor at ages 19-23 is adult violence. "Adult violence" consists of severity of physical abuse$_2$ (the sum of items indicating physical abuse after age 18 -- victimization, perpetration, or reciprocal violence), severity of sexual abuse$_2$ (the sum of items indicating sexual abuse victimization after age 18), and severity of emotional abuse$_2$ (indexed as the frequency of emotionally abusive incidents experienced in one month) -- all as measured by the *Maltreatment History Self-Report* (MacMillan, Offord, & Racine, 1993). The sample size of this study meets guidelines for number of participants per predictor (189 participants and 6 predictors -- child and adult physical abuse, child and adult sexual abuse, and child and adult emotional abuse).[4]

Mediating variables for the cross-sectional analyses are ASB$_{1,2}$ and number of SUDs$_{1,2}$, described in Section 4.1. In order to prove mediation certain conditions must be met: 1) The predictor variable (for visit 1, child abuse -- physical abuse mother$_1$ or physical abuse father$_1$, sexual abuse$_1$, and emotional abuse$_1$; for visit 2, adult violence -- physical, sexual, and emotional abuse$_2$) must affect the mediator (ASB$_{1,2}$; number of SUDs$_{1,2}$) when the mediator is regressed on

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[4] Various guidelines have been suggested for multiple regression sample sizes: "for social science research, about 15 participants per predictor are needed for a reliable equation" (*reviewed in* Pallant, 2010, p. 150). Another author offers the following formula: $N > 50 + 8m$ (where m = the number of independent variables) (*reviewed in* Pallant, 2010, p. 150).

the predictor; 2) the predictor (child abuse[1] or adult violence[2]) must affect the outcome variable (physical health problems[1,2]) when the outcome variable is regressed on the predictor; 3) the mediator (ASB[1,2] and number of SUDs[1,2], respectively) must affect the outcome variable (physical health problems[1,2]) when the outcome variable is regressed on both the predictor variable and the mediator; and 4) when all of these conditions are met, the effect of the predictor variable (child abuse, adult violence) on the outcome variable (physical health problems[1,2]) must be less when the mediator (ASB[1,2]; number of SUDs[1,2]) is added (*adapted from* Baron & Kenny, 1986). It is hypothesized that after performing these multiple regressions in SPSS, ASB[1,2] and number of SUDs[1,2] will mediate the relationship between maltreatment (child abuse[1], adult violence[2] -- predictors) and physical health problems[1,2] (outcome variables), controlling for age, ethnicity, and SES.

The outcome variable "physical health problems[1,2]" is indexed as the sum of items endorsed on the *Health Problems Checklist* (Schinka, 1989).

4.1 STATISTICAL ANALYSES

The current investigation consists of three parts – two cross-sectional analyses of young women with SUD at ages 14-18 and 19-23, respectively, and one longitudinal analysis of the same young women from ages 14-18 to 19-23.

4.1.1   Cross-Sectional Analyses

4.1.1.1   Model 1, Ages 14-18 The first cross-sectional analysis seeks to determine the impact of child abuse (physical, sexual, and emotional), antisocial behavior (ASB), and number of SUDs on physical health problems at ages 14-18 in female adolescents with SUD.   Age, ethnicity, and SES will be controlled for statistically.

4.1.1.2   Hypothesis 1.1 (Model 1, Step 1) Child abuse -- physical, sexual, and emotional -- is associated with physical health problems at ages 14-18 in female adolescents with SUD.

4.1.1.3   Hypothesis 1.2 (Model 1, Step 2) ASB_1 mediates the association between child abuse and physical health problems at ages 14-18 in female adolescents with SUD.

4.1.1.4   Hypothesis 1.3   (Model 1, Step 3)   Number of $SUDs_1$ mediates the association between child abuse and physical health problems at ages 14-18 in female adolescents with SUD.

4.1.1.5   Full Model 1, Ages 14-18

Child abuse -- physical, sexual, and emotional -- is associated with physical health problems, mediated by ASB and number of SUDs, at ages 14-18 in female adolescents with an SUD. *See* Figure 1.
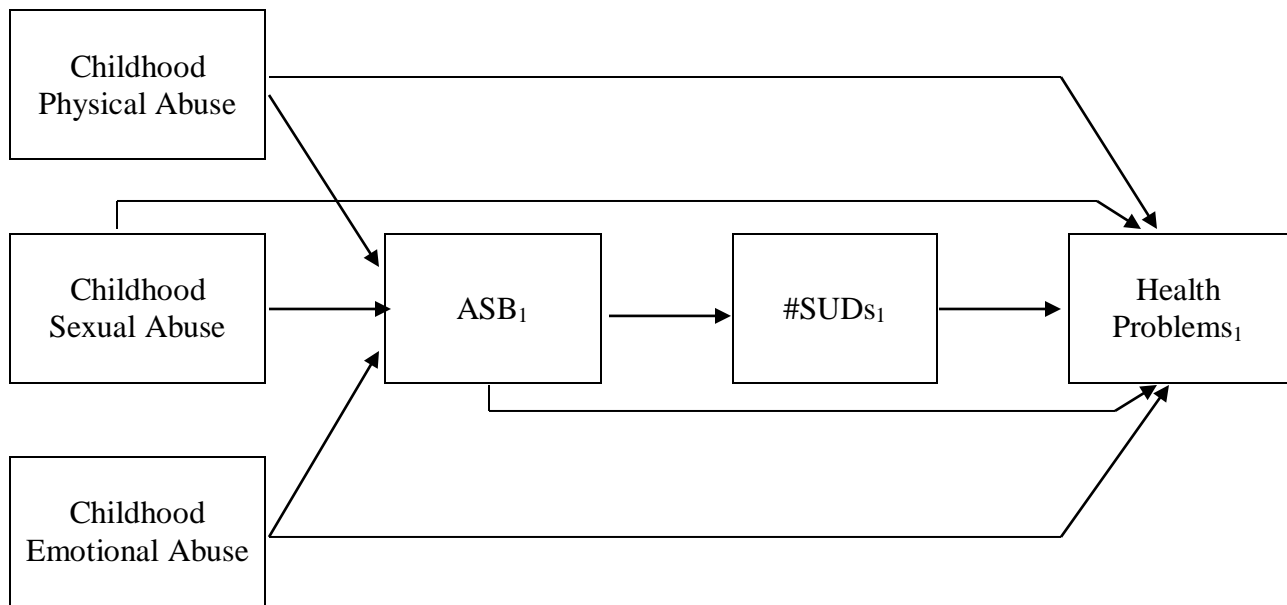
Figure 1: Full model 1, ages 14-18

4.1.2   Model 2, Ages 19-23

This analysis is similar to the first except abuse pertains to adult violence, and participants are ages 19-23. The purpose is to determine the impact of adult violence (physical, sexual, and emotional abuse), antisocial behavior (ASB_2), and number of $SUDs_2$ on physical health problems at ages 19-23 in young women with SUD. As in the previous analysis, age, ethnicity, and SES will be controlled for statistically.

4.1.2.1 **Hypothesis 2.1 (Model 2, Step 1)** Adult violence -- physical, sexual, and emotional abuse -- is associated with physical health problems at ages 19-23 in young women with SUD.

4.1.2.2 **Hypothesis 2.2 (Model 2, Step 2)** ASB_2 mediates the association between adult violence and physical health problems at ages 19-23 in young women with SUD.

4.1.2.3 **Hypothesis 2.3 (Model 2, Step 3)** Number of $SUDs_2$ mediates the association between adult violence and physical health problems at ages 19-23 in young women with SUD.

4.1.2.4 **Full Model 2, Ages 19-23** Adult violence – adult physical, sexual, and emotional abuse -- is associated with physical health problems$_2$, mediated by ASB_2 and number of $SUDs_2$, at ages 19-23 in young women with SUD. *See* Error! Reference source not found..
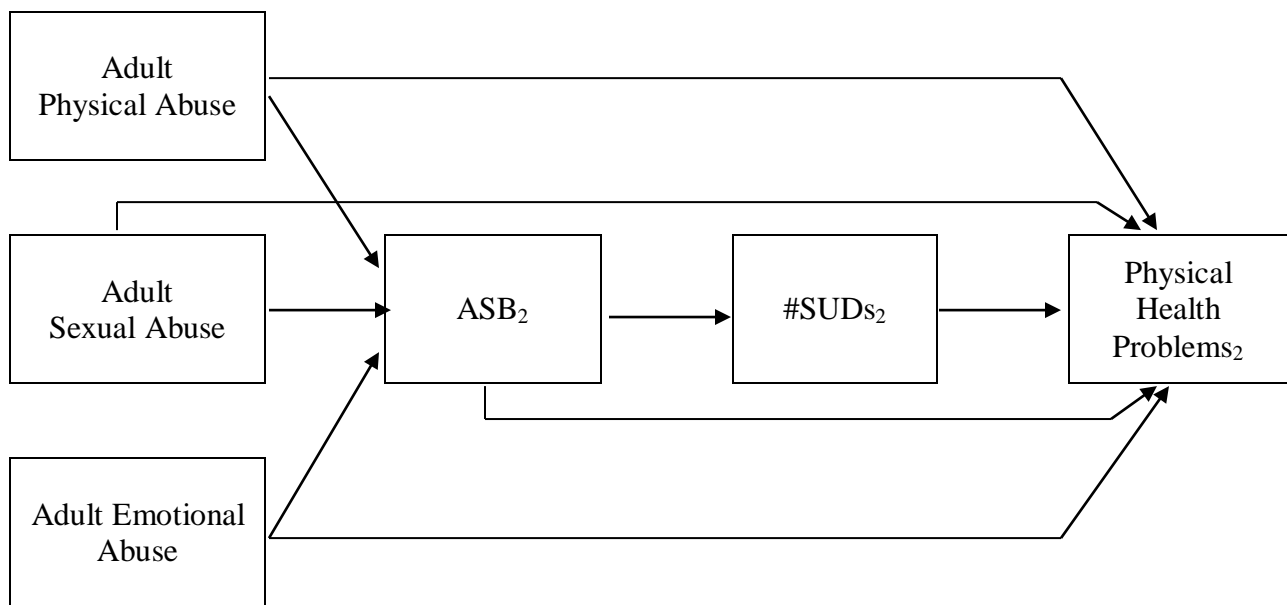
Figure 2: Full model 2, ages 19-23

4.1.3 Longitudinal Analysis (Model 3)

The goal of the longitudinal analysis is to determine the impact of child physical, sexual, and emotional abuse; adult physical, sexual, and emotional abuse; $ASB_{1,2}$, number of $SUDs_{1,2}$, and physical health problems$_1$ on physical health problems$_2$ at ages 19-23 in young women with SUD, controlling for age$_2$, ethnicity$_1$, SES$_2$, and physical health problems$_1$ (HP$_1$).

