Three Potential Mediators of the Effects of Child Abuse and Neglect on Smoking in Middle Adulthood

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THREE POTENTIAL MEDIATORS OF THE EFFECTS OF CHILD ABUSE AND NEGLECT ON SMOKING IN MIDDLE ADULTHOOD

by

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Abstract

THREE POTENTIAL MEDIATORS OF THE EFFECTS OF CHILD ABUSE AND NEGLECT ON SMOKING IN MIDDLE ADULTHOOD

by

MIRIAM GHIRMAY

Advisor: Professor Cathy S. Widom, PhD

The purpose of the current study was fourfold: (1) to determine whether individuals with histories of child abuse and neglect have higher rates of current cigarette smoking in middle adulthood compared with matched controls; (2) to examine whether individuals with histories of abuse and/or neglect are at increased risk for higher rates of current psychopathology (anxiety or depression), negative coping, and past year traumas and victimization experiences in adulthood compared with matched controls; (3) to determine whether current psychopathology, negative coping, and past year traumas and victimization experiences mediate the relationship between child maltreatment and current smoking; and (4) to examine whether there are sex differences in the relationship between child maltreatment and current cigarette smoking. Using a prospective cohort design, children (ages 0-11) with documented cases of abuse and neglect during the years 1967 to 1971 were matched with children without such histories on the basis of age, sex, race/ethnicity and approximate family social class and followed up into adulthood. Individuals with histories of child abuse and neglect and non-maltreated matched controls were followed up and interviewed using a series of structured and semi-structured interviews and rating scales that included assessments of smoking behavior, current psychopathology, negative coping, and past year traumas and victimization experiences. There were multiple phases in the study. This study used data from the second set of interviews conducted between 2000-2002 and the third wave of
interviews that were conducted in 2003 to 2005. Current psychopathology, negative coping, and past year traumas and victimization experiences were assessed during the second wave of interviews (M=39.5-years old). Cigarette smoking was assessed during the third wave of interviews (M=41.2-years old). Child abuse and/or neglect was associated with increased risk for current cigarette smoking in middle adulthood and was found to predict current psychopathology, negative coping, and past year traumas and victimization experiences. Only current psychopathology mediated the relationship between child abuse and/or neglect and current smoking. Separate analyses for males and females revealed significant sex differences. Child abuse and/or neglect predicted an increased risk for current cigarette smoking for females only. Child abuse and/or neglect predicted current psychopathology and past year traumas and victimization experiences for males and females, but predicted negative coping for males only. These results suggest the importance of considering the roles of current psychopathology and coping styles in cigarette smoking prevention and intervention among the maltreated population.
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Chapter I: Introduction

According to the United States Department of Health and Human Services (2015), state and local child protective services investigated 3.5 million reports of children who were suspected of being abused or neglected in 2013. After investigation, 678,932 of these children were found to be victims. Out of these children, 79.5 percent were victims of neglect, 9.0 percent were victims of sexual abuse, and 18.0 percent were victims of physical abuse. The percentages add up to more than 100 percent, because a child could have suffered from more than one type of maltreatment. According to World Health Organization estimates, every year 155,000 deaths in children younger than 15-years old occur worldwide as a consequence of abuse or neglect (Gilbert et al., 2009; Pinheiro, 2006). In the United States, an estimated 1,484 children died as a result of child victimization in 2013 (DHHS, 2015). Evidence exists that suggests that child maltreatment increases risk for cigarette smoking (Anda et al., 1999; Hibbard, Brack, Rauch, & Orr, 1988; Jun et al., 2008; Moran, Vuchinich, & Hall, 2004; Tomori, Zalar, Plesnicar, Zihrl & Stergar, 2001).

Cigarette smoking is the leading cause of preventable death in the U.S. Annually, approximately 480,000 individuals die from smoking-related illness (DHHS, 2014). Each year, smoking is responsible for more deaths than all deaths from HIV, illegal drug use, alcohol use, motor vehicle accidents, suicides, and murders combined (Lai, Lai, Page, & McCoy, 2000). The leading causes of death from cigarette smoking are cardiovascular disease, chronic obstructive pulmonary disease, and lung cancer (Ezzati, & Lopez, 2003). Among individuals age 18-years old and older, 17.8 percent currently smoke cigarettes and 22.9 percent of high school students report current use of tobacco products (CDC, 2014; DHHS, 2014). These national statistics highlight the importance of understanding the factors that contribute to smoking behavior.
Chapter II: Theories and Research on Smoking Behavior

Smoking behavior is a complex phenomenon involving many different factors and several types of theories have been offered to explain substance use, including smoking behavior. These theories include self-medication, social learning, physical addiction, and genetic contributions. The current paper will only review the self-medication hypothesis, as examining all of the above theories is beyond the scope of this dissertation.

Self-Medication Hypothesis

According Khantzian’s (1985) self-medication hypothesis (SMH), substance use serves to aid individuals to cope with distressful emotions they are unable to tolerate (Carrigan, & Randall; Henwood, & Padgett, 2007; Hall & Queener, 2007; Khantzian, 1985; 1997; 1999; 2002). It is assumed that substance users cannot manage their emotions and experience them as overwhelming or do not experience their emotions at all and that the psychological and physiological effects of substances help them gain control over their emotions and experience emotional stability (Gottdiener, Murawski, & Kucharski, 2008; Hall & Queener, 2007; Khantzian, 1997; 2003; Suh, Ruffins, Robins, Albanese, & Khantzian, 2008). Furthermore, according to this theory, it is believed that an individual’s drug of choice is not random, but rather that an individual chooses a drug based on the drug’s pharmacological effects being able to alleviate specific distressful symptoms or states (Khantzian, 1997; Griffin, Mirin, & Weiss, 1992). According to the self-medication hypothesis, substance use disorders are developed when an individual discovers that the effects of a substance reduce unpleasure and possibly increases pleasure (Goeders, 2004; Gottdiener et al., 2008; Griffin et al., 1992; Schleicher, Harris, Catley, & Nazir, 2009). However, since the effects of the substance are only temporary, an individual will continually use the substance to achieve the desired effect the drug provides for them.
Coping. The self-medication hypothesis also posits that individuals turn to substances in order to cope with stressful affective states (Carrigan & Randall, 2003; Hall & Queener, 2007; Henwood, & Padgett, 2007; Khantzian, 1985; 1997; 1999; 2002). Coping refers to an individual’s attempts to change or manage the demands of a stressor. Coping responses are generally aimed at dealing with the stressor (i.e. problem-focused) or regulating the emotion (i.e. emotion-focused) evoked by the stressor (Hager & Runtz, 2012; Lazarus & Folkman, 1984). Problem-focused coping involves behavioral efforts to alter the situation as well as cognitive efforts to analyze and solve the stressor one is faced with (Carver, Scheier, & Weintraub, 1989; Endler & Parker, 1994; Matheson & Anisman, 2003; Ysseldyk, Matheson, & Anisman, 2009). Emotion-focused coping entails attempts to regulate or control emotional reactions to a stressor and can involve engaging with the emotions (e.g. expression, seeking support) or avoidance of the evoked emotions (e.g. disengagement, denial) (Hager & Runtz, 2012; Ysseldyk et al., 2009). When faced with a stressor, individuals generally appraise the meaning or importance of the situation and whether the situation constitutes a threat, in which case the individual will appraise whether they have the resources to cope with the stressor (Carver & Scheier, 1994; Chang, 1998; Lazarus & Folkman, 1984; Peacock & Wong, 1996; Ysseldyk et al., 2009). It has been proposed that problem-focused coping tends to be used in situations that are appraised as controllable and has been found to be related to positive psychological well-being. Emotion-focused coping is more likely to be employed in situations that are appraised as uncontrollable and threatening and related to poorer psychological outcomes (Carver et al., 1989; Lazarus, 1999; Matheson & Anisman, 2003; Ysseldyk et al., 2009). However, context plays an important role in coping and the effectiveness of a given coping response might depend on its appropriateness for the given
event (Hager & Runtz, 2012; Lazarus & Folkman, 1984; Ysseldyk et al., 2009).

**Self-control.** As an alternative to the self-medication hypothesis that individuals use substances (including smoking) in order to cope with stressful affect, substance use has been related to failures of self-control (Baumeister, Heatherton, & Tice, 1994). Self-control is defined as attempts to inhibit desires or delay gratification in order to avoid engaging in typical or desired behavior (Barkley, 1997; Baumeister et al., 1994; Hayes, 1989; Muraven & Baumeister, 2000). Individuals are thought to exert self-control by drawing on a personal resource. Even though the exact nature of this resource is not known, it is hypothesized that the resource is limited and partially consumed when exercising self-control (Muraven & Baumeister, 2000). Due to its proposed limited nature, it is believed that following acts of self-control, the amount of the resource available for subsequent acts requiring self-control will be diminished. The loss in strength is not thought to be a permanent one and it is assumed that resources can be restored. However, self-control efforts presumably reduce resources faster than they can be replenished and, therefore, in cases were unfavorable circumstances prevent an individual from resting and replenishing strength, a chronic deficit in resources leading to an impairment in self-control might occur (Muraven & Baumeister, 2000).

Being exposed to and coping with stress can also lead to poorer subsequent self-control even after the stressful situation has ended, since coping with stressors can involve trying to change or inhibit negative emotions that are evoked, reducing the amount of resource available for ensuing acts that require self-control (Glass, Singer, & Friedman, 1969; Hancock & Warm, 1989; Muraven & Baumeister, 2000). Regulating affect involves overriding the current mood, which necessitates inhibition and also requires self-control (Muraven & Baumeister, 2000). Support for the negative effect of affect regulation on subsequent self-control was demonstrated
in a study that showed participants a sad video clip and then instructed participants to either control or suppress, amplify, or not alter their emotional response (Muraven, Tice, & Baumeister, 1998). Subsequent self-control was measured by persistence on a handgrip task that required stamina and resistance to painful hand muscle fatigue and the results showed decreased handgrip in both groups who had been told to alter their emotional state. Physical endurance on the handgrip task was not decreased in the control group who had been exposed to the same sad film clip, suggesting that affect regulation decreases subsequent self-control (Muraven et al., 1998).

Negative affect has been found to be associated with relapses among individuals attempting to quit drinking or stop the use of heroin (Hodgins, El Guebaly, & Armstrong, 1995; Muraven & Baumeister, 2000; Pickens, Hatsukami, Spicer, & Svikis, 1985). Similarly, among individuals trying to quit cigarette smoking, negative affect has been found to be associated with relapse (Ashton, 1982; Brownell, Marlatt, Lichtenstein, & Wilson, 1986; Marlatt & Gordon, 1985; Muraven & Baumeister, 2000; Shiftman, 1982). Even though some evidence supports the theory that self-control strength is diminished after affect regulation, the evidence does not rule out the possibility that individuals use substances to cope with distressful affects. It is possible that substance use might serve as a tool to cope with negative affects, as well as being influenced by diminished self-control due to the demands on self-control resources posed by coping with negative affects. Further research is needed to understand whether these processes occur exclusively or can co-occur and how they influence each other and the individual.

