CHILDHOOD ABUSE AND SELF-REGULATION: RISK FACTORS FOR HEROIN ADDICTION

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ABSTRACT

Abused children often develop externalizing problems and substance abuse disorders later in life. The present study describes correlates of childhood abuse and heroin addiction with particular attention to the role of behavioral self-regulation and types of maltreatment. Self-regulation is operationalized as having factors of impulsivity, aggression, and inattention. 130 opiate addicts and matched controls completed the Childhood Trauma Questionnaire, the Eysenck Personality Questionnaire, the Buss Durkee Hostility Scale, and the Barratt Impulsivity Scale. It was hypothesized that maltreatment and self-regulation would predict addiction and that the type and severity of maltreatment would predict the type and extent of self-regulation problems. Results supported the hypotheses. The Addict group differed from the Control group on measures of self-regulation and nonsexual maltreatment but not on measures of sexual abuse, SES, IQ or demographics. As hypothesized, self-regulation was a significant predictor of addiction in hierarchical regressions even after accounting for the effect of gender, IQ, and SES. Nonsexual childhood maltreatment was a significant predictor of addiction. However, when self-regulation was added to the prediction, maltreatment was no longer significant and only self-regulation predicted addict status. Nonsexual abuse was a significant predictor of self-regulation, after controlling for IQ, gender, and SES. Canonical correlation analysis indicates that nonsexual abuse is more strongly related to behavioral self-regulation than sexual abuse. Results suggest that self-regulation has an important role in the development of heroin addiction in survivors of certain types of childhood maltreatment.

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APPROVAL OF THE DISSERTATION

This dissertation, "Childhood Abuse and Self-regulation: Risk Factors for Heroin Addiction," has been approved by the Graduate Faculty of the Curry School of Education in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Dedication

To Janet, Charles, and Stephen

who have given me the time, support and love

to complete this work.

Acknowledgement

I wish to acknowledge the contribution of Nancy Petry, Ph.D. and Warren Bickel, Ph.D., who collected the data used in this dissertation at the University of Vermont in 1996.

I also wish to acknowledge the guidance provided by Dr. Petry throughout the project. Although unable to participate as a formal committee member, her involvement in the project was certainly as extensive as those listed on the title page.

TABLE OF CONTENTS

LIST OF TABLES

Self-regulation and childhood abuse in the development of substance abuse

The consequences of child abuse and neglect include violence and antisocial behaviors (Dembo, Williams, Wothke, Schmeidler & Brown, 1992; Malinosky-Rummell & Hansen, 1993) as well as vocational impairment, increased psychopathology, and substance abuse (Bifulco, Brown & Adler, 1991; Browne & Finkelhor, 1986; Mullen et al., 1988). The prevalence of child abuse and the social cost of its sequelae underscore the need for better prevention and treatment. To this end, we seek a clearer understanding of how the experience of maltreatment interacts with an individual's psychological, biological, and social environments to develop into maladaptive behaviors, such as drug addiction.

A well-established connection exists between chemical dependence and childhood abuse. Alcohol and drug use are related to the perpetration of child abuse (see Miller, Maguin, & Downs, 1997, for a review) and the experience of having been abused. Studies have shown both a high prevalence rate of childhood abuse among samples of substance abusers (Briere, 1992a; Brown & Anderson, 1991; Dunn, Ryan & Dunn, 1994; Miller, Down & Testa, 1993; Ouimette, Wolfe, & Chrestman, 1996; Peters, Wyatt & Finkelhor, 1986; Rohsenhow, Corbett, & Devine, 1988) and a high rate of substance abuse among samples of child abuse survivors (Brown & Anderson, 1991; Malinosky-Rummell & Hansen, 1993). However, the nature of the relation between childhood victimization and later substance abuse is complex and unclear (Briere, 1992b; Mullen 1990; Peters, Wyatt & Finkelhor, 1986).

Familial transmission of factors, either biological or social, may predispose

maltreated children to become substance abusers. Child abuse is more likely to occur to children from problematic home and family backgrounds (Finkelhor & Baron, 1986), such as homes with parental substance abuse. Parental substance use is itself a strong predictor of offspring's substance use. Twin studies and adoption studies have helped establish the heritability of alcoholism (Schuckit, 1985) and drug use (Meller, Rinehart, Cadoret, & Troughton, 1988), indicating that a common genotype may explain part of this association. Biological explanations, however are incomplete and other evidence suggests that social learning processes in the family, such as family conflict, also contribute to the intergenerational pattern of drug abuse (Collins & Marlatt, 1981).

Non-familial explanations of this linkage have also been advanced. Certain characteristics of the child such as temperament or cognitive abilities, have been hypothesized to increase the child's risk of victimization and development of substance abuse (Starr, cited in Wolfe, 1987). Recent work suggests that the child's psychological response to trauma may be more closely associated with later adaptation than the traumatic events per se (Stewart, 1996; Varia, Abidin & Dass, 1996). In their recent review of the association between childhood abuse and subsequent drug problems, Miller, Maguin, and Downs (1997) proposed three possibilities: substance use as a coping mechanism, posttraumatic stress disorder related symptoms, and externalizing behaviors (e.g., hyperactivity, delinquency, aggression). Although a number of psychological, biological, familial, and demographic variables influence this developmental path in a complex manner, this study focuses on the role of externalizing behaviors.