4.1.3.1 Longitudinal Hypothesis, Ages 14-18 to 19-23 Predictors at ages 14-18 -- child physical, sexual, and emotional abuse (CPA, CSA, and CEA), ASB$_1$, number of SUDs$_1$, and physical health problems (HP$_1$) -- and predictors at ages 19-23 -- adult violence (adult physical, sexual, and emotional abuse), ASB$_2$, and number of SUDs$_2$ -- are associated with HP$_2$ in young women with SUD. *See* Figure 3.
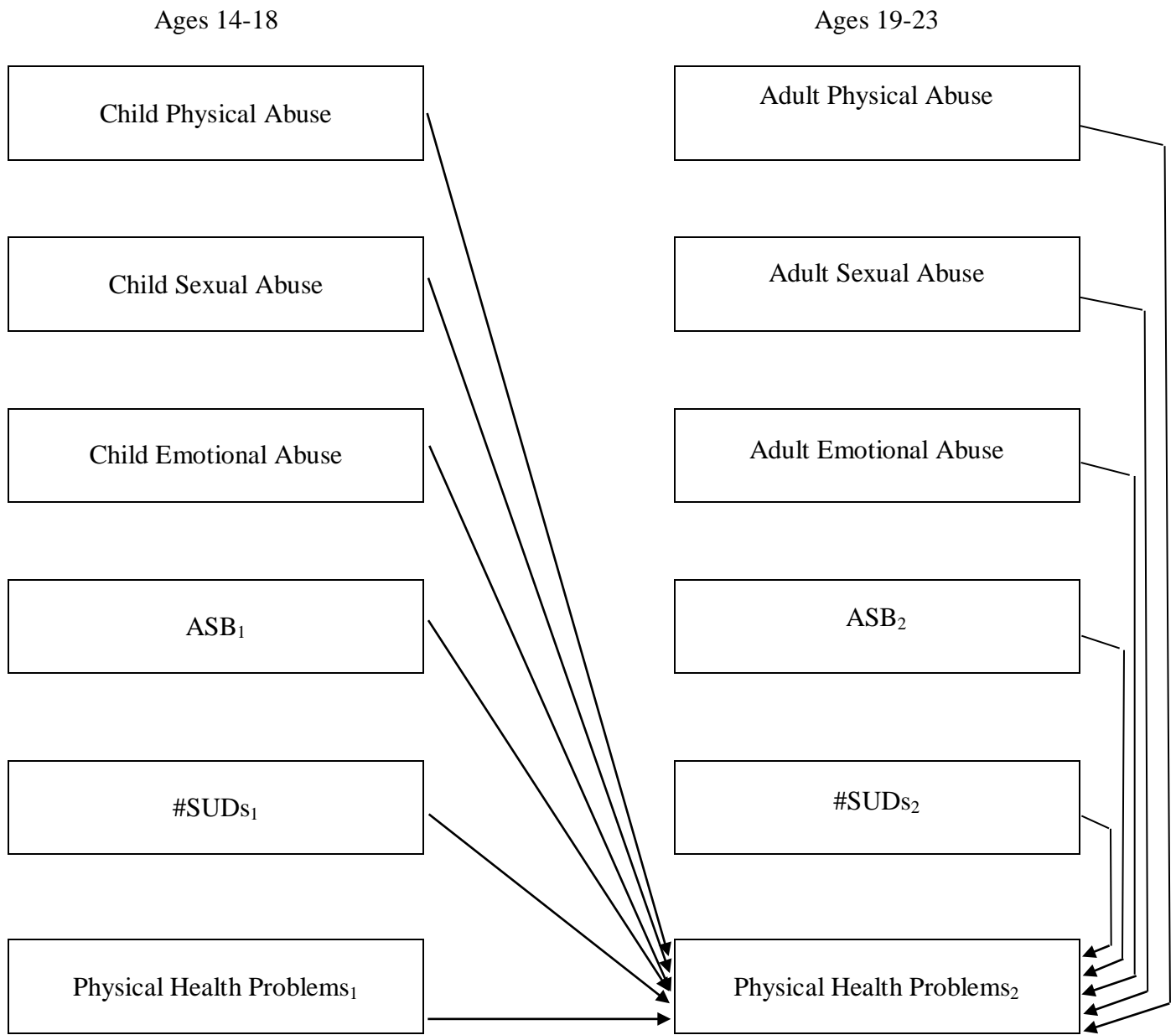
Figure 3: Longitudinal model 3

5.1.1   Model 1, Ages 14-18

5.1.1.1   Step 1.[5] Hypothesis 1.1: Child abuse is associated with physical health problems in female adolescents (ages 14-18) with SUD (child abuse → physical health problems).

Multiple regression was performed in SPSS ("Enter" method). Step 1 included only predictors -- child physical abuse (CPA), child sexual abuse (CSA), and child emotional abuse (CEA) -- and the outcome variable, physical health problems (HP_1). SES, age, and ethnicity were controlled for statistically. SPSS output is reproduced in the tables following each step. As shown in Table 3 ("Model Summary"), this model, of which child abuse is a part, accounts for 16.5% of the variation in physical health problems ($R^2 = .165$)[6]. A one-way ANOVA shows that this is significant at .001 (F (6, 119) = 3.924, sig. = .001). Further analysis (*see* Table 3 "Coefficients") shows that the only type of child abuse significantly associated with physical health problems is childhood sexual abuse ($\beta = .274$, $t = 3.019$, sig. = .003). SES approached significance (sig. = .072).

This hypothesis was partially confirmed. Neither CPA nor CEA showed a significant association with physical health problems$_1$, but the association with CSA was significant.

Step 1 Results:

$$CSA \longrightarrow HP_1$$

---

[5] Although reference is made to step numbers, this term is used for ease of explanation and does not imply stepwise regression. The simultaneous method of multiple regression ("Enter" in SPSS) was used.

[6] Adjusted R_2 = .123.

Table 3: Cross-sectional regression analysis, ages 14-18

Model 1, Step 1
Predictors and Outcome Variable Only

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1, Step 1	.406[a]	.165	.123	23.75444

a. Predictors (Constant): Childhood physical abuse, childhood sexual abuse, childhood emotional abuse, SES1, age1, ethnicity1.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1, Step 1	Regression	13285.409	6	2214.235	3.924	.001[a]
	Residual	67148.535	119	564.273		
	Total	80433.944	125			

a. Predictors (Constant): Childhood physical abuse, childhood sexual abuse, childhood emotional abuse, SES_1, age_1, $ethnicity_1$.
b. Outcome Variable: Physical health $problems_1$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1, Step 1 (Constant)	33.718	30.763		1.096	.275
SES_1	.297	.163	.159	1.817	.072
Age_1	-.230	1.812	-.011	-.127	.899
$Ethnicity_1$	-1.192	1.701	-.062	-.701	.485
Child Physical Abuse	1.468	1.318	.098	1.114	.268
Child Emotional Abuse	4.338	3.423	.122	1.267	.207
Child Sexual Abuse	7.601	2.518	.274	3.019	.003

a. Outcome Variable: Physical health $problems_1$.

5.1.1.2 **Step 2**. Hypothesis 1.2: Child abuse is associated with physical health problems$_1$ (HP$_1$), and the association is mediated by antisocial behavior$_1$ (ASB$_1$)[7] (child abuse → ASB$_1$ → physical health problems$_1$).

Regression was performed as in Step 1 with the addition of ASB$_1$ as a mediator. As shown in Table 4, ("Model Summary"), child abuse and ASB$_1$ explain 26.3% of the variance in physical health problems$_1$ (R^2 = .263; Adjusted R^2 = .220). A one-way ANOVA revealed a significant association with physical health problems$_1$ (*F* (df = 7, 118) = 6.029, sig. = .001). Step 1 indicated that the only type of abuse significantly associated with physical health problems was childhood sexual abuse (CSA). Step 2 revealed that the addition of ASB rendered CSA no longer significant in relation to physical health problems (sig. = .003 in Step 1, sig. = .264 in Step 2) (*see* Table 4, "Coefficients") -- evidence of mediation (Baron & Kenny, 1986). Similarly, the standardized coefficient for CSA diminished from β = .274 in Step 1 to β = .107.

This hypothesis was partially confirmed. CSA is associated with PHP$_1$, and ASB$_1$ mediates the relationship between CSA and HP$_1$ in female adolescents with SUD.

Step 2 Results:

$$CSA \longrightarrow ASB_1 \longrightarrow PHP_1$$

---

[7] Subscripts 1 or 2 – e.g., ASB$_1$, ASB$_2$, HP$_1$, HP$_2$ – are used to denote visit 1 (ages 14-18) or visit 2 (ages 19-23)

Table 4. Cross-sectional regression analysis, ages 14-18

Model 1, Step 2
Addition of ASB as Mediator

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1, Step 2	.513[a]	.263	.220	22.40703

a. Predictors (Constant): Childhood physical abuse, childhood sexual abuse, childhood emotional abuse, ASB_1, SES_1, age_1, $ethnicity_1$.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1, Step 2	Regression	211898.091	7	3027.013	6.029	.000[a]
	Residual	59244.854	118	502.075		
	Total	80433.944	125			

a. Predictors (Constant): Childhood physical abuse, childhood sexual abuse, childhood emotional abuse, ASB_1, SES_1, age_1, $ethnicity_1$.
b. Outcome Variable: Physical health $problems_1$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
1, Step 2 (Constant)	24.427	29.112		.839	.403
SES_1	.184	.157	.099	1.178	.241
Age_1	-.206	1.709	-.010	-.121	.904
$Ethnicity_1$	-2.040	1.618	-.107	-1.260	.210
Child Physical Abuse	.501	1.267	.034	.395	.693
Child Emotional Abuse	2.635	3.257	.074	.809	.420
Child Sexual Abuse	2.970	2.646	.107	1.122	.264
ASB_1	1.201	.303	.382	3.968	.000

a. Outcome Variable: Physical health $problems_1$.

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5.1.1.3 **Step 3, Full Model 1**. Hypothesis 1.3: Child abuse is associated with physical health problems, mediated by ASB_1 and number of substance use disorders$_1$ (#SUDs$_1$).

Number of SUDs$_1$ (#SUDs$_1$) was introduced as a mediator. This model explained 30.7% of the variability in physical health problems at ages 14-18 compared to 26.3% accounted for in Step 2 (R^2 = .307, Adjusted R^2 = .260) (*see* Table 5). A one-way ANOVA shows that this model is significant at .000 (F (8, 117) = 6.477, sig. = .000). Further analysis indicates that #SUDs$_1$ has a significant association with physical health problems$_1$ (sig. = .008) (*see* Table 5, "Coefficients"). With the addition of number of SUDs$_1$ as a mediator, the previously significant association between ASB_1 and physical health problems$_1$ remained significant (in Step 2, ASB_1 sig. = .000; in Step 3, ASB_1 sig. = .004), indicating that instead of mediating the ASB_1-PHP_1 relationship, number of SUDs$_1$ has a direct association with PHP_1.

This hypothesis was partially confirmed. In female adolescents diagnosed with SUD, CSA is associated with PHP1, mediated by ASB1. Number of #SUDs1 is directly associated with PHP1 (see Figure 4).

Step 3 Results:

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Table 5. Cross-sectional regression analysis, ages 14-18

Model 1, Step 3
Addition of Number of SUDs as Mediator

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1, Step 3	.554[a]	.307	.260	21.82787

a. Predictors (Constant): Childhood physical abuse, childhood sexual abuse, childhood emotional abuse, ASB_1, SUD_1, SES_1, age_1, $ethnicity_1$.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1, Step 3	Regression	24688.584	8	3086.073	6.477	.000[a]
	Residual	55745.361	117	476.456		
	Total	80433.944	125			

a. Predictors (Constant): Childhood physical abuse, childhood sexual abuse, childhood emotional abuse, ASB_1, $\#SUDs_1$, SES_1, age_1, $ethnicity_1$.
b. Outcome Variable: Physical health problems$_1$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1, Step 3 (Constant)	17.428	28.477		.612	.542
SES_1	.204	.153	.109	1.335	.185
Age_1	-.521	1.669	-.024	-.312	.756
$Ethnicity_1$	-1.206	1.606	-.063	-.751	.454
Child Physical Abuse	1.090	1.253	.073	.870	.385
Child Emotional Abuse	1.602	3.195	.045	.501	.617
Child Sexual Abuse	2.793	2.579	.101	1.083	.281
ASB_1	.920	.313	.293	2.945	.004
$\#SUDs_1$	5.008	1.848	.237	2.710	.008

a. Outcome Variable: Physical health problems$_1$.