**Psychiatric disorder and nicotine use.** Similar to other addictive drugs, nicotine is believed to relieve smokers of emotional distress associated with different psychiatric conditions (Gehricke et al., 2007; Khantzian, 1985; Khantzian & Albanese, 2008; McGovern, Rodriguez, & Kassel, 2009). High rates of substance use have consistently been found among individuals with
psychiatric disorders and this comorbidity has been found to be significant (Grant, Hasin, Chou, Stinson, & Dawson, 2004; Mueser et al., 1990). Research has suggested that the relationship between smoking and various psychiatric disorders is bi-directional; with smoking predicting the subsequent onset of many psychiatric disorders, as well as various mental disorders predicting the subsequent onset of cigarette smoking (Breslau, Novak, & Kessler, 2004 a, b; Cuijpers, Smith, Have, & de Graaf, 2007; Griesler, Hu, Schaffran, & Kandel, 2008; Ismail, Sloggett, & De Stavola, 2000; John, Meyer, Rumpf, & Hapke, 2004; Kessler et al., 2007). However, the presence of mental disorders as a predictor for subsequent substance use, such as cigarette smoking has been more strongly supported, suggesting that among individuals with a mental disorder, self-medication mechanisms might contribute to the development of substance use (Glantz et al., 2009; Griesler et al., 2008; Kessler et al., 2007).

**Major Depression.** Since the self-medication hypothesis posits that individuals use the effects of substances to manage distressful emotions, high rates of smoking among depressed individuals could lend further support to the theory that nicotine use alleviates negative emotional states, such as those that are experienced during depression. Epidemiological studies have suggested a bi-directional relationship between cigarette smoking and major depression (Dome, Lazary, Kalapos, & Rihmer, 2010). According to the National Comorbidity Survey, 60 percent of those with a lifetime history of depression were past or current cigarette smokers compared to 39 percent of the general population being past or current cigarette smokers (Lasser et al., 2000; Ziedonis et al., 2008). Among nicotine dependent individuals, 16.5 percent were found to suffer from a current episode of major depression, which represents a higher rate of current major depression compared to the general population (Grant et al., 2004; Rihmer & Angst, 2005). Longitudinal and retrospective studies have found smoking at baseline to be
associated with an increased rate of onset of depression during follow-up periods, suggesting that cigarette smoking might be a risk factor for depression (Dome et al., 2010). Another hypothesis is that depressed individuals might self-medicate with nicotine, since several compounds within cigarette smoke inhibit monoamine oxidase (MAO) (Lewis, Miller, & Lea, 2007). Inhibitors of MAO have been found to have an anti-depressive effect, which might make smoking especially appealing to depressed individuals (Benowitz, 2008b; Edmondson, Mattevi, Binda, Li, & Hubalek, 2004; Lewis et al., 2007).

**Bipolar disorder.** Similar to findings among depressed individuals, evidence has been found for a higher smoking rate among bipolar patients compared to the smoking rate of the general population (Diaz et al., 2009; Dome et al., 2010). Using data from the National Comorbidity Survey, a nationally representative sample of U.S. adults, higher rates of current and lifetime smoking among patients with bipolar disorder compared to control group individuals were reported (Lasser et al., 2000). Specifically, it was found that the prevalence of current smoking among patients with bipolar disorder was 68.8 percent compared to 22.5 percent of a control population and the prevalence of lifetime smoking among patients with bipolar disorder was 82.5 percent compared to 39.1 percent of control group individuals (Lasser et al., 2000). According to a study using data from the National Epidemiologic Survey on Alcohol and Related Conditions, the odds of suffering from bipolar disorder among individuals with nicotine dependence are approximately four times higher (Grant et al., 2004).

Some recent literature suggests that smoking behavior might also influence the clinical characteristics of bipolar disorder, including severity of symptoms and treatment response (Dome et al., 2010). For example, patients with a current manic episode who are smokers showed poorer treatment response compared to non-smoking patients (Berk et al., 2008).
Furthermore, in a cross-sectional study it was found that bipolar patients who are smokers have more previous and more serious previous episodes of both mania and depression compared to bipolar patients who are non-smokers (Waxmonsky et al., 2005). It has also been reported that a history of lifetime smoking was associated with a more severe course of illness and an increased rate of comorbid psychiatric problems (Ostacher et al., 2006). Smoking among patients with bipolar disorder has been found to be associated with rapid cycling, psychiatric comorbidity, suicidal behavior, and the use of illicit drugs, alcohol, and caffeine (Waxmonsky et al., 2005). Among a sample of adolescents with bipolar disorder, a positive relationship between smoking status and higher rates of comorbid substance use disorder was found (Goldstein et al., 2008). The association of nicotine with a more severe course of illness among bipolar patients and poorer response to treatment highlights the importance of addressing cigarette smoking among these populations. These findings might lend support to the self-medication hypothesis, as they suggest that individuals who experience more severe bipolar symptoms might be using nicotine to self-medicate the symptoms of their disorder.

**Posttraumatic Stress Disorder (PTSD).** Further supporting the association between nicotine use and psychiatric disorder, a disproportionately high rate of tobacco use among individuals with PTSD has been reported. For example, smoking rates among individuals with PTSD have remained high despite the decline of smoking rates in the general population (Breslau et al., 2004b; Fu et al., 2007; Kalman, Morisette, & George, 2005; Lasser et al., 2000). Individuals with PTSD who are cigarette smokers have been found to be more likely to be heavy smokers than individuals without PTSD (Beckham et al., 1997). In a systematic review of 12 studies reporting smoking prevalence among individuals with PTSD with a range of trauma exposure histories, current smoking prevalence rates were found to range from 34 to 86 percent,
with many studies reporting prevalence rates higher than 50 percent (Fu et al., 2007). Similarly, data from the National Comorbidity Survey revealed current smoking rates among individuals with PTSD to be 45 percent and lifetime smoking rates to be 63 percent (Fu et al., 2007; Lasser et al., 2000), which is much higher than smoking rates among individuals without PTSD.

The above findings demonstrate the strong association that has been found between nicotine use and psychiatric disorders. Even though various studies have demonstrated a strong association between substance use, including nicotine use, and psychiatric disorders, varying interpretations as to whether substance abuse is the cause or consequence of psychopathology have been offered (Balfour & Ridley, 2000; Hall & Queener, 2007; Khantzian, 1997; Smith et al., 2002). Many of the empirical studies that have examined the relationship between substance use and psychopathology have relied upon standardized assessment methods. However, as Khantzian (1999) pointed out, the self-medication theory does not claim that it is psychiatric conditions that lead an individual to self-medicate, but rather a range of distressful states and subjective symptoms that may or may not be correlated with a psychiatric disorder. Standardized assessment methods might be less likely to pick up subjective signs of distress and using measures that can assess subjective distress seem crucial in examining the self-medication hypothesis (Khantzian, 1999). Some studies have attempted to examine a causal link between cigarette smoking and affect.

Cue reactivity research on drug motivation presents individuals with neutral stimuli or stimuli that is associated with drug use and then assesses subsequent drug self-administration, physiological responses, and self-reported desire to use the drug (Brandon, 1994; Payne, Schare, Lewis, & Colletti, 1991). The two classes of stimuli that have been investigated are environmental cues and affective states. Environmental cues are stimuli that are directly
associated with smoking, such as ashtrays or the smell of smoke (Payne et al., 1991). Exposure to internal cues typically entails inducing negative affect in individuals by exposing them to stressful circumstances (Brandon, 1994; Payne et al., 1991). Affective cues usually involve presenting participants with negative visual or auditory stimuli and assessing mood before and after the mood induction. The desire to smoke prior and after mood induction and number of puffs have been assessed as a measure of the effect of induced negative affect on mood (Payne et al., 1991; Carter, & Tiffany, 2001; Conklin & Perkins, 2005). Research that has induced negative affect in participants has found that induced negative mood affects smoking behavior, such as cravings, number of puffs, and time elapsed before lighting up a cigarette (Payne et al., 1991; Carter, & Tiffany, 2001; Conklin & Perkins, 2005). Conklin & Perkins (2005) induced negative affect via visual slides and music and examined self-reported mood and subsequent smoking. Smokers in the negative mood condition where found to have higher ratings of negative mood, a higher number of puffs, and were quicker to light up a cigarette compared to the control group without an affect manipulation (Conklin, & Perkins, 2005). Even though these results suggest that negative mood affected smoking behavior, smoking after the completion of the task was not found to reduce self-reported negative affect (Conklin, & Perkins, 2005).

Even though a strong association between substance use and psychiatric disorders has been found, most of the evidence is based on correlational studies. For example, findings from correlational studies are not adequate to support the self-medication hypothesis that substance use serves to alleviate negative emotions, because correlational evidence cannot establish the temporal sequence, i.e., that substance use occurs as a consequence of experiencing negative emotions in individuals with psychiatric disorders. In regard to smoking, the possibility exists that smoking increases negative affect or that a third variable predisposes individuals to both
negative affect and cigarette smoking (Balfour & Ridley, 2000; Brandon, 1994; Smith et al., 2002). Therefore, longitudinal studies are needed in order to be able to establish a temporal order. Affect induction paradigms seem promising in evaluating self-medication mechanisms in smokers; however, it is possible that affect induced in experimental conditions might be different from affect experienced in the real world and more studies are needed to investigate the relationship between negative affect and smoking.
Chapter III: Theory and Research on the Relationship between Child Maltreatment and Smoking

Increased Risk of Smoking among Victims of Childhood Abuse and Neglect

Several studies have reported a relationship between childhood maltreatment and nicotine use in adolescents and adults (Anda et al., 1999; Hibbard, Brack, Rauch, & Orr, 1988; Jun et al., 2008; Moran, Vuchinich, & Hall, 2004; Tomori, Zalar, Plesnicar, Ziferl & Stergar, 2001). Cross-sectional studies have reported that the odds of smoking were up to 11.4 times higher among adult women who self-reported histories of child maltreatment compared to women without maltreatment histories (Nichols & Harlow, 2004; Pederson et al., 2008). Similar results have also been reported in studies using mixed sex samples. For example, Chartier, Walker & Naimark (2009) examined the relationship between childhood abuse and health risk behaviors among a sample of 8116 males and females (age 15-64-years old) and found that those who reported childhood physical abuse were 1.52 times more likely to smoke than respondents who did not report any abuse histories.

Earlier age of smoking onset. Earlier age of onset of smoking has been associated with an increased risk for disease and mortality (Jun et al., 2008). Some evidence points to an increased risk of smoking initiation at a younger age in individuals who report abuse histories (Anda et al., 1999; Agrawal et al., 2005). Agrawal et al. (2005) suggested that individuals with histories of abuse might be experiencing affective, socialization, and self-esteem problems, which might make these children more vulnerable to peer pressure. In a retrospective study that examined the relationship between adverse childhood experiences and smoking behavior, adults who reported maltreatment histories were also found to report an earlier age of smoking onset (Anda et al., 1999). These results are from the Adverse Childhood Experiences study that used a sample of 4958 women and 4257 men from a health maintenance organization in California.
(mean ages of 55.3-years old and 58.1-years old, respectively), who responded to a survey questionnaire assessing the exposure to adverse childhood experiences and smoking behavior (Anda et al., 1999). Among individuals who reported being sexually abused before age 14-years old, the prevalence of early smoking initiation was 25.1 percent (OR= 3.9) compared to 8.7 percent for those who had not. Another study reported a relationship between the severity, type, and timing of abuse in childhood and adolescence and smoking status among young women. Using a retrospective design, child maltreatment (sexual and physical abuse) was assessed using questionnaires that solicited information during two time periods: childhood (age 0-11-years old) and adolescence (11-17-years old) among a sample of 68,505 women (Jun et al., 2008). Physical abuse and sexual abuse during childhood were found to be associated with an increased risk of smoking prior to age 14-years old (OR=1.9 and OR=1.5, respectively). Among individuals who reported experiencing both physical and sexual abuse in childhood, a two-fold increase in risk (OR=2.0) for early smoking initiation was found (Jun et al., 2008). Although there is a body of evidence suggesting that child abuse is a risk factor for early smoking initiation, the reliance on retrospective self-report measures makes it difficult to establish a temporal order and future studies should examine the relationship between child maltreatment and early smoking initiation using prospective designs.

**Age of child maltreatment and psychiatric functioning.** Researchers have also examined the extent to which the age at which maltreatment occurs influences subsequent psychological functioning (Widom, 2000). There is some evidence for poorer outcomes among those who have been maltreated at an earlier age (English, Graham, Litrownik, Everson, & Bangdiwala, 2005; Kaplow, Dodge, Amaya-Jackson, & Saxe, 2005; Keiley, Howe, Dodge, Bates, & Petit, 2001). It is possible that maltreatment that occurs earlier in life exposes
individuals to poorer psychological functioning in adulthood by disrupting normal development (Cicchetti, 1989; Kaplow & Widom, 2007). In a study that examined the relationship between age of onset of maltreatment and subsequent psychopathology in childhood and/or adolescence, children who were abused at an earlier age (age 0-12-years old), were found to have lower levels of self-esteem than those abused later (Bolger, Patterson, & Kuppersmidt, 1999). Similarly, in a prospective study of physically abused children followed into adolescence, it was demonstrated that the earlier the physical abuse (prior to age 4-years old), the more likely were victims to experience adjustment problems in adolescence (Keiley, Howe, Dodge, Bates, & Pettit, 2001).

However, some evidence shows that individuals who are maltreated during adolescence have poorer outcomes compared to those who are maltreated at younger ages (Thornberry, Ireland, & Smith, 2001). In one study that compared the consequences of maltreatment that occurred only in childhood, only in adolescence, or in both childhood and adolescence, on various adverse outcomes (e.g. delinquency, drug use, depressive symptoms), it was found that individuals that were maltreated in adolescence (age 12-17-years old) had more consistent negative outcomes than those that were maltreated only in childhood (before age 12-years old) (Thornberry, Ireland, & Smith, 2001). Importantly, the authors noted that the results should not be interpreted in a way that negates the presence of negative outcomes in individuals who experience maltreatment in childhood only and proposed that future longitudinal studies are needed that replicate their results to gain a better understanding of the outcomes of maltreatment experienced during different developmental stages (Thornberry et al., 2001). Thornberry et al. (2001) proposed several possible reasons for the absence of long-term outcomes in individuals who experienced maltreatment in childhood only, including possible successful interventions in cases where maltreatment were substantiated and might have received services, possible
resilience of families, and the cessation of the maltreatment. It is also possible that adolescents might be particularly stressed by unavoidable adverse conditions and more likely than children to engage in antisocial behavior (Garbarino, 2001). One possible explanation is that younger children might experience less force or coercion compared to older children or adolescents and these differences in abuse experiences might affect outcomes as opposed to the timing of maltreatment (Gomes-Schwartz, Horowitz, & Sauzler, 1985; Kaplow & Widom, 2007).

Importantly, some evidence suggests that the age of maltreatment might have a different effect depending on the outcome that is assessed. This was demonstrated in a prospective cohort design study that examined the relationship between age of onset of maltreatment and long-term mental health outcomes in adulthood, utilizing data from participants who had documented and substantiated cases of child physical abuse, sexual abuse, and neglect (Kaplow & Widom, 2007; Widom, 1989a). Age of onset was measured continuously (age 0-11-years old), dichotomously (early [age 0-5-years old] vs. late [age 6-11-years old]), and developmentally (infancy [age 0-2-years old], pre-school [age 3-5-years old], early school age [age 6-8-years old], and school age [age 9-11-years old]) (Kaplow & Widom, 2007). The findings showed that earlier onset of maltreatment (assessed dichotomously and developmentally) predicted more symptoms of anxiety and depression in adulthood. Interestingly, later onset of maltreatment (assessed continuously and developmentally) predicted more behavioral problems in adulthood (Kaplow & Widom, 2007).

In regard to smoking, some evidence exists that shows smoking during adolescence (age 15-19-years old) to be more strongly associated with abuse experienced during adolescence than during childhood, suggesting that child abuse during adolescence might be a more important risk factor for smoking during adolescence than abuse experienced in childhood (Jun et al., 2008). As
reviewed, some research shows that maltreatment can have different effects on subsequent psychological functioning depending on the age when maltreatment occurs. Despite the heavy reliance on self-report of child abuse and cross-sectional designs that do not examine outcomes beyond adolescence, age at which maltreatment occurs seems to be an important factor to consider.
Chapter IV: Correlates of Smoking

Increased Risk of Mental Health Problems Among Victims of Childhood Maltreatment

Proposed theories on the relationship between child maltreatment and smoking have generally used the self-medication framework to understand the relationship. That is, it is widely believed that nicotine is used to regulate mood, affect, and stress experienced after being exposed to traumatic events (Lewis et al., 2011). The possibility that victims of child maltreatment use nicotine in order to self-medicate seems plausible, since an association between exposure to childhood victimization and adverse mental health outcomes, such as depressive disorders, anxiety disorders, and post-traumatic stress disorder has been reported (Burnam et al. 1988; Fergusson Boden, & Horwood, 2008; Finkelhor, 1990; Holmes & Slap, 1998; Kaplan, Pelcovitz, & Labruna, 1999; Putnam, 2003; Rummell & Hansen, 1993; Stevenson, 1999; Tackett, Williams, & Finkelhor, 1993; Turner, Finkelhor, & Ormrod, 2006; Widom, 1999; Widom, DuMont, & Czaja, 2007). Although as has been noted previously, many studies have relied on self-report to assess victimization histories, which can introduce reporting bias and have used a cross-sectional design, which makes it difficult to establish a temporal order (Widom, Raphael, & DuMont, 2004; Widom, Weiler, & Cottler, 1999).

Nonetheless, results of longitudinal studies have provided support for the association between child maltreatment and mental health problems. A 25-year longitudinal study of a birth cohort of 1,265 children born in New Zealand that examined the effects of childhood sexual and childhood physical abuse on long-term mental health outcomes found that exposure to childhood sexual abuse was associated with increased risk for subsequent mental health disorders including depression, anxiety disorders, conduct/anti-social personality disorder, substance dependence, suicidal ideation, and suicide attempts at ages 16-25-years old (Fergusson et al., 2008).
Individuals exposed to childhood sexual abuse involving attempted/completed sexual penetration had overall rates of mental illness that were 2.4 times higher compared to individuals who were not exposed to childhood sexual abuse (Fergusson et al., 2008). A longitudinal community study of 375 young adults found that males who were physically abused were at increased risk for reporting suicidal ideation at age 15-years old and an increased risk for depression, PTSD, antisocial behavior, substance abuse at age 21-years old, compared to adolescents without maltreatment histories (Fergusson et al., 2008; Silverman, Reinherz, & Giaconia, 1996). Additionally, females with physical abuse histories were found to be at higher risk for depression, anxiety, anti-social behavior, somatic complaints, and suicidal ideation at age 15-years old, and higher risk for depression, PTSD, anti-social behavior, and substance abuse at age 21-years old (Fergusson et al., 2008; Silverman, Reinherz, & Giaconia, 1996). An increased risk for mental health problems was also reported in a study using a prospective design to examine the relationship between child abuse and neglect and posttraumatic stress disorder in young adulthood, with abused and neglected individuals reported to be at an increased risk to develop posttraumatic stress disorder compared to control individuals (Widom, 1999).

Research has found a strong association between child maltreatment and mental health outcomes; however, some studies have found that after controlling for confounding variables, the association becomes non-significant (Fergusson, & Lynsky, 1997; Horwitz, Widom, McLaughlin, & White, 2001). For example, a prospective cohort study that examined a group of abused and neglected children and a matched control group, found an association between child maltreatment and dysthymia and antisocial personality disorder among abused and neglected males and women compared to control individuals. Only the abused and neglected women were also found to be at higher risk for alcohol problems. However, child maltreatment had no
significant effect on mental health outcomes after controlling for stressful life events (Horwitz et al., 2001). Similarly, in a birth cohort study of children born in New Zealand that examined the relationship between childhood physical abuse and subsequent mental health outcomes, there was an increased risk of adverse mental health outcomes among individuals who were exposed to childhood physical abuse compared to individuals without maltreatment histories; however, after controlling for confounding variables, the associations became statistically non-significant (Fergusson & Lynskey, 1997). It is important to note that data on childhood physical abuse in the Fergusson & Lynskey (1997) study was based on participants’ retrospective reports at age 18-years old, which could have introduced reporting bias.

**Race and Ethnicity**

Differences in smoking initiation and smoking behavior by people of different races or ethnic backgrounds have been documented and suggest that there may be cultural factors that influence smoking behavior (Benowitz, 2008b; Kandel, Kiros, Schaffran, & Hu, 2004; Kiefe et al., 2001). Caucasian adolescents have been found to be more likely to smoke cigarettes than Black and Hispanic youths, according to evidence from analyses using data from the Longitudinal Study of Adolescent Health, a longitudinal, nationally representative study of adolescents in grades 7-12 (Bearman, Jones, & Udry, 1997; Blum et al., 2000). A difference in attitudes towards smoking behavior and smoking cessation has also been reported for different ethnic groups. Latinos have been found to be more likely to consider it important to quit smoking due to family criticism and setting a good example for children compared to non-Latino White smokers (Stable, Marin, & Posner, 1998). Hispanics have also been found more likely to cite living longer as a reason not to smoke compared to non-Hispanic Whites (Palinikas et al., 1993).
In addition to race or ethnic differences in smoking prevalence, racial differences in vulnerability to tobacco addiction and related disease have been documented (Benowitz, 2008b). Even though African Americans smoke fewer cigarettes than Caucasians, they have been found to take in 30 percent more nicotine for each cigarette smoked, based on comparisons of metabolism rates based on urine levels of serum cotinine, which is a metabolite of nicotine (Stable, Herrera, Jacob, & Benowitz, 1998). In addition, African Americans have been found to have higher rates of and mortality from lung cancer compared to Caucasians and Hispanics (Haiman et al., 2006). A factor thought to contribute to racial and ethnic differences in smoking behavior and diseases are menthol cigarettes. Evidence exists that shows that smoking menthol cigarettes makes it more difficult to quit smoking (Benowitz, 2008b). Among African-American smokers, approximately 75 percent smoke mentholated cigarettes compared to only 20-30 percent of Caucasian smokers (Benowitz, 2008b; Pletcher et al., 2006). In sum, it appears that the risk of smoking is influenced by race and ethnicity through different attitudes toward smoking and vulnerability to addiction.

**Gender**

Sex differences in smoking prevalence have consistently been reported, with recent statistics showing that 20.5 percent of males are current smokers compared to 15.3 percent of females (DHHS, 2014). Human and animal studies suggest that gender differences may play a role in the biological effects of nicotine (Dome et al, 2010; Pauly, 2008; Pogun & Yararbas, 2009; Schnoll & Patterson, 2009). Gender differences in nicotine metabolism rates have been reported, with women being found to metabolize nicotine faster (Benowitz, Schlaggar, Swan, & Jacob, 2006). A study that examined gender differences in nicotine metabolism used 139 male and female twins and 16 siblings of twins who were infused with nicotine and cotinine, which is an
enzyme of nicotine. Comparison of metabolic rates of nicotine and cotine in blood and urine revealed nicotine metabolism to be faster in women than males. Among women, nicotine metabolism was found to be faster in women taking oral contraceptives compared to women not taking oral contraceptives, leading the authors to suggest that female sex hormones might accelerate nicotine metabolism (Benowitz et al., 2006). Importantly, perhaps because of the sex differences in the effect of nicotine, nicotine replacement therapy (NRT) has been found to be less effective in females than males in long-term smoking cessation (Dome et al., 2010; Pauly, 2008).