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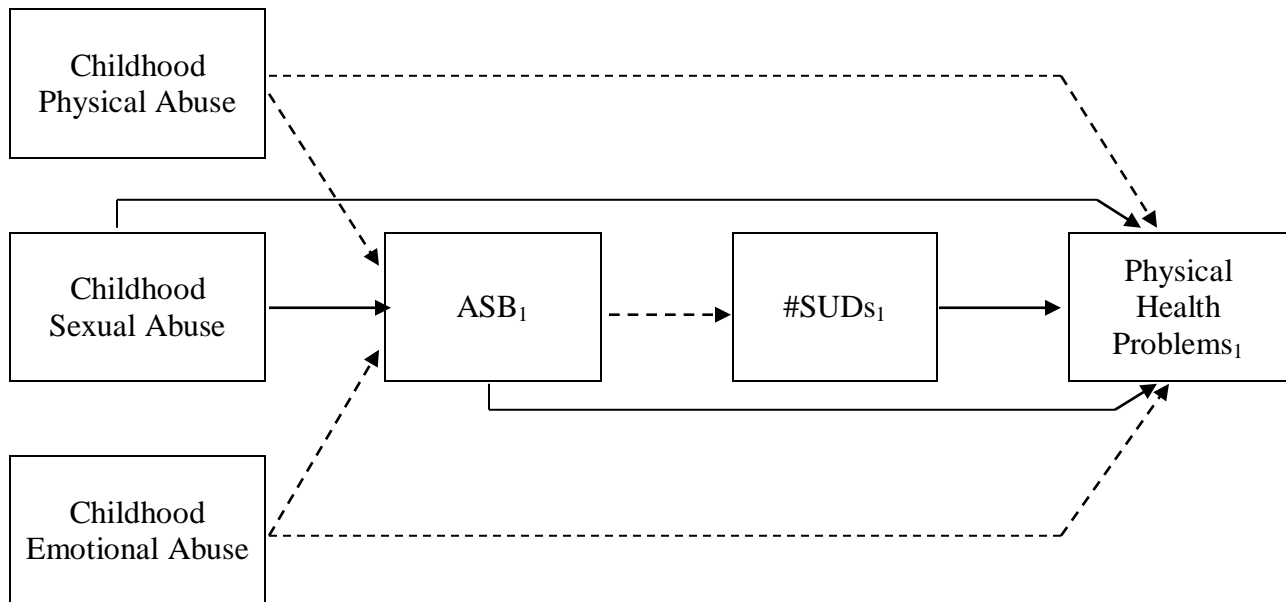
$R^2 = .307$, $F(8, 117) = 6.477$, $p < .001$
dashed lines indicate hypothesized association was not significant

Figure 4: Results, full model 1, ages 14-18

5.1.2   Model 2, Ages 19-23

5.1.2.1   Step 1. Hypothesis 2.1: Adult violence (adult physical, sexual, and emotional abuse) is associated with physical health problems (PHP$_2$[8]) in young adult females (ages 19-23) with SUD (adult violence $\rightarrow$ PHP$_2$).

Regression was performed in SPSS ("Enter" method).   Each type of adult violence -- physical, sexual, and emotional -- was entered as a predictor, and the outcome variable was PHP$_2$. SES, age, and ethnicity were controlled for. As shown in Table 6 ("Model Summary"), this model explains only 6.7% of the variability in physical health problems$_2$ (R^2 = .067; Adjusted R^2 = .029). A one-way ANOVA reveals that this model is not significant (F (6, 149) = 1.771, sig. = .109) (*see* Table 6, "ANOVA"). Further analysis confirms that none of the predictors is significantly associated with physical health problems (*see* Table 6, "Coefficients").

Adult violence (physical, sexual, emotional) is not associated with physical health problems$_2$ in young adult females (19-23) with SUD.

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Step 1 Results:

Adult violence $\dashrightarrow$ PHP$_2$

</div>

---

[8] PHP$_2$ denotes new health problems at visit 2 (ages 19-23).

Model 2, Step 1
Predictors and Outcome Variable Only

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2, Step 1	.258[a]	.067	.029	23.66789

a. Predictors (Constant): Adult physical abuse, adult sexual abuse, adult emotional abuse, SES_2, age_2, $ethnicity_1$.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
2, Step 1	Regression	5952.562	6	992.094	1.771	.109[a]
	Residual	83465.182	149	560.169		
	Total	89417.744	155			

a. Predictors (Constant): Adult physical abuse, adult sexual abuse, adult emotional abuse, SES_2, age_2, $ethnicity_1$.
b. Outcome Variable: Physical health $problems_2$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
2, Step 1 (Constant)	23.854	28.404		.840	.402
SES_2	-.164	.166	-.081	-.987	.325
Age_2	.789	1.313	.051	.601	.549
$Ethnicity_1$	-1.978	1.613	-.104	-1.226	.222
Adult Physical Abuse	.347	.287	.142	1.210	.228
Adult Emotional Abuse	.187	.405	.052	.462	.645
Adult Sexual Abuse	.491	1.333	.033	.368	.713

a. Outcome Variable: Physical health $problems_2$.

5.1.2.2 **Step 2**. Hypothesis 2.2: Adult violence (adult physical, sexual, and emotional abuse) is associated with PHP_2, and the association is mediated by ASB_2.

Step 1 predictors were entered with the addition of ASB_2 as a mediator. Table 7 ("Model Summary") indicates that adult violence and ASB_2 explain only 10% of the variability in PHP_2 ($R^2 = .101$; Adjusted $R^2 = .058$). A one-way ANOVA demonstrates the significance of this model ($F (7, 148) = 2.370$, sig. $= .025$). Further analysis indicates ASB_2 (sig. $= .019$) is the only significant predictor (*see* Table 7, "Coefficients").

The hypothesis was partially confirmed: As determined in step 1, adult violence has no significant relationship with PHP_2. The association between ASB_2 and PHP_2 is significant. Because there is no significant relationship between adult violence and physical health problems, ASB_2 does not mediate that association but instead has a direct relationship with PHP_2.

Step 2 Results:

Adult Violence $- - - - - \rightarrow$ ASB_2 $\longrightarrow$ PHP_2
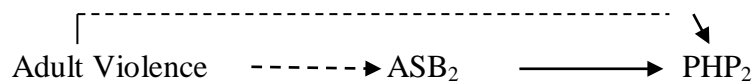
Table 7: Cross-sectional regression analysis, ages 19-23

Model 2, Step 2
Addition of ASB_2 as Mediator

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2, Step 2	.317[a]	.101	.058	23.30830

a. Predictors (Constant): Adult physical abuse, adult sexual abuse, adult emotional abuse, ASB_2, SES_2, age_2, $ethnicity_1$.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
2, Step 2	Regression	9012.774	7	1287.539	2.370	.025[a]
	Residual	80404.970	148	543.277		
	Total	89417.744	155			

a. Predictors (Constant): Adult physical abuse, adult sexual abuse, adult emotional abuse, ASB_2, SES_2, age_2, $ethnicity_1$.
b. Outcome Variable: Physical health problems$_2$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
2, Step 2 (Constant)	13.991	28.279		.495	.622
SES_2	-.155	.164	-.077	-.950	.344
Age_2	1.021	1.297	.066	.787	.433
$Ethnicity_1$	-1.974	1.589	-.103	-1.243	.216
Adult Physical Abuse	.222	.288	.091	.771	.442
Adult Emotional Abuse	.118	.400	.033	.295	.768
Adult Sexual Abuse	.394	1.314	.026	.300	.765
ASB_2	.631	.266	.197	2.373	.019

a. Outcome Variable: Physical health problems$_2$.

5.1.2.3 __Step 3, Full Model 2__. Hypothesis 3.1: Adult violence is associated with PHP_2, and the association is mediated by ASB_2 and number of $SUDs_2$.

As previously mentioned, Step 2 determined there was no association between adult violence and PHP_2. Therefore, ASB_2 and SUD_2 are not mediators. Step 2 further identified a direct association between ASB_2 and PHP_2. Step 3 will determine if number of $SUDs_2$ has an independent relationship with PHP_2 or mediates the relationship between ASB_2 and PHP_2. Results indicate that number of $SUDs_2$ accounts for 15.5% of the variance in physical health problems$_2$ (*see* Table 8, "Model Summary"). A one-way ANOVA shows an association between predictors and PHP_2 that is significant at .001 ($F (8, 147) = 3.383$, sig. = .001). Further analysis reveals a significant relationship between $\#SUDs_2$ (sig. = .002) and PHP_2 (*see* Table 8, "Coefficients"). With the addition of $\#SUDs_2$ as mediator, the association between ASB_2 and PHP_2 was no longer significant (from sig. = .019 to sig. = .348 *see* Table 7 and Table 8). This confirms that $\#SUDs_2$ mediates the association between ASB_2 and PHP_2.

The hypothesis was partially confirmed. At ages 19-23 adult violence was not associated with physical health problems. Antisocial behavior was associated with physical health problems, mediated by number of SUDs.

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Full Model 2 Results:

$ASB_2 \longrightarrow \#SUDs \longrightarrow PHP_2$

</div>

Table 8: Cross-sectional regression analysis, ages 19-23

Model 2, Step 3
Addition of Number of SUDs$_2$ as Mediator

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2, Step 3	.394[a]	.155	.110	22.66527

a. Predictors (Constant): Adult physical abuse, adult sexual abuse, adult emotional abuse, ASB$_2$, #SUDs$_2$, SES$_2$, age$_2$, ethnicity$_1$.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
2, Step 3	Regression	13901.742	8	1737.718	3.383	.001[a]
	Residual	75516.002	147	513.714		
	Total	89417.744	155			

a. Predictors (Constant): Adult physical abuse, adult sexual abuse, adult emotional abuse, ASB$_2$, #SUDs$_2$, SES$_2$, age$_2$, ethnicity$_1$.
b. Outcome Variable: Physical health problems$_2$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
2, Step 3 (Constant)	17.928	27.529		.651	.516
SES$_2$	-.191	.159	-.095	-1.198	.233
Age$_2$	.596	1.269	.038	.470	.639
Ethnicity$_1$	-1.944	1.545	-.102	-1.258	.210
Adult Physical Abuse	.211	.280	.087	.756	.451
Adult Emotional Abuse	2.337E-02	.390	.007	.060	.952
Adult Sexual Abuse	-.126	1.288	-.008	-.098	.922
ASB$_2$	.268	.284	.084	.942	.348
#SUDs$_2$	4.761	1.543	.274	3.085	.002

a. Outcome Variable: Physical health problems$_2$.

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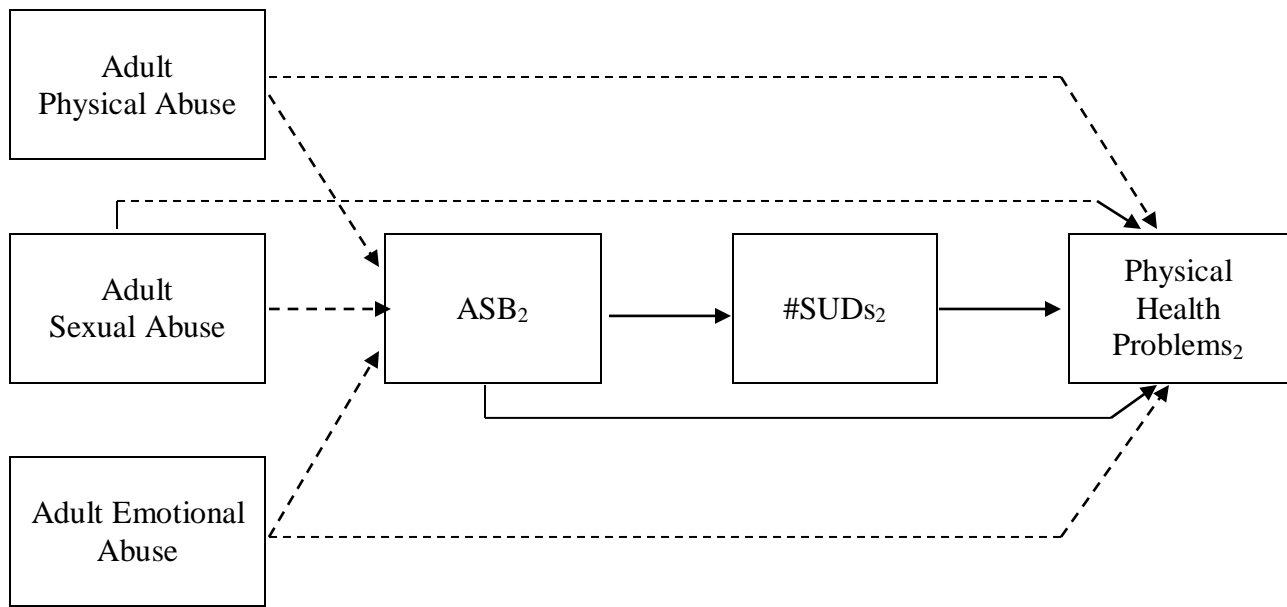
$R^2 = .155$, F (8, 147) = 3.383, sig. = .001
dashed lines indicate hypothesized association was not significant

Figure 5: Results, model 2, ages 19-23

5.2   LONGITUDINAL ANALYSIS

This model included all predictors from visits 1 and 2: maltreatment (child and adult physical, sexual, and emotional abuse), $ASB_{1,2}$, $\#SUDs_{1,2}$, PHP_1. As in all analyses, SES, ethnicity, and age were controlled for, as was PHP_1. The outcome variable is PHP_2.