Gender differences have also been found regarding motivations for smoking (Dome et al., 2010; Rose, Chassin, Presson, & Sherman, 1996). Studies that examine reasons for smoking using subjective reports, have found gender differences, with results showing that women are more likely to report smoking for the anxiety-reducing effects of nicotine than males (Dome et al, 2010; Pauly, 2008; Pogun & Yararbas, 2009). In a study that examined factors influencing adult smoking status using self-report measures to assess personal psychological beliefs about smoking, females were found to be more likely than males to smoke for perceived psychological benefits such as anxiety reduction and improvement of concentration (Rose et al., 1996). Overall, gender differences in smoking motivation and nicotine metabolism have been found, which might influence smoking behavior. At a minimum, these findings suggest that gender is an important factor to consider in regard to smoking risk as gender differences in nicotine metabolism and motivations for smoking have been found.

Social Class

Globally, socioeconomically disadvantaged individuals aged 35-69-years old are much more likely to die from smoking compared to individuals from higher socioeconomic groups.
Low socioeconomic status (SES) communities are thought to have more access to cigarettes due to a higher number of cigarette retail outlets in addition to higher levels of tobacco advertising (Himmelberger, Ross; Burdick, & Simpson, 2010; Novak, Reardon, Raudenbush, & Buka, 2006). Differences in smoking rates among different SES groups also seem to be affected by quit rates, since low SES smokers have been found less likely to quit smoking, but just as likely to attempt to quit smoking (Hiscock et al., 2012). Lower quit rates among low SES smokers are thought to be influenced by a lack of social support of quit attempts and due to higher rates of smokers in their social network.

Interestingly, some evidence suggests that low socioeconomic status teenagers are less likely than teenagers with greater financial resources to have ever tried cigarettes. For example, Hanson & Chen (2007) examined the relationship between socioeconomic status and substance abuse in teenagers and found the high socioeconomic status teenagers to be more likely to have tried cigarette smoking. This could indicate that the lack of resources available to low socioeconomic status teenagers, prevents them from engaging in smoking behavior at a young age. However, it is possible that there is a turnover leading to an increased risk of smoking in adulthood among low SES individuals (Laaksonen et al., 2004). Laaksonen et al. (2004) examined several socioeconomic indicators at the same time to determine how different dimensions of socioeconomic position may relate to smoking and found that with increasing age, there is a cross-over, where the socioeconomically challenged are more likely to be cigarette smokers. They attributed this crossover to multiple factors, such as a lack of knowledge, scarce resources, and psychological stress stemming from conditions caused by the socioeconomic disadvantage (Laaksonen et al., 2004). Thus, the relationship between SES and smoking is an important factor to consider in the relationship between child maltreatment and smoking, since
child maltreatment has been associated with negative long-term economic consequences (Currie & Widom, 2010).
CHAPTER V: The Current Research

The notion that individuals with maltreatment histories smoke to self-medicate is appealing, since maltreatment in childhood has been associated with adverse mental health outcomes (Burnam et al. 1988, Turner, Finkelhor, & Ormrod, 2006; Widom, 1999). The vast majority of research on the relationship between child maltreatment and smoking examines psychopathology as outcomes and then concludes that individuals are believed to be unable to cope with their symptoms and use cigarettes as a coping strategy (Lewis et al., 2007). Research examining the role of coping skills in smoking behavior has found poor coping skills to mediate the relationship between anxiety, stress and smoking (Bindu, Sharma, Suman, & Marimuthu, 2011; Johnson, Stewart, Zvolensky, & Steeves, 2009; Siqueira, Diab, Bodian, & Rolnitzky, 2000). However, it is possible that individuals with maltreatment histories rely on poor coping skills not only in relation to symptoms of psychopathology, but also in relation to the experience of stressful life events. Individuals with maltreatment histories have been found to be at an increased risk for experiencing stressful life events (Dienes, Hammen, Henry, Cohen, & Daley, 2005; Hammen, 2006; Harkness, Bruce, & Lumley, 2006; Horwitz et al., 2001). If these individuals have poorer coping skills, experiencing stressful life events in the absence of adequate coping skills will be challenging. Additionally, childhood maltreatment might influence personality development and behavioral and attachment styles that could increase the risk of experiencing stressful life events (Korkeila et al., 2010). Importantly, child maltreatment often does not only involve an isolated event, but may be part of a chronically stressful environment including external factors such as economic disadvantage, parental mental illness, parental imprisonment, and homelessness, which could further increase the number of stressful life events and the burden these events pose (Laaksonen et al., 2004; Turner et al., 2006;
Korkeila et al., 2010).

Despite the fact that some research suggests that maltreated individuals are at increased risk for psychopathology, poor coping skills, and stressful life events (Burnam et al., 1988; Korkeila et al., 2010; Leitenberg, Gibson, & Novy, 2004; Turner et al., 2006; Widom, 1999), there is a lack of research that examines whether these factors mediate the relationship between child maltreatment and cigarette smoking. In order to develop prevention and intervention strategies, it is important to understand factors that contribute to an increased smoking risk and the maintenance of smoking behavior among this population.

Current Research

The current research has several methodological advantages. Using data from a prospective cohort design makes it possible to establish a temporal sequence, since child maltreatment occurred at an early age (0-11-years old) and therefore occurred before smoking onset. Most of the research examining the relationship between child maltreatment and smoking has relied on self-report measures, which can introduce reporting bias, which is limited in the proposed study by the use of court-substantiated cases of child maltreatment. Cigarette smoking was assessed in middle adulthood at a mean age of 41.2 years, which allows the observation of long-term outcomes of child maltreatment because of the time elapsed since the child abuse/neglect occurred. Finally, this research will examine current psychopathology, negative coping skills, and past year traumas and victimization experiences in order to gain a better understanding of the relationship between child maltreatment and smoking and the factors that maintain smoking behavior among this population.

Hypotheses

There are four major hypotheses:
(1) Individuals with documented histories of child abuse and/or neglect will have higher rates of current smoking in middle adulthood compared with matched controls.

(2) Individuals with documented histories of child abuse and/or neglect will be at increased risk for higher rates of current psychopathology (anxiety or depression), negative coping, and past year traumas and victimization experiences, compared with matched controls.

(3) Current psychopathology, negative coping, and past year traumas and victimization experiences will mediate the relationship between child abuse and/or neglect and smoking. That is, these outcomes associated with child abuse and neglect will, at least partially, explain the relationship between child abuse and/or neglect and cigarette smoking.

(4) Given no firm basis to make predictions, the relationships examined in hypotheses 1-3 will be examined in males and females separately.
CHAPTER VI: METHODS

Research Design

The study uses data from a prospective cohort design study of the long-term consequences of child abuse and neglect. Information about the design of the study is based on the work of Cathy Spatz Widom, Ph.D. and colleagues and adapted here with Dr. Widom’s permission. Details of the design of this study and sample selection are available in Widom (1989a). The original sample consisted of a large group of individuals who had substantiated cases of child physical abuse, sexual abuse, and neglect. Some individuals experienced multiple forms of abuse. There were multiple phases in the study. This study will use data from the second set of interviews that were conducted between 2000-2002 and the third wave of interviews that were conducted in 2003 to 2005.

Participants

The data used here are from a large research project based on a prospective cohort design study in which abused and/or neglected children were matched with non-victimized children and followed prospectively into adulthood. Because of the matching procedure, the subjects are assumed to differ only in the risk factor: that is, having experienced childhood abuse or neglect. Since it is not possible to randomly assign subjects to groups, the assumption of equivalency for the groups is an approximation. Cases were drawn from the records of county juvenile and adult criminal courts in a metropolitan area in the Midwest during the years 1967 through 1971. The rationale for identifying the abused and neglected group was that their cases were serious enough to come to the attention of the authorities. Only court-substantiated cases of child abuse and neglect were included. Abuse and neglect cases were restricted to those in which the children were younger than 11 years of age at the time of the abuse or neglect incident. Excluded from the sample were court cases that represented: (1) adoption of the child as an infant; (2)
involuntary neglect only -- usually resulting from the temporary institutionalization of the legal guardian; (3) placement only; or (4) failure to pay child support.

A critical element of the design involved the selection of a comparison group, matched with the maltreated sample on the basis of age, sex, race/ethnicity, and approximate family social class during the time period under study. Matching for approximate family social class was important in this study because it is theoretically plausible that any relationship between child abuse and neglect and subsequent outcomes may be confounded with or explained by social class differences (MacMillan, et al., 2001; Widom, 1989a). It is difficult to match exactly for social class because higher income families could live in lower social class neighborhoods and vice versa. The matching procedure used here is based on a broad definition of social class that includes neighborhoods in which children were reared and schools they attended. Similar procedures, with neighborhood school matches, have been used in studies of individuals diagnosed with schizophrenia to match approximately for social class (Watt, 1972). The control group establishes the base rates of pathology to be expected in a sample of adults from comparable circumstances who did not come to court attention in childhood as victims of abuse or neglect. Where possible, two matches were found to allow for loss of comparison group members. Thus, individuals who were initially selected for the comparison group who were reported in the official abuse and neglect files were eliminated and replaced, where possible, with a second matched comparison subject. Any comparison group child with an official record of abuse or neglect was eliminated, regardless of whether the record was before or after the period of the study. This occurred in 11 cases.

Children who were under school age at the time of the abuse and/or neglect were matched with children of the same sex, race, date of birth (+/- 1 week), and hospital of birth
through the use of county birth record information. For children of school age, records of more than 100 elementary schools for the same time period were used to find matches with children of the same sex, race, date of birth (±6 months), class in elementary school during the years 1967 through 1971, and approximate home address. Overall, there were matches for 74% of the abused and neglected children. Non-matches occurred for a number of reasons: (1) information about the date of birth was missing for the abused or neglected child; (2) the abused or neglected child was born outside the county and/or state; (3) the elementary school that the abused/neglected attended had closed during the years since 1971 and class registers were not available; and (4) the school was not integrated at the time and a same race match could not be found.

The original sample of 1,575 was composed of 908 abused and neglected individuals and 667 controls. Of the original sample of 1,575, a total of 1,307 participants (83%) were located and 1,196 interviewed (76%) between 1989 and 1995. Of the people not interviewed, 43 were deceased (prior to interview), 8 were incapable of being interviewed, 268 were not found, and 60 refused to participate (a refusal rate of 3.8%). There were no significant differences between the interviewed follow-up sample (N = 1,196) and the original sample (N = 1,575) in terms of demographic characteristics (male, white, poverty in childhood census tract, or current age) or group status (abuse/neglect versus comparison group). Of those individuals who participated in the first interview, 896 completed the second interview (2000–2002) and 807 completed the third interview (2003–2005). At interview 1, the mean age of participants was 29.2 years (SD = 3.8), 51.3 % were male, 34.9 % were Black (non-Hispanic) and 56.5 % of participants were in the abuse and/or neglect group. As seen in Table 1, there were no significant differences in the demographic characteristics of the sample across the four waves of the study.
Participants in the current study were those who took part in the first, second, and third wave of interviews (N = 807). The sample was about half female (53%) and approximately 66.3% White, non-Hispanic, 36.7% Black, not of Hispanic origin, 4% were Hispanic and 3% other. Individuals who reported being of Hispanic background and individuals identifying as “Other” were excluded from these analyses because their small numbers make it difficult to generalize to Hispanics. The sample used in the current study is composed of non-Hispanic Whites and Blacks, not of Hispanic origin (N=754). The current sample was composed of 56 (7.4%) cases of sexual abuse, 72 (9.5%) cases of physical abuse, 344 (45%) cases of neglect and 331 controls, with some individuals having experienced multiple types of victimization. With the exception of the exclusion of Hispanics, there were no significant differences between the current sample and the original sample on the variables of age (at original data collection), sex, or percent of abuse and neglect. At the time of the third interview, the mean age was 41.2 years (±3.54 years). Sixty percent had completed high school, 54% had unskilled or semi-skilled jobs, and 13.7% had semiprofessional or professional jobs.

Measures

**Independent variable: child abuse/neglect.** Through the review of official records from 1967 to 1971, childhood physical abuse, sexual abuse, and neglect were assessed. Physical abuse cases were defined as abuse that resulted in injuries such as bruises, welts, abrasions, lacerations, wounds, cuts, bone and skull fractures, and other evidence of physical injury. Sexual abuse cases included felony sexual assault, fondling or touching in an obscene manner, sodomy, incest, and rape. Neglect cases included parents’ deficiencies in childcare that were beyond those found acceptable by community and professional standards at the time and represented extreme failure to provide adequate food, clothing, shelter, and medical attention to children.
Abuse and neglect cases were restricted to those in which the children were 11 years of age or younger at the time the abuse or neglect occurred. Child abuse and neglect cases were coded as “1” and control cases were coded as “0”.

**Potential mediators.** There are three potential mediators that are hypothesized to partially explain the relationship between child abuse and neglect and current cigarette smoking in middle adulthood. These are (1) current psychopathology, (2) negative coping, and (3) past year traumas and victimization experiences. Information about the three potential mediators was collected at the same time point, during the second follow-up interview (2000-2002) when the participants were approximately 40 years old and before the assessment of smoking.

**Current psychopathology.** Two measures of current mood state (anxiety and depression) were assessed to indicate current psychopathology. The Center for Epidemiologic Studies Depression (CES–D) Scale (Radloff, 1977), a brief 20-item self-report scale designed to measure depressive symptomatology in the general population, was used to assess depression. Respondents indicated how often within the past week they experienced each symptom, with responses ranging from 0 (none of the time) to 3 (most or all of the time). Sample items include “I was bothered by things that usually don’t bother me” and “I felt lonely.” The Beck Anxiety Inventory (BAI; Beck, 1987) is a 21-item self-report scale designed to measure the severity of anxiety symptoms in adults. Respondents indicate how much they have been bothered by each of the symptoms over the past week, with responses ranging from 0 (not at all) to 3 (severely—I could barely stand it). Sample items include “unable to relax” and “heart pounding or racing.” A dichotomous variable was created to indicate current psychopathology. Responses were coded “1”, indicating that the person had reported experiencing clinical level current symptoms and had a Beck Anxiety Inventory score of 22 or higher or reported experiencing current depression.
(CES-D scale score 16-60). Responses were coded “0” if the person reported lower levels of anxiety or depression.

**Negative coping.** Negative coping was assessed at the same time as anxiety and depression at the second follow-up interview. The Coping Responses Inventory (CRI-Adult:Moos, 1993) is a 48-item measure that asked about eight different types of coping responses to stressful like circumstances. The scales include: logical analysis; positive reappraisal, seeking guidance and support, problem solving, cognitive avoidance, acceptance, or resignation, seeking alternative rewards, and emotional discharge. The CRI scales measure both approach and avoidance, as well as cognitive and behavioral coping responses. According to the author, the scales are only minimally correlated with social desirability. CRI-adult scales have been found to discriminate between problem and non-problem drinking adults, depressed patients from case controls, and persons with and without personality disorders (Brennan & Moos, 1991; Moos, Brennan, Fondacaro & Moos, 1990; Moos, Brennan & Moos, 1991). Each item consists of a statement of a specific response to a stressful situation. Participants are asked to describe the most distressing situation they have faced within the last twelve months and answer the frequency of use of 48 different coping responses.

For this study, a shortened form of the CRI was used. Respondents indicated a recent stressful event (within the past 12 months) and then rated the frequency of use of 24 different coping responses. A negative coping measure was created that included 12 different coping responses with face validity (see Appendix A). Responses were measured on a four-point Likert scale (1=Not at all; 2= Once or twice; 3= Sometimes; 4= Fairly often). Items were summed to yield a total score. Higher scores signify more frequent use of negative coping strategies.
**Past year traumas and victimization experiences.** Past year traumas and victimization experiences were assessed using the Lifetime Trauma and Victimization History (LTVH) instrument (Widom, Dutton, Czaja, & DuMont, 2005). Building on the work of other researchers (e.g., Goodman, Corcoran, Turner, Yuan, & Green, 1998; Green, 1996; Resnick, Falsetti, Kilpatric, & Freddy, 1996), the LTVH is a 30-item instrument that assesses a participant’s lifetime trauma and victimization history in the context of a structured in-person interview, using a matrix format for ease of administration and scoring. For this study, traumas and victimization experiences that were reported to have occurred during the past 12 months were used. The responses were coded “0” for no past year traumas and victimization experiences, “1” for one past year trauma and victimization experience, and “2” for two or more past year traumas and victimization experiences.

**Outcome variable: current cigarette smoking.** The outcome measure was assessed in the context of the third interview that was conducted during 2003-2005 (at approximately age 41-years old) and included a medical status examination and interview in the field. Participants were asked a series of questions about smoking and tobacco use from the 1999-2000 National Health and Nutrition Examination Survey (NHANES) whose component includes the Smoking and Tobacco Use Questionnaire (SMQ). NHANES is a survey conducted by the National Center for Health Statistics (NCHS), part of the Centers for Disease Control and Prevention (CDCP), U.S. Public health Service. This survey was designed to collect information about the health and diet of people in the United States. NHANES is a government survey using a stratified random sample of individuals in households in the U.S (CDCP, 2010). For the purposes of the present study, current cigarette smoking was measured by a person’s response to the following items: (1) Have you smoked at least 100 cigarettes in your life? (2) How long has it been since you quit
smoking cigarettes? Responses were coded “0” for not currently smoking (Having smoked < 100 cigarettes/life-including never smoked or having smoked at least 100 cigarettes/life but quit > 12 months ago) and “1” for currently smoking (Having smoked 100 cigarettes/life; still smoking or having quit 12 or fewer months ago).

**Control variables.** Three control variables (sex, race, and age) were used. Demographic characteristics (sex and race) have been found to have an influence on smoking behavior (Benowitz, 2008b; Dome et al., 2010; Kandel, Kiros, Schaffran, & Hu, 2004; Kiefe et al., 2001; Pauly, 2008; Pogun & Yararbas, 2009; Schnoll & Patterson, 2009). Thus, when examining the effects of child maltreatment on smoking, it is important to control for these factors. For the purposes of this research, sex was coded “1” for males and “0” for females. For the current study, individuals of Hispanic background were excluded from the analyses because their small numbers make it difficult to generalize to Hispanics. Race/ethnicity was coded “1” Blacks and “0” for Whites. In addition, exposure to cigarettes is affected by age. With increasing age, an individual will have more opportunities to smoke and, thus, the older a person is, age might have an effect on smoking behavior. Age was included as a continuous variable.

**Procedures**

The initial phase of the research was an archival study that compared the abused and/or neglected children with the matched comparison group (N = 1,575) on juvenile and adult criminal arrest records (Widom, 1989b). Subsequent phases of the research involved in-person interviews consisting of a series of structured and semi-structured questions and rating scales. Respondents were interviewed in person, typically in their homes, or, if the participant preferred, another place appropriate for the interview. The interviewers were blind to the purpose of the study, to the participants' group membership, and to the inclusion of an abused and/or neglected
group. Similarly, the subjects were blind to the purpose of the study and were told they had been selected to participate as part of a large group of individuals who grew up in that area in the late 1960s and early 1970s. After a complete description of the study was provided to the subjects, subjects signed a consent form acknowledging that they were participating voluntarily. Institutional Review Board approval was obtained for the procedures involved in this study. For those individuals with limited reading ability, the consent form was read and, if necessary, explained verbally.

**Statistical Analysis**

Correlations were conducted to examine the associations among all study variables. Bivariate relationships between each of the mediating variables and both childhood abuse/neglect and current cigarette smoking were assessed, using logistic regression for dichotomous variables and linear regression for continuous dependent variables. Strength of the association was determined by odds ratios (OR) with 95% confidence intervals (CI) for logistic regression analyses and standardized coefficients were reported for linear regressions. The analyses were computed for the overall sample with age, race, and sex as control variables. The analyses were also computed for males and females separately with age and race as control variables. Structural equation modeling (SEM) with Mplus was used to test separate path models with each individual mediator for the overall group and for males and females separately. Mplus uses multivariate multiple regression to determine how well the entire model fits the data and provides multiple indices of overall model fit. A chi square ($\chi^2$) statistic reflects the difference between the observed model relationships and estimated relationships based on the specified model: a nonsignificant $\chi^2 (\alpha \geq .05)$ indicates a good fit. The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) indicate how well the model explains the data relative to a
The model stipulating no common variance in the data: indices of .90 or higher indicate a good fit. The Root Mean Square Error of Approximation (RMSEA) reflects the average size of model misfit; RMSEA $\leq .06$ is considered a close fit. $R^2$ indicates the amount of variance explained by each independent variable. Individual path estimates are provided in the form of probit regression coefficients ($b$) and associated $z$-scores. For assessment of effect magnitude and more straightforward interpretation, probit coefficients are converted to approximately equivalent logit coefficients and corresponding odds ratios (Liao, 1994; Long, 1997). To handle missing data, full information maximum likelihood estimation, which uses all information available for each case and thus avoids biases and loss of power associated with traditional approaches to missing data, is used (Allison, 2003; Curran & Hussong, 2003). To handle missing data and dichotomous dependent variables, Mplus calculates weighted least square parameter estimates using a diagonal weight matrix with standard errors and mean-and-variance-adjusted chi-square test statistics that use a full weight matrix (Muthen & Muthen, 2004).
CHAPTER VII: RESULTS

Descriptive Statistics for All Variables

Table 2 displays the prevalence, mean, and standard deviation of each variable across participants. Bivariate correlations were examined and the results indicate that there were significant associations across all variables. Child abuse/neglect was significantly correlated with current psychopathology ($r = .17, p < .001$), negative coping ($r = .10, p < .01$), and past year traumas and victimization experiences ($r = .09, p < .01$). Current psychopathology was significantly correlated with negative coping ($r = .48, p < .001$) and past year traumas and victimization experiences ($r = .19, p < .001$). Negative coping was significantly correlated with past year traumas and victimization experiences ($r = .09, p < .05$). Current cigarette smoking was significantly correlated with child abuse and/or neglect ($r = .10, p < .01$), current psychopathology ($r = .12, p < .001$), negative coping ($r = .09, p < .05$), and past year traumas and victimization experiences ($r = .08, p < .05$).