Model 3 Hypothesis: Maltreatment$_{1,2}$, $ASB_{1,2}$, $\#SUDs_{1,2}$, and PHP_1 are associated with PHP_2 in young adult females with SUD. SPSS output reveals that this model accounts for 26.5% of the variability in PHP_2 (*see* Table 9, "Model Summary"). A one-way ANOVA indicates this model is significant at .001 (F (14, 117) = 3.006, sig. = .001). Predictors significantly associated with PHP_2 are PHP_1 (β = 270, sig. = .007) and $\#SUD_2$ (β = .274, sig. = .004),. Adult physical abuse approaches significance (β = .239, sig. = .062). PHP_1 and $\#SUDs_2$ are significantly associated with PH_2 in young adult females with SUD.   (*See* Figure 6.)

Table 9: Longitudinal regression analysis, ages 14-18 to 19-23

Model 3
Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.514[a]	.265	.177	21.66112

a. Predictors (Constant): Child physical abuse, child sexual abuse, child emotional abuse, ASB_1, $\#SUDs_1$, adult physical abuse, adult sexual abuse, adult emotional abuse, ASB_2, $\#SUDs_2$, SES_1, age_1, $ethnicity_1$.

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
3	Regression	19749.096	14	1410.650	3.006	.001[a]
	Residual	54896.874	117	469.204		
	Total	74645.970	131			

a. Predictors (Constant): Child physical abuse, child sexual abuse, child emotional abuse, adult physical abuse, adult sexual abuse, adult emotional abuse, ASB_1, ASB_2, $\#SUDs_1$, $\#SUDs_2$, SES_1, age_1, $ethnicity_1$.

b. Outcome Variable: Physical health $problems_2$.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
3 (Constant)	5.079	29.180		.174	.862
SES_1	6.940E-03	.152	.004	.046	.964
Age_1	.607	1.688	.030	.359	.720
$Ethnicity_1$	-.925	1.614	-.051	-.573	.568
Child Physical Abuse	1.032	1.248	.073	.827	.410
Child Emotional Abuse	3.300	3.222	.097	1.024	.308
Child Sexual Abuse	2.287	2.550	.088	.897	.372
ASB_1	-7.445E-02	.326	-.025	-.228	.820
$\#SUDs_1$	-.214	1.924	-.011	-.112	.911
Physical health $problems_1$	.255	.092	.270	2.761	.007
Adult Physical Abuse	.567	.300	.239	1.887	.062
Adult Emotional Abuse	-.437	-.419	-.123	-1.043	.299
Adult Sexual Abuse	-1.351	1.323	-.096	-1.021	.309
ASB_2	-5.630E-02	.305	-.018	-.185	.854
$\#SUDs_2$	4.616	1.569	.274	2.941	.004

a. Outcome Variable: Physical health $problems_2$.

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Ages 14-18

Ages 19-23

| Child Physical Abuse | | Adult Physical Abuse |

| Child Sexual Abuse | | Adult Sexual Abuse |

| Child Emotional Abuse | | Adult Emotional Abuse |

| ASB_1 | | ASB_2 |

| $\#SUDs_1$ | | $\#SUDs_2$ |

| Physical Health Problems$_1$ | | Physical Health Problems$_2$ |
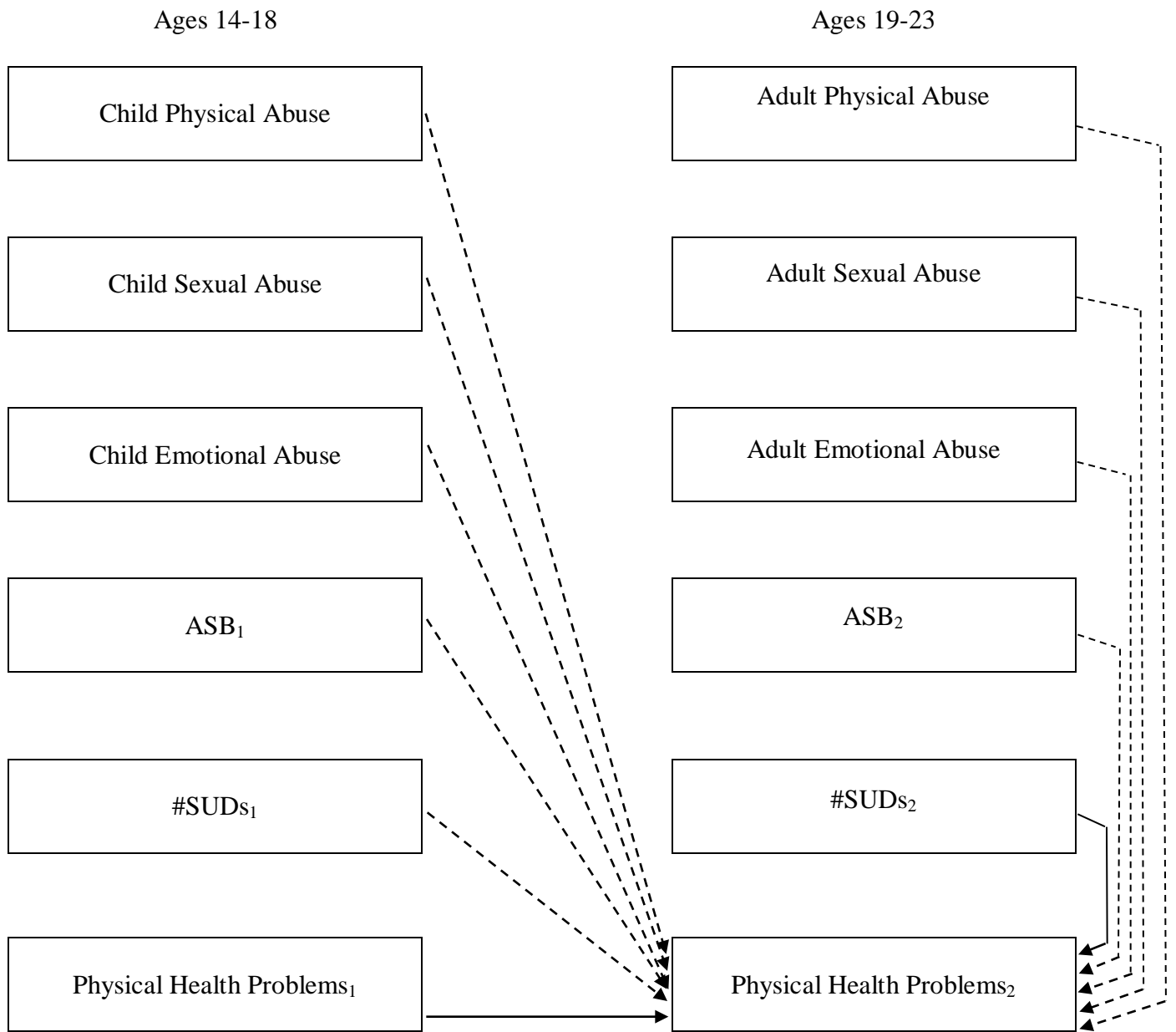
Figure 6: Results, longitudinal regression model, ages 14-18 to 19-23

6.0   DISCUSSION

The current analysis suggests that childhood sexual abuse may predispose to antisocial behavior and that antisocial behavior, together with severity of SUD, promotes poor health among female adolescents with a substance use disorder. Antisocial behavior is a key element in the trajectory from childhood sexual abuse to physical health problems and was associated directly with physical health problems in adolescence and young adulthood and indirectly in young adulthood via number of SUDs. The longitudinal analysis shows that physical health problems in at ages 14-18 and number of substance use disorders at ages 19-23 predict physical health problems in young adulthood among females with SUD.

6.1   CROSS-SECTIONAL ANALYSES

6.1.1   Analysis 1, Ages 14-18

This analysis found that child sexual abuse was associated with physical health problems directly and indirectly through antisocial behavior. Both antisocial behavior and number of SUDs were directly related to physical health problems. Although it was hypothesized that all types of child abuse -- physical, sexual, and emotional -- would be associated with physical health problems, a statistically significant relationship was found for childhood sexual abuse only. This finding supports some community and clinical studies which have found a stronger association between physical health problems and child sexual abuse than for child physical abuse (Diaz, Simantov, & Rickert, 2002; Hussey, Chang, & Kotch, 2006; Green, Russo, Navratil, & Loeber, 1999). Other studies, though, have found a significant association between childhood physical abuse and physical health problems (Bensley, Van Eenwyk, & Simmons, 2003; Springer, Sheridan,

Kuo, & Carnes, 2007). It is unsure why the current analysis found that only child sexual abuse was the only type related to physical health problems. As participants were female adolescents with a diagnosis of SUD, perhaps the developmental failure represented by child sexual abuse (reviewed in Tharinger, 1990) is particularly detrimental to this population during this critical stage of development?

6.1.1.1 Child Sexual Abuse, Antisocial Behavior, and Physical Health Problems

Childhood sexual abuse was associated with physical health problems at ages 14-18 directly and indirectly through antisocial behavior. Antisocial behavior was directly related to physical health problems.

Results of the current analysis support community and clinical studies that have found an association between childhood sexual abuse and antisocial behavior. Two community studies determined that childhood sexual abuse was linked with "serious to extreme" and aggressive-criminal behavior among female adolescents (Bergen, Martin, Richardson, Allison, & Roeger, 2004; Garnefski & Diekstra, 1997). One study found, however, that child sexual abuse alone was not associated with antisocial behavior. A secondary analysis of the National Longitudinal Study of Adolescent Health in women ages 18-27 (Add Health) determined that childhood sexual abuse alone was not associated with delinquency outcomes, although childhood physical abuse alone was linked to property damage, selling drugs, fighting, and running away. Combined sexual abuse and either physical abuse or neglect was associated with every category of delinquency including gang affiliation and owning a gun (Hahm, Lee, Ozonoff, & Van Wert, 2010). As mentioned earlier, perhaps childhood sexual abuse has a particularly deleterious outcome for female adolescents with SUD. The additional burden of an SUD diagnosis may

explain why other studies have found no association between childhood sexual abuse only and antisocial behavior, contrary to the current findings.

Results of the current analysis linking child abuse and antisocial behavior reinforce findings of clinical studies as well. A cross-sectional study of female adolescents with disruptive behavior disorders found an association between conduct disorder and a history of child physical or sexual abuse (Green, Russo, Navratil, & Loeber, 1999). A secondary analysis of women offenders found a direct association between childhood physical abuse and adolescent conduct problems and also between childhood sexual abuse and adult criminal behavior that was mediated by adolescent substance use (Grella, Stein, & Greenwell, 2005). Participants in the current analysis may have displayed antisocial behavior earlier than those in the Grella study due to the additional stressor of substance use *disorder* (as opposed to psychoactive substance *use*, as in the Grella study).

Relationships among childhood sexual abuse, antisocial behavior, SUD, and physical health support existing literature. A secondary analysis of a longitudinal survey of young women involved in or at risk of involvement with the criminal justice system found associations between childhood sexual abuse and lifetime consumption of alcohol, tobacco, and marijuana, use of other drugs, delinquency (particularly vandalism), substance use during sex, and risky sexual behavior (Goodkind, Ng, & Sarri, 2006). A prospective, longitudinal study of female adolescents in the criminal justice system found that 91% had been victimized in childhood. The association between childhood victimization (physical and sexual abuse, witnessing violence) and poor physical health was mediated entirely by health-risk behaviors in adolescence including substance use, HIV risk behaviors, and aggression. Severity of childhood victimization predicted injury risk and number of injuries (Odgers, Robins, & Russell, 2010). Findings in the

current analysis support those of Odgers and colleagues: the association between childhood victimization and poor physical health was mediated by health-risk behaviors such as substance use (participants in the current analysis had SUD), HIV risk behaviors, and aggression (i.e., antisocial behavior).

Although a history of CSA appeared to predispose young women in the current analysis toward antisocial behavior and related health problems, antisocial behavior promoted physical health problems regardless of abuse history in this sample of young women with SUD. Antisocial behaviors included, among others, engaging in risky sex, driving while drunk or high, carrying weapons, selling drugs, displaying violent outbursts, and inciting a riot -- items on *Andrew's Scale of History and Severity of Offenses* (Andrew, 1974). This supports existing studies linking delinquency with physical health problems among women (Pajer, Stouthamer-Loeber, Gardner, & Loeber, 2006) and female adolescents (Pajer, Kazmi, Gardner, & Wang, 2007) including overweight status, obesity, asthma, and a family history of diabetes and heart disease (Odgers, Robins, & Russell, 2010)**.** One study found that young women with antisocial behavior reported less satisfaction with their health and poorer physical health even in the absense of increased medical disorders, surgeries, or injuries. Instead, the antisocial group engaged in more health risk behaviors including using alcohol or other drugs, smoking cigarettes, engaging in unprotected sex, and driving without a seatbelt (Pajer, Kazmi, Gardner, & Wang, 2007). This emphasizes the interrelated effects of psychoactive substance use (participants in the current analysis had SUD), risky and antisocial behavior, and physical health as in the current analysis and as summarized succinctly by Odgers and colleagues: "incarcerated [antisocial] young women 'live on the edge' and become injured in the process" (Odgers, et al., 2010, p. 437).

6.1.1.2   Number of SUDs and Physical Health Problems

In the current analysis number of SUDs was associated with physical health problems at ages 14-18. The most common psychoactive substances ingested by young women in the current analysis (besides nicotine/cigarettes) were alcohol and marijuana. Although young women in the current analysis already had received a diagnosis of SUD, associations in the literature between SUD severity and physical health problems are instructive. Findings of increased physical health problems among individuals with greater SUD severity support existing literature associating marijuana smoking with lung disease and alcohol abuse with liver damage.

Accurate study of the adverse effects of marijuana has been hindered by various factors including its illegal status, different smoking techniques, and concomitant cigarette smoking (*reviewed in* Hii, Thompson, & Naughton, 2008). Nevertheless, recent case studies have linked marijuana use in adults with impaired lung function, damaged large airway mucosa (Howden & Naughton, 2011), and bullous lung disease (Hii, Thompson, & Naughton, 2008). Some marijuana smokers experienced lung damage approximately twenty years earlier than the typical age for tobacco smokers and were often asymptomatic, with lung damage being detected only by high-resolution CT scans (Howden & Naughton, 2011). It has been hypothesized that marijuana may be more deleterious than tobacco because marjiuana smokers inhale extremely hot fumes, inhale more, and hold their breath four to five times longer than cigarette smokers (Hii, Thompson, & Naughton, 2008), although further research is necessary.

Findings of the current analysis support cross-sectional and longitudinal studies of adolescents and young adults with alcohol use disorder (AUD) which have found greater liver injury and self-reported health problems (Aarons, et al., 1999; Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995; Clark, Lynch, Donovan, & Block, 2001). A cross-sectional study of males

and females determined that the most frequently reported health problems were general health related and included appetite problems, weight loss, sleeping difficulties, and fatigue. In addition all laboratory indicators of liver damage except total bilirubin were significantly higher among the AUD group (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995). As most investigations of SUD health effects have studied adults, the Arria (1995) study is unique in its demonstration of concrete health consequences linked with alcohol abuse as early as adolescence.

Physical health problems related to alcohol abuse have been demonstrated in longitudinal and cross-sectional studies. Clark and colleagues (2001) found slight but significant liver injury among AUD males and females at baseline and one-year follow-up (Clark, Lynch, Donovan, & Block, 2001). A cross-sectional study of male and female alcohol abusers using the same outcome measure for physical health as the current analysis ("Health Problems Checklist," *see* Schinka, 1989) found significantly higher subscale scores on eight of eleven domains of physical health problems. Most frequently reported symptoms were general health related and included appetite problems, weight loss, sleeping difficulties, and fatigue (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995). In addition all laboratory indicators of liver damage except total bilirubin were significantly higher among the AUD group compared to controls (Arria, Dohey, Mezzich, Bukstein, & Van Thiel, 1995).

Results in the literature demonstrating poor physical health outcomes among young women with a substance use disorder combined with the current finding that physical health problems at ages 14-18 influenced physical health problems at ages 19-23 emphasize the necessity of early prevention and intervention in an effort to encourage health-promoting

behaviors and avert the trajectory to antisocial behavior, psychoactive substance use and abuse, and potentially life-long, life-threatening health consequences.

Although childhood sexual abuse may initiate a chain of health-risk behaviors including early-onset sexual activity, antisocial behavior, psychoactive substance use, and SUD, once antisocial behavior is initiated, the combination of antisocial behavior and SUD assume prominence in the promotion of of physical health problems.

6.1.2   Analysis 2, Ages 19-23

Contrary to the research hypothesis, in the current analysis adult violence was not associated with physical health problems at ages 19-23. Antisocial behavior$_2$ was related to physical health problems$_2$, and the association was mediated by number of SUDs$_2$.

In this analysis adult violence may not have demonstrated an association with physical health problems for a couple of reasons. The operational definition of "adult violence" includes victimization by individuals other than intimate partners (and infliction of violence on others including but not limited to intimate partners) and may have diluted the strength of the association between intimate partner violence and health problems. Expanding the definition of adult violence to include physical violence with *anyone* minimizes the effects of more intense, systematic abuse by an intimate partner and also negates the effects of reciprocal partner violence, which is often among the most dangerous (Hanson, 2010; Swahn, Alemdar, & Whitaker, 2010).

Another possibility for lack of significance between adult violence and physical health problems$_2$ has to do with the instrument used to measure adult violence. The *Maltreatment History Self-Report* inquired only about experiences after the age of 18, as anything prior to that was considered child abuse. It is possible, however, that females with a diagnosis of SUD

engaged in intimate partner violence before age 18 due to precocious sexuality, affiliation with deviant males, etc. Limiting experiences of adult violence to only those occurring after age 18 may limit opportunities to report resulting physical health problems.

At ages 19-23 antisocial behavior was associated with physical health problems, and the relationship was mediated by number of SUDs. This supports existing studies discussed in previously. By ages 19-23 health problems were exacerbated due to the progressive, degenerative nature of SUD and protracted stress, injury, and disease associated with antisocial behavior.

6.2   LONGITUDINAL ANALYSIS

Associations were anticipated between all predictors -- maltreatment (child abuse, adult violence), antisocial behavior at ages 14-18 and 19-23, and physical health problems at ages 14-18 and 19-23. The only variables associated with physical health problems at 19-23 were physical health problems at ages 14-18 and number of SUDs at ages 19-23.

Results support a longitudinal study that determined female adolescents and young adults who had received treatment for alcohol or drug problems -- regardless of outcome -- scored significantly higher on indices of health problems and severe health problems compared to females without SUD (Aarons, et al., 1999).

Although variables significant in cross-sectional hypotheses were no longer associated with health problems at ages 19-23 in this longitudinal analysis (e.g., childhood sexual abuse, antisocial behavior), they laid the groundwork for physical health problems at ages 14-18 which was one of two variables promoting and maintain poor physical health in young adulthood. Similarly, although no longer significant in the longitudinal study, in the cross-sectional analysis at ages 19-23, antisocial behavior was linked with poor physical health, mediated by number of

SUDs. It appears that childhood sexual abuse and antisocial behavior facilitate the development of physical health problems in female adolescents with SUD and are associated with severity of SUD. By young adulthood, after these young women are thoroughly entrenched in polysubstance abuse informed in part by antisocial behavior, their delinquent behaviors assume less importance and their continued poor health is instead promoted and maintained by previous health problems and number of current SUDs. Because of the controls inherent in the Female Adolescent Study on which this analysis is based, physical health problems at ages 14-18 were controlled for, and physical health problems at ages 19-23 reflect only new health problems. Therefore, the influence of physical health at ages 14-18 at physical health at ages 19-23 does not imply just an exacerbation of existing conditions but an expansion of health problems into new domains. This supports previously cited literature confirming serious health risks associated with severe SUD and antisociality and underscores the need for early intervention.

7.0 LIMITATIONS OF THE STUDY

Although the current analysis has many strengths including the longitudinal nature of the Female Adolescent Study on which it is based, there are also limitations. One limitation is reliance on self-report measures. Although SUD and child abuse were assessed using semistructured interviews, most other measures were not. Supplementing participant self-reports with public records -- e.g., government or hospital -- would lend greater veracity to the data. One longitudinal study found, for example, that mothers of delinquent adolescents rated their children's antisocial behavior twice as high as did the adolescents themselves. This suggests that antisocial adolescents may underreport their delinquent behavior (Lansford, et al., 2002), a tendency that would be revealed if public records were used to corroborate self-report data.

Another shortcoming of the existing analysis is that child abuse data were reported in terms of type, frequency, and severity of abuse but were not coded for duration of abuse, chronological age of the child, and relationship to the perpetrator -- all of which have been shown to influence the outcome of child abuse (*reviewed in* Child Welfare Information Gateway, 2008).

Perhaps the biggest limitation of this analysis pertains to the generalizability of findings. Results may be generalized only to female adolescents and young women with an SUD.

This analysis is unique in its focus on female adolescents, a population frequently ignored, and contextual factors perpetuating poor health. Inclusion of emotional abuse in measures of childhood and adult maltreatment is another strength. Many recent studies have emphasized the deleterious effects of emotional, as well as physical and sexual, abuse, with one investigation determining childhood emotional abuse is as detrimental as familial sexual abuse on some outcome measures (Teicher, Samson, Polcari, & McGreenery, 2006). Nevertheless,

studies of emotional abuse and physical health are scant and were almost nonexistent when the Female Adolescent Study was undertaken.

An important component of this study is the implementation of statistical controls in all analyses. Analyses at ages 14-18 and 19-23 controlled for ethnicity, socioeconomic status, and age, as these variables have been shown to influence physical health status, as mentioned earlier. Further, physical health problems at ages 14-18 were controlled to ensure that health problems identified at ages 19-23 did not represent an artifact of earlier health problems but instead measured new problems related to health at ages 19-23.

Finally, this analysis is based on one of few studies that instituted a prospective, longitudinal design to explore the continuity of physical health problems in young women with a substance use disorder. Findings illuminated by this analysis will facilitate the design of appropriate interventions for at-risk young women.

8.0   IMPLICATIONS FOR INTERVENTION AND TREATMENT

The current analysis found: 1) At ages 14-18 childhood sexual abuse was associated with physical health problems, mediated by antisocial behavior. Additionally antisocial behavior and number of SUDs were associated with physical health problems; 2) at ages 19-23 antisocial behavior was associated with physical health problems, mediated by number of SUDs; and 3) in the longitudinal analysis (ages 14-18 to 19-23), physical health problems at ages 14-18 and number of SUDs at ages 19-23 influenced physical health problems at ages 19-23.

These findings suggest crucial opportunities for prevention and intervention before antisocial behavior and SUD become pervasive, contributing to life-long poor health. In this analysis the first point on the trajectory to poor physical health is child sexual abuse. As early intervention with children having abuse histories (physical or sexual) has been shown to reduce adulthood medical disease rates, Clark and colleagues (2010) recommend regular screening of at-risk children for alcohol, cigarette and other drug use, monitoring for weight gain and treatment of comorbid mental disorders (Clark, Thatcher, & Martin, 2010). Because of the association between childhood sexual abuse and use of psychoactive substances[9] and because sexually abused children are not always readily identifiable, schools might attempt a resilience intervention directed at all students. In Australia such a pilot program across three schools effectively reduced tobacco, alcohol, and marijuana use among high school students (Hodder, et al., 2011). As antisocial behavior and other negative sequelae of child abuse are often entrenched by the time young women enter high school, such a program could be introduced in

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[9] The association between childhood sexual abuse and use of psychoactive substances was not studied in the extant analysis, as participants already had a diagnosis of SUD. Nevertheless, the association has been established in the literature and provides an opportunity to implement strategies to prevent SUD and its health-destroying sequelae.

lower grade levels. In light of findings of the current analysis -- that ASB and SUD are associated with physical health problems at ages 14-18 and that physical health problems at ages 14-18 perpetuate physical health problems at ages 19-23 – the role of prevention is crucial.

Clark and colleagues (2002) suggest engaging antisocial, SUD adolescents in multisystemic therapy, with multifaceted interventions targeting the family, peers, school, and neighborhood (Clark, Bukstein, & Cornelius, 2002). One study found motivational interviewing to be more effective than relaxation training in decreasing negative engagement in substance abuse treatment (Stein, et al., 2006). Although participants in the Stein (2006) study were mostly male (90%), the emphasis on empowerment inherent in motivational interviewing might prove effective with antisocial and substance use-disordered female adolescents who have been sexually abused in childhood.