Child Abuse and/or Neglect and Current Smoking in Middle Adulthood

Individuals with documented histories of abuse/neglect were at significantly greater risk for current cigarette smoking in middle adulthood (60.33%) compared to 50.46% of the matched controls (AOR=1.49, 95% CI [1.10, 1.99], $p < .01$). When analyses were conducted for males and females separately, the results indicated that abused and/or neglected males were not at increased risk for current cigarette smoking compared to matched control males (see Table 3). However, abused/neglected females were more likely to be current cigarette smokers (64.35%) compared to 49.40% of the control females (AOR=1.85, 95%CI [1.23, 2.78], $p < .01$).
Child Abuse and/or Neglect and Potential Mediators: Current Psychopathology, Negative Coping, and Past year Traumas and Victimization Experiences

It was hypothesized that child abuse and/or neglect would predict current psychopathology, negative coping, and past year traumas and victimization experiences. As expected, the results indicate that a history of child abuse and/or neglect significantly predicted increased risk for current psychopathology (AOR=2.11, 95% CI [1.55, 2.86], p < .001), negative coping (B = 1.25, SE (B) = 0.47, β = .09, p < .01.), and past year traumas and victimization experiences (B = 0.15, SE (B) = 0.06, β = .10, p < .05).

Potential Mediators (Current Psychopathology, Negative Coping, and Past Year Traumas) and Current Smoking

The next step was to test whether the hypothesized mediators (current psychopathology, negative coping, past year traumas and victimization experiences) predicted current cigarette smoking in middle adulthood. Table 4 presents the relationship between the hypothesized mediators and current cigarette smoking in middle adulthood, with child abuse and/or neglect controlled. These results indicate that current psychopathology (AOR= 1.62, 95% CI [1.16, 2.25], p < .01) and negative coping significantly predicted current cigarette smoking in middle adulthood (AOR= 1.03, 95% CI [1.00, 1.05], p < .05). There was a non-significant trend for past year traumas and victimization experiences to predict current cigarette smoking (AOR= 1.22, 95% CI [0.99, 1.51], p=.057).

Path Model: Child Abuse and/or Neglect to Psychopathology, Coping, and Traumas Leading to Current Smoking

The full structural model included paths from child abuse and neglect to current psychopathology, negative coping, and past year traumas and victimization experiences, from
each of these mediators to current smoking, and directly from child abuse and neglect to current smoking. This overall model yielded fit indices that were not within the acceptable range ($x^2=238.94$, df=7, $p<0.001$; CFI=0.30, TLI=-1.69, RMSEA= 0.19). Therefore, separate models for each potential mediator for the overall group and for males and females separately were tested (see Table 5). All of these models were over-identified (i.e. all possible paths specified) and therefore overall fit indices could not be calculated. For the overall group, the first column of Table 4 shows that the effect of child abuse/neglect on current psychopathology, negative coping, and past year traumas and victimization experiences was consistent with the bivariate relationships described earlier. Column 2 shows that current psychopathology and negative coping predicted current cigarette smoking. Past year traumas and victimization experiences were not found to predict current cigarette smoking; however, the relationship was significant at the trend level. Looking at columns 3 and 4, it can be seen that the introduction of current psychopathology had a significant mediation effect and reduced the effect of child maltreatment on current cigarette smoking to non-significance, suggesting that child abuse and/or neglect influences current cigarette smoking through its effects on current psychopathology (see Figure 1). Column 3 also shows that child abuse and/or neglect significantly predicted current cigarette smoking when negative coping or past year traumas and victimization experiences were introduced into (separate) models (see Figure 2 and 3); however, the indirect effect of child abuse and/or neglect on current cigarette smoking was not significant in these models (see Table 5).

**Child Abuse and/or Neglect and Current Cigarette Smoking for Males and Females Separately**
Table 6 displays results of the analyses (controlled for age and race) on the relationship between child abuse and/or neglect and potential mediators for males and females separately. When males and females were examined separately, the results indicated that abused/neglected males were at increased risk for current psychopathology (AOR=1.60, 95% CI [1.02, 2.51], \( p < .05 \)). In addition, among the males, child abuse/neglect significantly predicted negative coping (B =1.40, SE (B) = .65, \( \beta = .10, p < .05 \)) and past year traumas and victimization experiences (B =0.14, SE (B) = .07, \( \beta = .10, p < .05 \)). Abused/neglected females were also found to be at increased risk for current psychopathology (AOR=2.64, 95% CI=1.74, 4.01, \( p < .001 \)). For females, child abuse/neglect significantly predicted past year traumas and victimization experiences (B=0.15, SE (B) = .07, \( \beta = .10, p < .05 \)), but not negative coping.

Among males, current psychopathology, negative coping, and past year traumas and victimization experiences were not significantly associated with current cigarette smoking in middle adulthood (see Table 7). For females, however, current psychopathology (AOR=1.60, 95%CI [1.03, 2.49], \( p < .05 \)), negative coping (AOR=1.04, 95%CI [1.01, 1.08], \( p < .05 \)), and past year traumas and victimization experiences (AOR=1.50, 95%CI [1.12, 2.02], \( p < .01 \)) significantly predicted current cigarette smoking.

Finally, to examine whether the potential mediators explained the relationship between child abuse and/or neglect and current cigarette smoking, path models were conducted. Males were not found to be at increased risk for cigarette smoking and none of the paths in the (separate) path models that included current psychopathology (see Figure 4), negative coping (see Figure 5), and past year traumas and victimization experiences (see Figure 6) were found to be significant. For females, the first column in Table 8 shows that the effect of child abuse and/or neglect on current psychopathology, negative coping, and past year traumas and victimization
experiences was consistent with bivariate relationships described earlier. The results in column 2 show that current psychopathology, negative coping, and past year traumas and victimization experiences predicted current cigarette smoking. Looking at column 3 and 4, it can be seen that the relationship between child abuse and/or neglect and current cigarette smoking remained significant when current psychopathology was introduced (see Figure 4); however, the indirect effect between child abuse and/or neglect and current cigarette smoking was also found to be significant. The relationship between child abuse and/or neglect and current cigarette smoking remained significant when negative coping (see Figure 5) and past year traumas and victimization experiences (see Figure 6) were included in respective models and the indirect effect of child abuse and/or neglect and current cigarette smoking was not found to be significant in these models.
CHAPTER VIII: DISCUSSION AND CONCLUSIONS

This prospective longitudinal study examined the extent and potential mechanisms by which childhood abuse and/or neglect contributes to current cigarette smoking in middle adulthood. It was hypothesized that childhood abuse and/or neglect would predict current cigarette smoking in middle adulthood, and that this relationship would be accounted for by current psychopathology, negative coping, and past year traumas and victimization experiences.

As expected, the findings demonstrate that individuals with a history of childhood victimization are at increased risk of current cigarette smoking in middle adulthood compared to individuals without such histories. The present findings also show that individuals with histories of child abuse and/or neglect are at increased risk for current psychopathology, negative coping, and past year traumas and victimization experiences. Current psychopathology mediated the relationship between child maltreatment and current cigarette smoking for the overall group. However, in contrast to what was hypothesized, negative coping and past year traumas and victimization experiences did not explain the relationship between child maltreatment and current smoking in middle adulthood.

Although individuals with childhood victimization histories were found to be at increased risk for current cigarette smoking, the prevalence of current smoking in the control group was also found to be high. Research has reported higher smoking prevalence rates among individuals from disadvantaged circumstances (Hiscock et al., 2012). The disadvantaged background of the sample used in the current study could have contributed to the high smoking prevalence rates found among individuals with histories of childhood abuse and/or neglect and control individuals. Future research should examine the relationship between childhood abuse and/or
neglect and cigarette smoking in middle adulthood in samples from less disadvantaged backgrounds.

Current psychopathology (as indicated by anxiety or depression) and negative coping predicted current smoking in middle adulthood. Surprisingly, past year traumas and victimization experiences did not increase risk for smoking in middle adulthood. The current study only examined traumas and victimization experiences that occurred within the past 12 months. Thus, although this design element was used to ensure the correct temporal order of traumas and victimization to later smoking, it is possible that limiting the inclusion of victimization experiences to those that occurred during the past year may have restricted the range of experiences and variance. In addition, because traumas and victimization experiences were coded into three categories (i.e. 0 traumas; 1 trauma; 2 or more traumas), it is possible that the failure of the current study to establish a link between past year traumas and victimization experiences and current cigarette smoking is due to the failure to consider other past victimization experiences and this may have provided an inaccurate characterization of individuals who did not report victimizations during the past year but who might have had substantial traumas from earlier in their lives.

Other design factors might have influenced the negative coping findings as well. Negative coping was assessed by asking participants to describe the most distressing situation experienced over the past twelve months and to report the frequency of their use of negative coping skills in response to the situation. It is possible that participants’ coping responses to a single situation, as well as a situation (subjectively) rated as having been the worst experienced over the past year, might not necessarily be representative of their general coping responses or coping responses associated with situations perceived as less distressing. Furthermore, the
current study did not examine possible buffering factors that could minimize risk for cigarette smoking. For example, it has been suggested that participation in prosocial activities serves as a protective factor against risks associated with cigarette smoking, with adolescents involved in such activities found to be less likely to smoke (Chung & Elias, 1996; Elder, Dunn, Wang, Nagy, & Green, 2000; Luthar, Cicchetti, & Becker, 2000; Steinman & Zimmerman, 2004; Zimmerman & Arunkumar, 1994; Xue, Zimmerman, & Caldwell, 2007). Identifying protective variables is not only important to gaining a better understanding of the relationship between child maltreatment and cigarette smoking, but also to aid in the development of preventive measures for populations at risk for cigarette smoking.

These new findings reveal that current psychopathology accounted for the effects of childhood abuse and/or neglect on current smoking in middle adulthood. Numerous studies have reported that individuals with histories of childhood maltreatment are at greater risk for poor psychiatric outcomes in adulthood than individuals without such histories (Fergusson et al., 2008; Kaplan et al., 1999; Putnam, 2003; Rummell & Hansen, 1993; Stevenson, 1999; Tackett et al., 1993; Turner et al., 2006; Widom, 1999; Widom et al., 2007) and that psychopathology is associated with cigarette smoking (Dome et al., 2010; Fu et al., 2007; Lasser et al., 2000).

The notion that individuals smoke to self-medicate psychiatric symptoms is appealing given that tobacco smoke includes other psychoactive ingredients besides nicotine, such as Monoamine Oxidase Inhibitors (MAOIs) (Berlin et al., 1995a; Berlin et al., 1995b; Fowler et al., 1996a; Fowler et al., 1996b). MAOIs have been used for the treatment of depression (Robinson, 2001). It is possible that the antidepressant effects of MAOIs contribute to the self-medicating effects of cigarette smoking. Other scholars have suggested that the relationship between psychiatric disorders and smoking is bi-directional (Breslau et al., 2004 a, b; Cuijpers et al., 2007;
Griesler et al., 2008; Ismail et al., 2000; John et al., 2004; Kessler et al., 2007). Some of this research suggests that individuals initiate smoking behavior because of difficulties with emotion regulation underlying anxiety and depression; nevertheless, evidence also exists that suggests an increased risk for major depression and anxiety disorders associated with cigarette smoking (Gehricke et al., 2007). It is possible the psychoactive ingredients in tobacco smoke initially alleviate symptoms associated with depression and anxiety; however, individuals might be at increased risk for negative affect as nicotine use progresses to nicotine dependence (Gehricke et al., 2007). Nicotine withdrawal between cigarettes in individuals who are nicotine dependent could be a factor contributing to negative affect. The findings of the current study suggest that current psychopathology remains an important risk factor in cigarette smoking within the maltreatment population.