Walker and colleagues (1998) emphasize the inherent danger of relapse when patients with a history of sexual abuse are successfully treated for chemical dependency and can no longer rely on drugs to mediate environmental triggers. They suggest two phases of treatment after sobriety: phase 1 to unblock hidden memories, with the aid of pharmacology for agitation, intrusive thoughts, etc.; and phase 2 to develop effective coping mechanisms. The authors further recommend that child sexual abuse survivors participate in individual and group therapy, support groups, adjunct therapies such as biofeedback and guided imagery, and physical activities to increase body awareness and empowerment (Walker, Scott, & Koppersmith, 1998).

Dialectical behavior therapy, originally designed to help suicidal patients to build a "life worth living" (p. 39) by embracing the dialectic of change and acceptance, has demonstrated effectiveness for individuals with comorbid SUD and borderline personality disorder (*reviewed in* Dimeff & Linehan, 2008). Although randomized clinical trials have not been conducted for

the use of DBT in individuals with SUD only without comorbid borderline personality disorder, it has been hypothesized that DBT might be an effective treatment in cases in which emotional dysregulation influences the use of drugs or alcohol (*reviewed in* Dimeff & Linehan, 2008). Given the history of sexual abuse among young women in the current analysis as well as their extensive psychoactive substance use and engagement in severe antisocial behavior at an early age, a pilot program of DBT may prove effective in reducing various health-risk behaviors.

Although many interventions have been designed for males, it appears that tailoring treatment to females may be effective. Using a pre- and post-test design, a study of incarcerated sexually abused adolescent females found that a gender-specific cognitive-behavioral therapy (CBT) intervention was effective in improving psychosocial functioning (Arnold, et al., 2008). A study of treatment processes among male and female childhood abuse survivors in drug treatment found that abused females (physical or sexual) had the lowest rate of participation in 12-step groups but also higher scores on measures of counselor rapport and treatment effectiveness (especially compared to females without an abuse history). This suggests that female adolescents with a physical or sexual abuse history may do particularly well in relation to an individual counselor than in a group process (Grella & Joshi, 2003).

Finally, Laurene Bowers presents a feminist treatment perspective. In this view it is important to link acting-out behavior to the precipitating event of trauma and allow the adolescent to reveal her trauma without creating the secondary trauma of an invalidating environment (Bowers, 1990). Through the therapeutic relationship the adolescent is encouraged to identify manipulative patterns which facilitated her survival but now impede her development. Trust, empathy, and empowerment are key to therapeutic rapport. Empowerment, in Bowers'

model, involves encouraging the female adolescent to envision her victimization as a problem of society and to explore ways in which she can help other young women (Bowers, 1990).

Given the longitudinal findings demonstrating the contribution of physical health problems at visit 1 and number of SUDs at visit 2 to physical health problems at visit 2, intervention in adolescence is crucial to reduce health problems at ages 19-23. Whatever modality is used, early intervention is necessary among female adolescents who have been exposed to childhood sexual abuse and who have demonstrated antisocial behavior including substance abuse, as these are predictive of physical health problems in adolescence and young adulthood. Female adolescents may have unique treatment needs that should be addressed in order to help them successfully reduce health-compromising behaviors and discover the possibility of a life worth living.

APPENDIX A

CONSENT FORM, AGES 14-18

CONSENT TO ACT AS A SUBJECT IN AN EXPERIMENTAL STUDY
(Subjects 14-18 years old)

TITLE: Female Adolescent Drug Use: Biobehavioral Development

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SOURCE OF SUPPORT: NIDA

DESCRIPTION: This study is being done to look up the characteristics of female adolescents that have a history of drug abuse and/or behavior problems. You are asked to participate in this research because you have sought treatment for one of these conditions, have had legal problems because of your behavior, or because you do not have these problems. This study is designed to help us determine whether there are biological or psychosocial factors in female adolescents that put them at risk to develop the conditions described above.

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The characteristics that we are concerned with have to do with physical development, personality characteristics, and hormones and brain chemistry. Several psychosocial tests will be given that measure your personality characteristics, the way you solve problems, your reactions to stress, your relationship with parents, friends and members of the opposite sex, drinking behavior as well as hobbies and recreational activities that you do. All of the psychosocial tests and diagnostic procedures to be given to you are either standard, commonly used testing techniques or have been used for research purposes in a variety of different settings. The information will allow us to have a complete picture of your feelings, attitudes, interests, behavioral characteristics, temperament and personality make-up and social relationships. Your total time of participation is about two 9-hour days in direct evaluation, including one overnight stay. In addition, we would like to interview your parents regarding their personal histories and your childhood. At the time of this evaluation you are required to be free of drugs, not have used drugs for at least the past week, and not be pregnant.

Just before going to sleep, during the overnight stay, you will be given two medications to take by mouth. The purpose of these medications is to help us understand how your liver changes drugs so that they may be removed from your body. This is called drug metabolism. The two medications are called Debrisoquine and Mephenytoin. You will be given one relatively low dose of each medication. The dose of Debrisoquine is 10 mg. and the dose of Mephenytoin is l00 mg. Many hundreds of people around the world have been safely tested in this manner to find out how their bodies remove drugs. Only a very small proportion of people tested in this way have any problems with this procedure. Most people do not feel anything after taking these medications. Both medications have other medical uses besides their use in testing drug metabolism. Debrisoquine (in much higher doses) is a medicine routinely used to treat high blood pressure throughout Europe and Canada but in the USA the Food and Drug Administration allows us to use this medication for research purposes only. Mephenytoin is a medication approved in the US for treatment of seizure and is also usually taken in higher doses for that purpose. After you take the two medications, we must collect all your urine overnight, so we will ask that you urinate into a special container rather than the toilet. The urine collection will end in the morning. Then, we will obtain a blood sample from your arm. The amount of blood we will take is 48 ml. or about three and a half tablespoons. This blood sample will help us to evaluate the results of this study, and will also allow us to measure aspects of your brain chemistry and hormones. You will be carefully watched during this overnight procedure.

Five hundred and ten female adolescents your age will be recruited for study. Two hundred and four will have a history of drug abuse, 102 will have a history of behavior problems, 102 will not have any problems. In addition the research study will evaluate 102 female adolescents who are older sisters of female adolescents who participate in the study. All will receive the same testing.

RISKS AND BENEFITS: Debrisoquine may make some people dizzy if they get up too quickly and may lower their blood pressure. These effects are noted to be usually mild, passing quickly and stopping soon after the drug is stopped. You will be watched closely for these side effects. Once in a while, gastrointestinal side effects with Debrisoquine have been reported, including heartburn, gas, vomiting, abdominal discomfort, constipation and diarrhea. None of our research subjects have experienced any of these problems, so far.

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The side effect of Mephenytoin, including effects on the blood, skin and nervous system, are present at higher doses and occur after continuous treatment. The only expected side effect of Mephenytoin in this study is the possibility of mild sleepiness. The amount of blood taken during the study will be approximately 48 ml. or about 3.5 tablespoons. A blood sampling may produce a small bruise at the site of needle puncture.

The study of Debrisoquine and Mephenytoin will not be of immediate benefit to you but will help us understand drug abuse and metabolism. None of the questionnaires that you will answer have any medical or psychological risk. Some people are a little nervous at first answering questionnaires but this usually goes after a few minutes. The benefit to participating in this investigation is that it will greatly help us to understand the factors that put female adolescents at risk to develop drug abuse. When these factors have been found, we will be able to better prevent or treat this problem. Thus, although the benefits may not be direct to you for participating, it is hoped that there will be a large increase in scientific knowledge from your participation.

ALTERNATE TREATMENT: Not applicable.

NEW INFORMATION: New information which the investigators learn during the research which may relate to your willingness to participate will be provided to you or to your legal representative.

COSTS AND PAYMENTS: You will be paid a total of $150.00 in the form of a gift certificate to a local mall upon completion of the study. Your parents will receive $50 in cash for their participation. The overnight stay is part of the research, therefore it will not be charged to you. All laboratory, physician and hospital costs not related to the research will be charged to you as though you were not part of the study.

CONFIDENTIALITY: All the information collected about you will be kept strictly confidential. A number will be assigned to your name and all of the information will be stored in locked file cabinets.   Any information about you obtained from this research including answers to questionnaires, history, laboratory data and findings on physical examination will be kept confidential.   This project has a Certificate of Confidentiality which means that your research records may not be subpoenaed or asked to be brought to court in any legal proceeding either criminal or civil. However, you should be aware that this has never been tested in a Court of Law and thus, may not be enforceable. It has been explained to you that your name will not appear in any description or publication of this research. Only group data will be presented. So that means you only consent to such publication for scientific purposes.

In the assessment process, information about possible pregnancy, physical abuse or neglect and suicidal thoughts, plans or attempts and alcohol and/or drug abuse will be obtained.

If pregnancy is identified, Drs. Mezzich and Tarter will discuss the finding with you and ask permission to discuss this matter with your parents. If you do not give Drs. Mezzich and Tarter permission to discuss this matter with your parents they will not do so.

If you are in treatment and child abuse/neglect and/or alcohol and/or drug abuse and/or suicidal thoughts, plans or attempts are noted during the study, Drs. Mezzich and Tarter will contact your treatment team to make sure there is a safe environment for you.

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Initials

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If you are not in treatment and alcohol and/or drug abuse and/or suicidal thoughts, plans or attempts are identified, Drs. Mezzich and Tarter will discuss the findings with you, recommend treatment, provide a list of treatment places and ask permission to discuss these matters with your parents. If you do not give Drs. Mezzich and Tarter permission to contact your parents they will not do so. If either abuse or neglect is identified, Drs. Mezzich and Tarter will discuss the situation with you and your parents. You and your parents will be interviewed by Dr. Linda Gourash, M.D., Chairperson of the Committee on Abuse/Neglect at the University of Pittsburgh Health Science Center or one of her staff within 24 hours. She will decide with you and your parents what to do. If necessary, she will refer you and your family to Children and Youth Services of Allegheny County where a social worker will be assigned for further evaluation. We will make every effort possible to help your family get treatment for this problem.

RIGHT TO WITHDRAW: I understand that I am free to refuse to participate in the study or to withdraw at any time and that my decision will not negatively affect my care at this institution or cause a loss of benefits to which I might be otherwise entitled. I also understand that the investigators may require that I withdraw from the study for many reasons related to their desire to keep the research groups made up of particular types of people.

CLINICAL RESEARCH CENTER: Not applicable.

COMPENSATION FOR ILLNESS OR INJURY: I understand that in the event of a physical injury or illness resulting from the research procedure no monetary compensation will be made but any immediate emergency medical treatment that may be necessary will be provided. I can call the investigators to obtain information about this type of treatment.

VOLUNTARY CONSENT: I certify that I have read the pages before this or that it has been read to me and that I understand the contents. Any questions I have pertaining to the research have been and will be answered by Dr. Ada Mezzich (624-1060) or Dr. Ralph Tarter (624-1060). Any questions that I have concerning my rights as a research subject will be answered by the Office of the Senior Vice President, Health Services (648-9885). A copy of this consent form will be given to me. My signature below means that I freely agree to participate in this experimental study.

_____
Subject's Signature

_____   _____
Witness   Date

I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participating in this research study, have answered any questions that have been raised, and have witnessed the above signature.

_____   _____
Date   Investigator's Signature

CONSENT FORM, AGES 19-23

CONSENT TO ACT AS A SUBJECT IN AN EXPERIMENTAL STUDY
(Subjects 19-23 years old)

TITLE: Female Adolescent Drug Use: Biobehavioral Development

INVESTIGATORS:

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(412) 624-1060

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University of Pittsburgh, School of Pharmacy
(412) 624-2615

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Assistant Director of Psychology
University of Kentucky
(859) 257-4502

SOURCE OF SUPPORT: NIDA

DESCRIPTION: This study is being done to learn about various characteristics of young adult females (19-23 years old) who had a history of drug abuse during adolescence and participated in this study at age 14-18. You are asked to participate in this research because you may or may not have had a drug abuse problem during adolescence. This study is designed to help us determine the outcome of drug abusing female adolescents in young adulthood and the patterns of drug abuse and personality characteristics in the young adult females and their male partners.   Severe psychosocial and neuropsychological tests will be given that measure your personality characteristics, the way you solve problems, your reaction time to stress, your relationship with your male partner, and your drinking and

_____
Initials

drug use behavior. For the reaction time task you will be seated alone in a room with a push button panel in front of you. Your opponent will be seated alone in a nearby room with a similar panel. You and your boyfriend will then compete against different opponents on the task. When a light appears on your panel you will have to press a button as fast as you can. If you are faster than your opponent you will be able to give your opponent a mild sound stimulus; if your opponent is faster, she will give you a mild sound stimulus. Sound stimuli are administered to the ears. The levels of sound intensities will vary depending on your personal preference to sound levels. The sound stimulus used here has been shown to have no harmful effects. To learn about your interaction with your male partner, both of you will complete a questionnaire that describes situations that cause problems between you and your partner. You will then select two conflicts and find a resolution. This discussion will be videotaped for 12 minutes. All of the psychosocial and neuropsychological tests and diagnostic and laboratory procedures to be given to you are either standard commonly used testing techniques or have been used for research purposes in a variety of different settings. The information will allow us to obtain a complete picture of your behavioral characteristics, personality make-up, and relationship with your male partner. Your total time of participation is about one 6-hour day in direct evaluation. In addition, we would like to interview your male partner regarding his substance use behavior and personality characteristics. Three hundred young adult females your age and their male partners will be recruited for study. Two hundred had a history of drug abuse during adolescence and 100 did not have any drug problems during adolescence. All will receive the same testing.

RISK AND BENEFITS: None of the questionnaires that you will answer have any medical or psychological risk. Some people are a little nervous at first about receiving sound stimuli. However, the sound stimuli that you are going to receive have repeatedly been used in the past with no adverse consequences. Also, answering questionnaires may make you nervous but this usually goes away after a few minutes. The benefit to participating in this investigation is that it will greatly help us to understand the consequences of drug abuse in young adulthood among females. Also, this study will help us to clarify our knowledge about the influence that the sexual partner of the young adult female has on her drinking and drug use. When these factors have been found, we will be able to better prevent or treat this problem. Thus, although you may not benefit directly from your participation, it is hoped that there will be a large increase in scientific knowledge from your participation.

ALTERNATE TREATMENT: Not applicable.

NEW INFORMATION: New information which the investigators learn during the research which may relate to your willingness to participate will be provided to you or to your legal representative.

_____
Initials

3

COSTS AND PAYMENTS: You will be paid a total of $100.00 in the form of a gift certificate to a local mall upon completion of the study. Your male partner also will be paid $100.00 for his participation. All laboratory, physician, and hospital costs not related to the research will be charged to you as though you were not part of the study.

CONFIDENTIALITY: All the information collected about you will be kept strictly confidential. A number will be assigned to your name, and all of the information will be stored in locked file cabinets. Any information about you obtained from this research, including answers to questionnaires, history, laboratory data, and findings on the physical examination will be kept confidential. This project has a Certificate of Confidentiality, which means that your research records may not be subpoenaed or asked to be brought to court in any legal proceeding either criminal or civil. However, you should be aware that this has never been tested in a Court of Law and thus may not be enforceable. It has been explained to you that your name will not appear in any description or publication of this research. Only group data will be presented. So that means you consent only to such publication for scientific purposes.

In the assessment process, information about possible pregnancy, physical abuse by your male partner, suicidal and homicidal thoughts, plans, or attempts, and alcohol and/or drug abuse will be obtained.

If pregnancy is identified in the assessment process, Dr. Mezzich will discuss the findings with you.

If you are in treatment and if in the process of the evaluation we identify alcohol/drug abuse and/or suicidal and/or homicidal thoughts, plans or attempts and/or physical abuse by your male partner, Dr. Mezzich will contact your treatment team to make sure there is a safe environment for you.

If you are not in treatment and if alcohol/drug abuse and/or physical abuse by your male partner are identified, Dr. Mezzich will discuss the findings with you, recommend treatment, and provide a list of treatment places.

If you are not in treatment and if suicidal and/or homicidal thoughts, plans, or attempts are revealed during the interview, Dr. Mezzich will talk to you and determine your suicidal and/or homicidal status. Following this, Dr. Mezzich will ask you to go to St. Francis Medical Center Emergency Room for a psychiatric evaluation.

If you are not in treatment and if physical abuse by your male partner is identified, Dr. Mezzich will discuss the situation with you and will offer a referral for treatment.

RIGHT TO WITHDRAW: I understand that I am free to refuse to participate in the study or to withdraw at any time and that my decision will not negatively affect my care at this institution or cause a loss of benefits to which I might be otherwise entitled. I also understand that the investigators may require that I withdraw from the study for many reasons related to their desire to keep the research groups made up of particular types of people.

_____

Initials

4

CLINICAL RESEARCH CENTER: Not applicable.

COMPENSATION FOR ILLNESS OR INJURY: I understand that in the event of a physical injury or illness resulting from the research procedure, no monetary compensation will be made but any immediate emergency medical treatment that may be necessary will be provided. I can call the investigators to obtain information about this type of treatment.

VOLUNTARY CONSENT: I certify that I have read the pages before this or that it has been read to me and that I understand the contents. Any questions I have pertaining to the research have been and will be answered by Dr. Ada Mezzich (624-1060). Any questions that I have concerning my rights as a research subject will be answered by the Office of the Senior Vice Chancellor, Health Services (647-9834). A copy of this consent form will be given to me. My signature below means that I freely agree to participate in this experimental study.

Date	Subject's Signature

I certify that I have explained to the above individual the nature and purpose, the potential benefits and possible risks associated with participating in this research study, have answered any questions that have been raised, and have witnessed the above signature.

Date	Investigator's Signature

APPENDIX C

DEMOGRAPHIC FORM

DEMOGRAPHIC FORM   Date: /   /

A. ID SECTION   ID:

1. Family ID: 2. Sequence # :

3. Relationship to the INDEX CASE:

(1)

| Biologic | Half | Step | Adopted |
| B | H | S | A |

(2)

| G.Father | G.Mother | | G.Father | G.Mother |
| PG | PG | | MG | MG |

| Uncle | Aunt | Father | Mother | Aunt | Uncle |
| PU | PA | PP | PP | MA | MU |

| P.Sibl | INDEX CASE | I.PARTN | O.SISTER | O.PARTN | B/A Sib | M.Sibl |
| PS | I C | IP | I S | OP | SS | MS |

| I.CHILD | O.CHILD |
| CC | SC |

4. SEX (F/M): _____

B. Demographic:
  1. Last name: _____

     First name: _____   MI: _____

  2. Birth Date (D/M/Y): _____ / _____ / _____   Age: _____

  3. Date of Death: _____ / _____ / _____

     Cause of Death: _____

     Social Security Number: ___|___|___ - ___|___ - ___|___|___|___

  5. Are you the PARENT of the INDEX CASE: _____   (-2) NO
     If yes, are you   a. Adopted _____ (1)Yes _____ (2)No
                        b. Twin _____ (1)Yes _____ (2)No

C. Driver's License, Address, & Phone Number

    1. Driver's License number: _____ State: _____

    2. Home Address & Phone:

        Street: _____

        City: _____ State: _____ Zip: _____

        Phone (Day): (   )   -

             (Eve): (   )   -

        Best time to call: _____

    3. Current Address & Phone, same as above: _____ Yes _____ No

        Street: _____

        City: _____ State: _____ Zip: _____

        Phone (Day): (   )   -

             (Eve): (   )   -

        Best time to call: _____

D. Informant's Information:

    1. Informant's relationship to the subject:

        _____(1) Self   _____(2) Spouse   _____(3) Father

        _____(4) Mother   _____(5) Son   _____(6) Daughter

        _____(7) Sibling   _____(8) Grandfather   _____(9) Grandmother

        _____(10) Other: _____

    2. If other than self,

        Street: _____

        City: _____ State: _____ Zip: _____

        Phone (Day): (   )   -

             (Eve): (   )   -

        Best time to call: _____

2

E. Ethnic Background:

_____(1) White

_____(2) Hispanic

_____(3) Black

_____(4) American Indian

_____(5) Asian

_____(6) Other:_____

F. Marital Status:

_____(1) Never married

_____(2) Married

_____(3) Divorced

_____(4) Divorced/Remarried

_____(5) Divorced/Living together

_____(6) Living together

_____(7) Separated

_____(8) Widow/Remarried

_____(9) Widow

_____(10) Other:_____

G. Religion:

_____(1) Roman Catholic

_____(2) Jewish

_____(3) Protestant

_____(4) Eastern Orthodox

_____(5) Muslim

_____(6) None

_____(7) Other:_____

3

FEMALE ADOLESCENT STUDY

H. Education (the highest grade or degree you completed):

_____(-2) NONE

_____(1)   1st   Grade   _____(7)   7th Grade

_____(2)   2nd   Grade   _____(8)   8th Grade

_____(3)   3rd   Grade   _____(9)   9th Grade

_____(4)   4th   Grade   _____(10) 10th Grade

_____(5)   5th   Grade   _____(11) 11th Grade

_____(6)   6th   Grade   _____(12) 12th. Grade   (GED)

_____(13) Kindergarten

_____(14) Partial College, Technical or Business School

_____(15) College graduate

_____(16) Partial Graduate or Professional School

_____(17) Graduate or Professional degree

_____(18) Other: _____

I. Special Education:

a. Type:

_____(-2) NONE (You don't have any special education)

_____(1)   Learning disabilities

_____(2)   Emotional or behavioral problems

_____(3)   Gifted

_____(4)   Mental Retardation

_____(5)   Other:_____

b. Duration:

_____(-2) NONE (You don't have any special education)

_____(1)   1-3 years

_____(2)   4-6 years

_____(3)   7 years or more

4

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FEMALE ADOLESCENT STUDY

H. Education (the highest grade or degree you completed):

_____(-2) NONE

_____(1) 1st Grade   _____(7) 7th Grade

_____(2) 2nd Grade   _____(8) 8th Grade

_____(3) 3rd Grade   _____(9) 9th Grade

_____(4) 4th Grade   _____(10) 10th Grade

_____(5) 5th Grade   _____(11) 11th Grade

_____(6) 6th Grade   _____(12) 12th. Grade (GED)

_____(13) Kindergarten

_____(14) Partial College, Technical or Business School

_____(15) College graduate

_____(16) Partial Graduate or Professional School

_____(17) Graduate or Professional degree

_____(18) Other: _____

I. Special Education:

a. Type:

_____(-2) NONE (You don't have any special education)

_____(1) Learning disabilities

_____(2) Emotional or behavioral problems

_____(3) Gifted

_____(4) Mental Retardation

_____(5) Other: _____

b. Duration:

_____(-2) NONE (You don't have any special education)

_____(1) 1-3 years

_____(2) 4-6 years

_____(3) 7 years or more

4

K. HEAD of HOUSEHOLD in your family:

1. Head of household relationship to you:

_____(1) Self _____(2) Spouse _____(3) Father

_____(4) Mother _____(5) Son _____(6) Daughter

_____(7) Sibling _____(8) Grandfather _____(9) Grandmother

_____(10) Other: _____

2. Household head's education (according to Hollingshead):

_____(-2) NONE

_____(1) 1st Grade _____(5) 5th Grade _____(9) 9th Grade
_____(2) 2nd Grade _____(6) 6th Grade _____(10) 10th Grade
_____(3) 3rd Grade _____(7) 7th Grade _____(11) 11th Grade
_____(4) 4th Grade _____(8) 8th Grade _____(12) 12th Grade
(GED)

_____(13) Kindergarten

_____(14) Partial College, Technical or Business School

_____(15) College graduate

_____(16) Partial Graduate or Professional School

_____(17) Graduate or Professional degree

4. Household head's occupation (according to Hollingshead):

_____(0) Homemaker, student

_____(1) Farm laborers/menial service workers

_____(2) Unskilled workers

_____(3) Machine operators and semiskilled workers

_____(4) Smaller business owners, skilled manual workers,
craftsmen, & tenant farmers
_____(5) Clerical & sales workers, small farm & business owners

_____(6) Technicians, small business owners, semiprofessionals

_____(7) Smaller business owners farm owner, managers,
and minor professionals
_____(8) Administrators, lesser professionals,
propietors of medium-sized businesses
_____(9) Higher executives, major professionals, and
proprietors of large businesses

6

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L. Close friends or relatives not living with you can be contacted

regarding address:

(1) a. Relationship

_____(1) Friend   _____(2) Spouse   _____(3) Father

_____(4) Mother   _____(5) Son   _____(6) Daughter

_____(7) Sibling   _____(8) Grandfather   _____(9) Grandmother

_____(10) Other: _____

b. Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone (Day): (   )   -

(Eve): (   )   -

(2) a. Relationship

_____(1) Friend   _____(2) Spouse   _____(3) Father

_____(4) Mother   _____(5) Son   _____(6) Daughter

_____(7) Sibling   _____(8) Grandfather   _____(9) Grandmother

_____(10) Other: _____

b. Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone (Day): (   )   -

(Eve): (   )   -

7

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APPENDIX D

DRUG CHECKLIST

INSTRUCTIONS: Circle all of the drugs which you have ever tried:

1. Beer

2. Wine (including Wine Coolers)

3. Liquor

4. Amphetamine (Uppers, Crystal, Meth, Speedball, Ice, Dexedrine, Black Beauties, Bennies, Ritalin, Jelly Beans, Wake-Ups, Speed)

5. Cocaine (Crack, Crank, Powder, Coke, Flake, Blow, Happy, Dust, Freese, Snow, Toot)

6. Prescription diet pills (Preludin, Tenuate, Tepanil, Sanorex)

7. Over-the-counter diet pills (Nonprescribed: Dexatrim, Accu-trim, Apadrine)

8. Caffeine pills (No Doze)

9. Heroin (Smack, Horse, N, Joy Powder)

10. Synthetic heroin (China White, T's, Blues)

11. Morphine

12. Methadone

13. Codeine (Tussinex, Percodan)

14. Other prescription painkillers (Demoral, Dilaudid, Darvon)

15. Barbiturates (Downers: Seconal, Reds)

16. Quaaludes (Ludes)

17. Benzodiazepines (Xanax, Librium, Valium, Dalmane, Serax, Halcion, Ativan)

18. Meprobamate (Miltown)

19. Doriden

20. Placidyl (Bam)

21. LSD (Acid, Window Pane, A-Bomb)

22. Psilocybin (Mushrooms, Fungus)

23. Peyote (Mescaline, Buttons)

24. MDMA, MDA (Ecstasy)

25. PCP (Angel Dust, Sherms)

26. Marijuana and Hashish (Reefer, Smoke, Herb, Shish, Pot, Weed)

27. Amyl Nitrate (Poppers, Rush, Pops, Locker Room)

28. Nitrous Oxide (Laughing Gas, Whippets, Chargers, Silly Man)

29. Glue

30. Gasoline

31. White-Out or Ko-Rec-Type

32. Smoking tobacco

33. Chewing tobacco

34. Snuff tobacco

35. Cough syrup (to get high)

36. Nyquil (to get high)

37. Anabolic steroids (Roids, Juice)

38. Other over-the-counter drugs

      Specify: _____

39. Other drugs

      Specify: _____

40. Caffeinated drinks (Coffee, Soda, Tea)

      How many per day?_____

SELECT YOUR MOST PREFERRED DRUGS AND RANK THEM (if alcohol in general is one of the choices, code 123)

                                    CODE

1._____   _____

2._____   _____

3._____   _____

4._____   _____

APPENDIX E

LIFETIME HISTORY OF ALCOHOL USE QUESTIONNAIRE

MODULE : Female Adolescent Study

TEST : Lifetime History of Alcohol Use

EFFECTIVE 4-2-92

| SUBJECT INITIALS | SUBJECT NUMBER |
| DATE | ASSESSMENT NO. | RATER INITIALS |

LIFETIME HISTORY OF ALCOHOL USE   Y (1) N (2) ___(1)

A. AGE

B. DRINKS PER OCCASION
Sip 1   Drink 2   ___(8)
One choice

C. STYLE
One choice
1 Frequent
2 Occassional
3 Weekend
4 Binge
___(21)

D. TIME
Mult. choice
(22) Morning
(23) Afternoon
(24) Night

E. PLACE
Mult. choice
(25) Home
(26) Social Events
(27) Other's home
(28) Park
(29) Cemetery
(30) Playground
(31) Street
(32) Car
(33) School
(34) Work
(35) Restaurant
(36) Bar
(37) Club
(38) Other:___

F. SOCIAL CONTEXT
Mult. Choice
(41) Friends
(42) Relatives
(43) Spouse/Partner
(44) Strangers
(45) Alone
(46) Other:___

Phase No.___ (2) Beer ___(3)   Wine   Liquor

From: __/__ year/month

	Beer	Wine	Liquor	
1	___1___	___1___	___1___	1 Every day
2	___2___	___2___	___2___	2 Every 2nd day
3	___3___	___3___	___3___	3 Once a week
4	___4___	___4___	___4___	4 Weekends
5	___5___	___5___	___5___	5 1 every 2 weeks
6	___6___	___6___	___6___	6 Every month
7	___7___	___7___	___7___	7 Every 3 months
8	___8___	___8___	___8___	8 Every 6 months
9	___9___	___9___	___9___	9 Every 9 months
10	___10___	___10___	___10___	10 Once a year
11	___11___	___11___	___11___	11 Once

To: __/__ year/month

(9) (10) (11) (12) (13) (14) (15) (16) (17)(18) (19) (20)

Quantity Frequency Quantity Frequency Quantity Frequency
Beer   Wine   Liquor

93

F. ALCOHOL USE CONSEQUENCES
Mult. choice

(47) Family objects
(48) Friends object
(49) Job/school absenteeism
(50) Job/school relational prob.
(51) Job/school poor performance
(52) Job/school expulsion
(53) Job/school quit
(54) Drinking related arrest
(55) DWI arrest
(56) Other illegal activities
(57) Motor vehicle accident
(58) Accidental injuries
(59) Suicide attempt
(60) Financial difficulties
(61) Physical victimization
(62) Sexual victimization
(63) Arguments
(64) Physical fights
(65) Physical abuse
(66) Liver disease or yellow Jaundice
(67) Inflamation of pancreas
(68) Vomiting blood or other stomach problems
(69) Tingling/numbness in feet
(70) Small sores
(71) Hands or feet swelling

(72) Use despite medical warning
(73) Decrease sexual drive
(74) Memory prob. after drinking
(75) Blackout
(76) Morning drink
(77) Shakes after stop/cut
(78) Fits of seizures after stopping
(79) Hallucinations/fever
(80) Marked tolerance
(81) completely unable to keep to limit
(82) Difficulty preventing getting drunk
(83) Difficulty cutting down
(84) Passing out in public
(85) Given up interests
(86) Use of antabuse to help to stop drinking
(87) Go on the wagon
(88) Geographic cure
(89) Restless without drink
(90) Times when cannot think of anything else
(91) Organizing day to ensure supply
(92) Needing more than companions
(93) Sneak drink or hide bottles
(94) Need for daily use

(95) Giving up responsibilities
(96) Missing main meal frequently
(97) Spending more time drinking
(98) Use of nonbeverage alcohol
(99) Delirium tremens
(100) Unprotected sexual activity
(101) Becoming pregnant
(102) Continue...while pregnant
(103) Other physical problems
(104) Depression
(105) anxiety
(106) much time recovering from Intoxication
(107) Withdrawal symptoms
(108) Other: _____

G. DESIRE TO USE AGAIN
One choice

1.Very strong
2.Moderately strong
3.Not strong

(109)

H. VARIATION
One choice

1.Decrease
2.Stop
3.Increase
4.No change

(110)

I. VARIATION REASONS
Mult. choice

(111) Phys. effts.
(112) Mental effts.
(113) Guilt
(114) Nervousness
(115) Treatment
(116) Money prob.
(117) Arrest
(118) Religion
(119) Fam pressure
(120) Marriage
(121) Having children
(122) Divorce
(123) Pregnancy
(124) Getting older
(125) Conseq.awareness
(126) Lifestyle change
(127) Taste
(128) Peer Pressure
(129) Depression
(130) Intoxication
(131) Hallucinations
(132) Tolerance
(133) has more money
(134) substance availability
(135) substitution for other substance
(136) to make sexual activity easier

(138) death
(139) boredom
(140) partner
(141) school/work pressure
(142) change of residence
(143) none
(144) Other _____

APPENDIX F

LIFETIME HISTORY OF DRUG USE QUESTIONNAIRE

MODUL : Female Adolescent Study

TEST : Lifetime History of Drug Use

SUBJECT INITIALS

SUBJECT NUMBER

DATE

ASSESSMENT NO.

RATER INITIALS

LIFETIME HISTORY OF DRUG USE   Y (1)   N (2)   ___(1)

A. AGE

B. QUANT. PER OCCASSION — One choice

C. FREQUENCY — One choice
1 Every day
2 Every 2nd day
3 Once a week
4 Weekends
5 1 every 2 weeks
6 Every month
7 Every 3 months
8 Every 6 months
9 Every 9 months
10 Once a year
11 Once
___

UNITS — One choice
1 Hits
2 Joints
3 Bowls
4 Doses
5 Lines
6 Grams
7 Milligrams
8 Ounces
9 Inhalations
10 Cigarette
11 Bags
12 Teaspoons
13 Tablets
14 Pieces
15 Blunts
16 Other: ___
___(15) ___(16)

D. ROUTE — Mult.choice
(21) Swallowing
(22) Injection
(23) Snorting
(24) Inhalation
(25) Smoking
(26) Other: ___

E. STYLE — One choice
1 Frequent
2 Occassional
3 Weekend
4 Binge
___(31)

F. TIME — Mult.choice
(32) Morning
(33) Afternoon
(34) Night

G. PLACE — Mult.choice
(35) Home
(36) Soc. events
(37) Other's home
(38) Park
(39) Cemetery
(40) Playgrd.
(41) Street
(42) Car
(43) School
(44) Work
(45) Restaut.
(46) Bar
(47) Club
(48) Other

II. SOCIAL CONTEXT — mult. choice
(50) Friends
(51) Relatives
(52) Partner
(53) Strangers
(54) Alone
(55) Other: ___

1. Code of preferred drug ___(11) ___(12) ___(13) ___(14)
according to list: ___(2) ___(3)

2. Phase No. ..... ___(4)

3. From: (yy/mm) ___(5) / ___(6)

4. To: (yy/mm) ___(7) / ___(8)

___(17) ___(18)

I. DRUG USE CONSEQUENCES choice		J. DESIRE TO USE AGAIN	TAKE VARIATION One choice	L. VARIATION REASONS Mult. choice	
(56) Family objects	(83) Passing out in public	1. Very strong	1. Decrease	(105) Phys. effts.	(132) Death
(57) Friends object	(84) Given up interests	2. Moderately strong	2. Stop	(106) Mental effts.	(133) Boredom
(58) Job/school absenteeism	(85) Restless without drug	3. Not strong	3. Increase	(107) Guilt	(134) Partner
(59) Job/school relational prob.	(86) Overdose		4. No change	(108) Nervousness	(135) School/Work pressure
(60) Job/school poor performance	(87) Thinking about drug only	(103)		(109) Treatment	(136) Change of residence
(61) Job/school expulsion	(88) Organizing day to ensure		(104)	(110) Money prob.	(137) None
(62) Job/school drop out	supply			(111) Arrest	(138) Other :
(63) Drug related arrest	(89) Needing more than companions			(112) Religion	
(64) Other illegal activities	(90) Need for daily use			(113) Fam. pressure	
(65) Motor vehicle accident	(91) Intoxication throughout the day			(114) Marriage	
(66) Accidental injuries	(92) Giving up resposiblities			(115) Having children	
(67) Suicide attempt	(93) Missing main meal frequently			(116) Divorce	
(68) Financial difficulties	(94) Spending more time using drug			(117) Pregnancy	
(69) Physical victimization	(95) Substitution of other drug			(118) Getting older	
(70) Sexual victimization	(96) Unprotected sexual activity			(119) Conseq.awareness	
(71) Arguments	(97) Becoming pregnant			(120) Lifestyle change	
(72) Physical fights	(98) Continue--while pregnant			(121) Taste	
(73) Physical abuse	(99) Physical problems			(122) Peer Pressure	
(74) Use despite medical warning	(100) Much time recovering from			(123) Depression	
(75) Decreased sexual drive	Intoxication			(124) Intoxication	
(76) Memory/concentration prob.	(101) Withdrawal symptoms			(125) Gaining weight	
(77) Blackouts	(102) Other:			(126) Hallucinations	
(78) Hallucinations/delusions				(127) Tolerance	
(79) Depressed, crazy or paranoid				(128) Has more money	
(80) Marked tolerance				(129) Substance availability	
(81) Unable to keep the limit				(130) Substitution for other substance	
(82) Difficult cutting down				(131) To make sexual activity easier	

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