These findings showed different patterns of these relationships for men and women. Abused and neglected females were found to be at increased risk for current cigarette smoking in middle adulthood, compared to matched controls. However, unlike females, for males, child abuse and neglect did not predict increased risk for current cigarette smoking. One possible explanation is that previous research has reported some sex differences in the biological effects of nicotine, suggesting that women metabolize nicotine faster than men (Benowitz et al., 2006). Furthermore, nicotine replacement therapy has been found to be less effective in females than in males in long-term smoking cessation (Dome et al., 2010; Pauly, 2008). The current study did not examine smoking cessation rates and it is possible that males were more successful at smoking cessation attempts, which could have contributed to the results. Gender differences in smoking motivation have also been reported, with women being more likely than men to report smoking due to the psychological effects of nicotine, such as anxiety reduction (Dome et al.,
2010; Pauly, 2008; Pogun & Yararbas, 2009; Rose et al., 1996). Given that current psychopathology (i.e. current anxiety or depression) was found to increase risk for current smoking among females, but not males, and negative coping was found to predict smoking among females, but not males, it is possible that the anticipated effects of nicotine (e.g. anxiety reduction) have contributed to these findings, as females might smoke to cope with symptoms of current psychopathology.

This study only included the presence of current anxiety and/or current depression. However, child maltreatment has been associated with an increased risk for a wide range of poor mental health outcomes, such as depressive disorders, anxiety disorders, antisocial personality disorder, alcohol problems, substance use disorders, and PTSD (Fergusson et al., 2008; Finkelhor, 1990; Holmes & Slap, 1998; Putnam, 2003; Rummell & Hansen, 1993; Stevenson, 1999; Tackett et al., 1993; Turner et al., 2006; Widom, 1999; Widom et al., 2007). It is possible that the current study’s reliance on a limited range of mental health outcomes (that is, internalizing mental health outcomes) may limit the conclusions that can be drawn about the impact of child abuse and neglect on smoking (Aneshensel, Rutter, & Lachenbruch, 1991; Horwitz, White, & White, 1996; Horwitz et al., 2001). It is possible that the focus on internalizing symptoms was more relevant for females, whereas the inclusion of other forms of psychopathology (e.g., externalizing symptoms) might predict cigarette smoking in males. Anxiety disorders and depressive disorders are important in the relationship between child maltreatment and cigarette smoking in females, but may not be the only mental health outcomes of importance.

Although child maltreatment predicted past year traumas and victimization experiences for the overall group and for males and females, past year traumas and victimization experiences
only predicted current cigarette smoking for females. Previous research has shown that there are gender differences in victimization experiences (Widom et al., 2008). Both abused and neglected males and females were found more likely to report certain victimization experiences compared to controls (e.g. physically harmed, assaulted with weapon, physically harmed as child). However, certain victimization experiences were found to be more likely to be reported by abused and/or neglected males (i.e. lived in war zone, kidnapped) compared to controls, but were not found for abused and/or neglected females compared to controls. Similarly, certain victimization experiences were more likely to be reported among abused and/or neglected females (i.e. serious accident, seeing another person physically harmed, property damaged, other). Interestingly, for one of the victimization experiences included (i.e. human-made disasters), a higher prevalence was reported for control males compared to the abused and/or neglected males. However, among females, the abused and/or neglected females were more likely to report experiencing human-made disasters compared to the control females (Widom et al., 2008). The present study only examined the presence of past year victimization experiences rather than the type of victimization experience. It is possible that only certain victimization experiences are associated with an increased risk for current cigarette smoking. For example, Low et al. (2012) examined the relationship between stressful life events, mental health, and substance use in young adolescents and found that out of the assessed stressful life events, only family disruption (i.e. parents separating or divorcing and/or reconstituted family) was associated with cigarette use. Further examination of the relationship between gender-specific types of victimization experiences and current cigarette smoking might have resulted in different findings. However, the low number of reported traumas experienced over the last year reported by individuals in the current study does not permit the examination of independent effects of
specific gender-specific types of victimization experiences on current cigarette smoking. Future studies should examine whether gender-specific victimization experiences are associated with an increased risk for cigarette smoking. The current study attempted to unravel the hypothesized relationships in a temporally correct way, but it appears that these relationships are more complex and/or reciprocal and that gender may be an important factor that should be further explored by future research.

It is important to note that the current study did not examine the specific effects of the types of maltreatment included (i.e. physical abuse, sexual abuse, neglect) separately and it is possible that the different types of maltreatment might show different patterns of results. It has been proposed that examining specific types of abuse as well as comorbid maltreatment experiences is crucial to understanding the effects of childhood victimization (Lau et al., 2005; Manly, 2005). For example, Widom et al. (2007) examined the relationship between child maltreatment and major depressive disorder and psychiatric comorbidity in young adulthood and found childhood neglect to be a risk factor for current (within past year) major depression in young adulthood, whereas childhood physical and sexual abuse were not found to increase the risk for current major depression (Widom et al., 2007). Although specific forms of abuse were not examined separately in this study, further knowledge about the risks associated with different types of childhood maltreatment experiences should be addressed in future research.

Another issue is that physiological addiction to nicotine is important in the maintenance of smoking behavior, due to the pharmacological effects of nicotine that are known to produce tobacco addiction (Benowitz, 2008a). Al Mamun et al. (2006) found that youth who had been sexually abused (before age 16-years) developed nicotine dependence within weeks of the onset of intermittent tobacco use. Furthermore, stressful life events have been found to be associated
with nicotine dependence. For example, Balk et al. (2009) examined the association between nicotine dependence and stressful life events in a national sample and found that a majority of the stressful life events were associated with nicotine dependence (over the past 12 months). Importantly, this association remained even after controlling for factors such as poverty, psychiatric and substance use disorders, and prior history of nicotine dependence (Balk et al., 2009). These data suggest that trauma may increase the risk for subsequent development of nicotine dependence, which could contribute to smoking maintenance. The combination of the addictive nature of nicotine and the increased risk for smoking among victims of childhood abuse and/or neglect could also contribute to current smoking by interfering with smoking cessation efforts, as some evidence shows that individuals who began smoking after experiencing abuse (sexual) were less likely to quit smoking than those without such victimization histories (King, Guilber, Ward, Arwidson, & Noubary, 2006). Thus, it is possible that nicotine dependence among current smokers in the sample could have influenced the results.

Another theory that has been proposed to explain cigarette smoking that was not examined in the current study is Social Learning Theory. Social learning theory (Bandura, 1986) is a theory of behavior that combines principles of learning and cognitive psychology. According to the theory, behavior is learned by observing the behavior being modeled by role models, such as parents, peers, and teachers, and by the observed consequences of the behavior (Bandura, 1977; Kobus, 2003; Vitoria, Salgueiro, Silva, & DeVries, 2009). Behavior that is reinforced makes it more likely that the observer will engage in the behavior, while behavior that is punished will be avoided (Bandura, 1977, 2001; Collins & Ellickson, 2004). Through observation, individuals acquire attitudes and beliefs regarding behavior, which influences the behavior they engage in, namely behavior they expect to have positive consequences (Bandura,
According to a social learning framework, smoking behavior would be expected to be learned through observing smoking in models and forming positive attitudes and beliefs about smoking by observing the behavior resulting in consequences that are considered positive, which would make the individual more likely to engage in or continue to engage in smoking behavior (Bandura, 1986).

Research findings have consistently demonstrated the importance of parent, peer, and sibling models on the adoption of smoking behavior (Collins & Ellickson, 2010). It is possible that adolescents are particularly susceptible to the influence of peers because of the importance of peer groups in adolescence (Steinberg & Monahan, 2007; Wen, Duker, & Olsen, 2009). The current study did not examine family, peer, or sibling smoking and it is possible that these factors could have contributed to the increased risk of smoking among individuals with maltreatment histories in the current study and should be explored in future research. Additionally, these factors seem to be important in regard to preventative efforts as it appears that preventive strategies should target peers as well as parents due to the influence these groups exert on adolescent smoking behavior (Vitoria et al., 2009).

In addition to environmental factors, a genetic contribution to smoking behavior has also been suggested. Aiming to gain a better understanding of smoking behavior, twin studies examining concordance rates in twins reared together or apart, have been used to estimate genetic contributions to smoking behavior. These studies have found results that support the presence of a genetic influence on smoking, level of nicotine dependence, age at initiation, and cigarettes smoked per day (Batra, Patkar, Berrettini, Weinstein, & Leone, 2003; Benowitz, 2008b; Lessov et al., 2004; Maes et al., 2004; Portugal & Gould, 2008; Rosenthal et al., 2011). The metabolism of nicotine has also been shown to be heritable and variability in nicotine
metabolism has been found to be associated with level of nicotine dependence (Hukkanen et al., 2005; Swan et al., 2005).

Even though various attempts have been made to locate specific genes associated with nicotine addiction, determining a causal relationship between particular genes and nicotine addiction is difficult, because behavior as complex as smoking is determined by the interaction of numerous genes and the environment. The attempts to localize specific genes is further complicated by the fact that different studies assess different factors of smoking behavior, which could have different underlying genetic causes. The current study did not examine the influence of genetic factors on the relationship between child maltreatment and smoking behavior and it is possible that genetic contributions could have influenced the results of the current study.

Limitations

Despite the numerous strengths of the current research, several limitations should be noted. First, the sample only includes court-substantiated cases of child abuse and neglect, which likely represent the most extreme cases that are processed in the system. Thus, the obtained findings cannot be generalized to unreported or unsubstantiated cases of child abuse and/or neglect. Second, the included cases are generally skewed toward the lower end of the socioeconomic spectrum and therefore these findings cannot be generalized to cases of child abuse and/or neglect cases in middle- or upper class samples. Third, these findings represent the experiences of a group of young children (0-11 years old) during the late 1960s and early 1970s in the Midwestern part of the United States and may not be generalizable to children abused and/or neglected at a later point in time or from other parts of the country. Fourth, the sample used for this study consisted of Black and White participants only, so that it is difficult to generalize the findings to other racial or ethnic groups. Lastly, these issues would ideally be
studied in the context of a large-scale longitudinal study involving multiple time points and assessments from early childhood to adulthood in order to be able to determine the onset of psychopathology and smoking behaviors.

**Conclusions**

The current findings build on and extend previous research on the extent to which childhood victimization leads to increased risk for cigarette smoking. To my knowledge, this is the first prospective study that followed a group of children with documented cases of childhood abuse and/or neglect and assessed their smoking in middle adulthood. These findings highlight the importance of disentangling the causes of cigarette smoking in order to inform prevention and intervention efforts with this at-risk population. These new findings indicate that the relationship between child maltreatment and current cigarette smoking is partially explained by current psychopathology. These findings highlight the importance of assessing and addressing current psychopathology and coping styles to support preventive measures with this at-risk populations. Furthermore, treatment of underlying emotional difficulties might reduce the reinforcing effects of smoking and should be considered in intervention efforts. Since the findings of the current study reveal an increased risk for current smoking associated with negative coping, teaching strategies to cope with nicotine withdrawal and possible associated negative mood could be valuable for intervention efforts. Finally, these findings suggest that preventive and intervention measures might need to address different risk factors for smoking among abused and neglected females and males.
Table 1  
*Characteristics of the Sample at Four Waves of the Study*

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Interview</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td><strong>DATES-PHASES</strong></td>
<td>Record</td>
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<tr>
<td>Eligible</td>
<td>1575</td>
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<tr>
<td>Interviewed</td>
<td>1196</td>
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<tr>
<td><strong>Characteristics</strong></td>
<td></td>
</tr>
<tr>
<td>Age at interview (years)</td>
<td>29.2 ± 3.8</td>
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<tr>
<td>Sex (% male)</td>
<td>49.3</td>
</tr>
<tr>
<td>White (%)</td>
<td>66.2</td>
</tr>
<tr>
<td>Black (%)</td>
<td>32.6</td>
</tr>
<tr>
<td>Abuse/neglect (%)</td>
<td>57.7</td>
</tr>
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</table>

Note. *a* Mean ± standard deviation
Table 2  
*Summary Statistics for All Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall</th>
<th>Child Abuse and Neglect</th>
<th>Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N (%)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Current Smoking</td>
<td>749</td>
<td>254 (60.43)</td>
<td>165 (50.46)</td>
</tr>
<tr>
<td>Current Psychopathology</td>
<td>832</td>
<td>456 (54.81)</td>
<td>376 (45.19)</td>
</tr>
<tr>
<td>Negative Coping</td>
<td>827</td>
<td></td>
<td>28.52 ± 6.88</td>
</tr>
<tr>
<td>Past Year Traumas and Victimization Experiences</td>
<td>833</td>
<td></td>
<td>0.58 ± 0.78</td>
</tr>
</tbody>
</table>

Note. ± standard deviation
Table 3
Prevalence of Current Cigarette Smoking among Abused/ Neglected Children and Matched Controls Followed into Middle Adulthood by Sex

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
<th>AOR</th>
<th>95%CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td><strong>MALES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>161</td>
<td>51.55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse/Neglect</td>
<td>191</td>
<td>55.50</td>
<td>1.17</td>
<td>[0.77, 1.79]</td>
<td>.911</td>
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<tr>
<td><strong>FEMALES</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Control</td>
<td>166</td>
<td>49.40</td>
<td></td>
<td></td>
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<tr>
<td>Abuse/Neglect</td>
<td>230</td>
<td>64.35</td>
<td>1.85**</td>
<td>[1.23, 2.78]</td>
<td>.003</td>
</tr>
</tbody>
</table>

Notes. Results are adjusted for demographics of age and race. AOR= adjusted odds ratio. CI= confidence interval. *p< .05; **p< .01, ***p< .001.
Table 4
*Relationship Between Potential Mediators and Current Cigarette Smoking in Middle Adulthood*

<table>
<thead>
<tr>
<th>Potential Mediators (Mean age = 39.5 years)</th>
<th>N</th>
<th>AOR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Psychopathology</td>
<td>697</td>
<td>1.62**</td>
<td>[1.16, 2.25]</td>
<td>.004</td>
</tr>
<tr>
<td>Negative Coping</td>
<td>695</td>
<td>1.03*</td>
<td>[1.00, 1.05]</td>
<td>.020</td>
</tr>
<tr>
<td>Past Year Traumas and Victimization Experiences</td>
<td>698</td>
<td>1.22</td>
<td>[0.99, 1.51]</td>
<td>.057</td>
</tr>
</tbody>
</table>

Notes. Results are adjusted for demographics of age, race, and sex. AOR= adjusted odds ratio. CI= confidence interval.
*p< .05; **p< .01; ***p< .001.
Table 5
Child Abuse/Neglect (IV) as predictor of Current Smoking (DV) with Current Psychopathology, Negative Coping, and Past Year Traumas and Victimization Experiences as Potential Mediators (M) each modeled separately.

<table>
<thead>
<tr>
<th></th>
<th>Effect of IV on M</th>
<th>Effect of M on DV</th>
<th>Direct effect of IV on DV</th>
<th>Indirect effect of IV on DV</th>
</tr>
</thead>
</table>
| Overall                  | B  
|                          | SE  
|                          | β  
|                          | B  
|                          | SE  
|                          | β  
|                          | B  
|                          | SE  
|                          | β  
|                          | B  
|                          | SE  
|                          | β  
| Current Psychopathology  | 0.40            | 0.09              | 0.19***                   | 0.18                        |
|                          | 0.18            | 0.06              | 0.18                      | 0.09                        |
|                          | 0.07            | 0.03              | 0.04*                     | 0.18**                      |
| Negative Coping          | 1.20            | 0.46              | 0.09**                    | 0.02                        |
|                          | 0.02            | 0.01              | 0.11*                     | 0.23                        |
|                          | 0.11*           | 0.09              | 0.02                      | 0.01                        |
| Past Year Traumas and    | 0.14            | 0.05              | 0.10**                    | 0.13                        |
| Victimization Experiences| 0.13            | 0.07              | 0.09§                     | 0.23                        |
|                          | 0.11*           | 0.09              | 0.02                      | 0.01                        |
|                          | 0.01            |                    |                           |                             |

Notes. β = standardized regression coefficient; SE=standard error of B; B = unstandardized regression coefficient; §=significant at trend level (p = 0.053).
### Table 6

**Relationship Between Child Abuse and Neglect and Potential Mediators by Sex**

<table>
<thead>
<tr>
<th>Group</th>
<th>Current Psychopathology</th>
<th>Negative Coping</th>
<th>Past Year Traumas and Victimization Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>AOR</td>
<td>95% CI</td>
</tr>
<tr>
<td><strong>MALES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse/Neglect</td>
<td>30.70</td>
<td>1.60*</td>
<td>[1.02, 2.51]</td>
</tr>
<tr>
<td><strong>FEMALES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abuse/Neglect</td>
<td>48.55</td>
<td>2.64***</td>
<td>[1.74, 4.01]</td>
</tr>
</tbody>
</table>

**Notes.** Results are adjusted for demographics of age and race. AOR = adjusted odds ratio. CI = confidence interval. SE = standard error of B; B = unstandardized regression coefficient.

*p < .05; **p < .01, ***p < .001.
<table>
<thead>
<tr>
<th>Potential Mediators (Mean age = 39.5 years)</th>
<th>N</th>
<th>AOR</th>
<th>95%CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MALES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Psychopathology</td>
<td>327</td>
<td>1.59</td>
<td>[0.96, 2.63]</td>
<td>.071</td>
</tr>
<tr>
<td>Negative Coping</td>
<td>326</td>
<td>1.01</td>
<td>[0.98, 1.05]</td>
<td>.423</td>
</tr>
<tr>
<td>Past Year Traumas and Victimization Experiences</td>
<td>327</td>
<td>0.97</td>
<td>[0.74, 1.35]</td>
<td>.982</td>
</tr>
<tr>
<td><strong>FEMALES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Psychopathology</td>
<td>370</td>
<td>1.60*</td>
<td>[1.03, 2.49]</td>
<td>.037</td>
</tr>
<tr>
<td>Negative Coping</td>
<td>369</td>
<td>1.04*</td>
<td>[1.01, 1.08]</td>
<td>.014</td>
</tr>
<tr>
<td>Past Year Traumas and Victimization Experiences</td>
<td>371</td>
<td>1.50**</td>
<td>[1.12, 2.02]</td>
<td>.007</td>
</tr>
</tbody>
</table>

Notes. Results are adjusted for demographics of age and race. AOR= adjusted odds ratio.
*p< .05; **p< .01, ***p< .001.
Table 8
Child Abuse/Neglect (IV) as predictor of Current Smoking (DV) with Current Psychopathology, Negative Coping, and Past Year Traumas and Victimization Experiences as Potential Mediators (M) each modeled separately by Sex.

<table>
<thead>
<tr>
<th></th>
<th>Effect of IV on M</th>
<th>Effect of M on DV</th>
<th>Direct effect of IV on DV</th>
<th>Indirect effect of IV on DV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>β</td>
<td>B</td>
</tr>
<tr>
<td><strong>MALES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Psychopathology</td>
<td>0.23</td>
<td>0.13</td>
<td>0.11</td>
<td>0.16</td>
</tr>
<tr>
<td>Negative Coping</td>
<td>1.24</td>
<td>0.65</td>
<td>0.09§</td>
<td>0.01</td>
</tr>
<tr>
<td>Past Year Traumas and Victimization Experiences</td>
<td>0.14</td>
<td>0.07</td>
<td>0.09§</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>FEMALES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Psychopathology</td>
<td>0.56</td>
<td>0.13</td>
<td>0.26***</td>
<td>0.20</td>
</tr>
<tr>
<td>Negative Coping</td>
<td>1.16</td>
<td>0.64</td>
<td>0.09</td>
<td>0.02</td>
</tr>
<tr>
<td>Past Year Traumas and Victimization Experiences</td>
<td>0.15</td>
<td>0.07</td>
<td>0.10*</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Notes. β = standardized regression coefficient. SE=standard error of B. §= significant at trend level (p = 0.057), *(p = 0.056), **(p = 0.056).
Figure 1
Path Model with Current Psychopathology as Mediator between Child Abuse and/or Neglect and Current Cigarette Smoking

Notes. Rectangles represent predictor, mediator, and outcome variables; solid lines represent estimated paths. Control variables: age, race, sex. *p<.05; **p<.01; ***p<.001
Figure 2
Path Model with Negative Coping as Mediator between Child Abuse and/or Neglect and Current Cigarette Smoking

Notes. Rectangles represent predictor, mediator, and outcome variables; solid lines represent estimated paths. Control variables: age, race, sex. *p<.05; **p<.01; ***p<.001
Figure 3
Path Model with Past Year Traumas and Victimization Experiences as Mediator between Child Abuse and/or Neglect and Current Cigarette Smoking

Notes. Rectangles represent predictor, mediator, and outcome variables; solid lines represent estimated paths. Control variables: age, race, sex. § = significant at trend level (p = 0.053). *p<.05; **p<.01; ***p<.001
Figure 4
Path Model with Current Psychopathology as Mediator between Child Abuse and/or Neglect and Current Cigarette Smoking by Sex of Participants

Notes. Rectangles represent predictor, mediator, and outcome variables; solid lines represent estimated paths. Control variables: age and race. M = Males; F = Females; *p<.05; **p<.01; ***p<.001
Figure 5
Path Model with Negative Coping as Mediator between Child Abuse and/or Neglect and Current Cigarette Smoking by Sex of the Participant

Notes. Rectangles represent predictor, mediator, and outcome variables; solid lines represent estimated paths. Control variables: age and race. M = Males; F = Females. § = significant at trend level (p = 0.057). *p<.05; **p<.01; ***p<.001
Figure 6

Path Model with Past Year Traumas and Victimization Experiences as Mediator between Child Abuse and/or Neglect and Current Smoking by Sex of Participant

Notes. Rectangles represent predictor, mediator, and outcome variables; solid lines represent estimated paths. Control variables: age and race. M = Males; F = Females. § = significant at trend level (p = 0.053). *p < .05; **p < .01; ***p < .001
Appendix

Coping Responses Inventory (CRI)- Negative Coping Items

1. Daydream or imagine a better time or place, than the one you are in.

2. Think that the outcome would be decided by fate.

3. Keep away from people in general.

4. Try to put off thinking about the situation, even though you know you will have to at some point.

5. Accept it; nothing can be done.

6. Wish the problem will go away or somehow be over with.

7. Expect the worst possible outcome.

8. Cry to let your feelings out.

9. Lose hope that things would ever be the same.

10. Do something that you don’t think will work, but at least you are doing something.

11. Take it out on other people when you feel angry or depressed.

12. Try not to think about the problem.
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