Attempts to untangle these relationships have begun by using statistical control of family factors (e.g., Dembo, Williams, Wothke, Schmeidler, & Brown, 1992; Miller,

Down & Testa, 1993; Mullen, Martin, Anderson, Romans & Harbison, 1993 and 1996). These studies have typically found that childhood abuse explains a unique portion of the variance in the development of substance abuse after controlling for family risk factors, such as parental drug and alcohol use. Nevertheless, results are often contradictory and methodological shortcomings are often cited as the reason for inconclusive results (Briere & Elliott, 1993). Research on the association between childhood abuse and chemical dependency has generally been cross-sectional and correlation in design, without an appropriate control group. When ecological factors such as socioeconomic status are not controlled, they further confound interpretation of the role of early childhood abuse in subsequent substance use disorders.

This research has also been criticized for treating abuse survivors and addicts as homogeneous groups despite the evidence that different types of maltreatment lead to different effects (Briere & Runtz, 1990; Egeland, Sroufe, & Erickson, 1983; Mullen, Martin, Anderson, Romans, & Herbison, 1996) and that addicts use different drugs to meet different psychological needs (Khantzian, 1985; Milkman & Frosch, 1973, cited in Kaufman, 1985). Failure to separate subgroups in analyses may obscure important differences. To further understand how drug dependency develops in abuse survivors, more specific approaches are needed.

Individuals who were abused in childhood often have problems managing their emotions, their behaviors and even their thoughts. Difficulties with emotional control are evident in the prevalence of depressive and anxiety disorders (Bifulco, Brown & Adler, 1991; Mullen et al., 1988). The prevalence of child abuse histories among juvenile delinquents and adult criminals indicates that behavioral control problems are a common

consequence. Inattention, dissociation, and lack of persistence are examples of the cognitive disruption associated with childhood abuse. Drug abuse has also been framed as a problem of self-control (Baumeister & Heatherton, 1996), either resulting from poor impulse control or as a way to cope with unmanageable emotions and distressing memories. These findings suggest that childhood abuse may contribute to the development of pervasive deficits in self-regulation, evident later in life in various maladaptive behaviors.

While cognitive and social psychologists have proposed theories of behavioral control (Barkley, 1997; Block & Block, 1980; Eisenberg & Fabes, 1992), explanations for the development of failures in self-control by abuse survivors have been offered primarily by developmental theorists. Developmental psychopathologists have demonstrated that abused children are likely to be insecurely attached (Cicchetti, Carlson, Braunwald, & Aber, 1987) and are at risk for later maladaptation in many areas. Childhood traumatization negatively affects self-control, attachment to others, peer relationships and social competence, which can subsequently lead to adult antisocial behaviors and drug addiction (Egeland, Jacobvitz, & Papatola, 1987; van der Kolk and Fisler, 1994; Wolfe, 1987). The early patterns of adaptation commonly seen in abused or neglected children give rise to undercontrolled behavioral responses including substance abuse (van der Kolk & Fisler, 1994).

Few empirical studies have examined self-control or self-regulation in the course from childhood abuse to drug abuse in adulthood. Some research suggests that a consequence of childhood abuse is increased impulsivity and decreased behavioral control, which are associated with substance abuse (Miller, Maguin & Downs, 1997).

Definitions of self-regulation, however, are often inconsistent.

This project examines the role of childhood maltreatment in the development of poor behavioral self-regulation and substance abuse. I develop an operational definition of self-regulation with components of aggression and hostility, impulsivity, and inattention. The type and severity of maltreatment, as measured by the Childhood Trauma Questionnaire, is hypothesized to have a relationship with these aspects of self-regulation and is examined using canonical correlation. Childhood abuse and self-regulation ability are hypothesized to predict heroin addiction and are tested with multiple regression analysis. Data previously collected at the University of Vermont by Nancy Petry, Ph.D. and Warren Bickel, Ph.D. is used in this project.

LITERATURE REVIEW

This chapter reviews the literature on behavioral self-regulation and discusses the possible links with childhood maltreatment and drug abuse in adulthood. Methodological issues in the maltreatment literature are discussed and the role of risk factors for substance abuse is reviewed. Self-regulation is proposed as a mediating influence between a past history of abuse and current substance abuse, and theories of self-regulation and self-control are reviewed.

Childhood maltreatment and substance abuse

Strong associations exist between two major social problems: a past history of maltreatment and drug abuse. Both of these difficulties have profound effects on the lives of those experiencing them. Examination of these effects should consider differences in the base rates of adult psychopathology. Compared to females, males have lower rates of depression (Boyd & Weissman, 1981) and higher rates of aggression (Tomada & Schneider, 1997), delinquent and criminal behavior, externalizing disorders (Achenbach & Edelbrock, 1986) and substance abuse (Stewart, 1996).

Incidence. Each year, an estimated 2.8 million of America's 60 million children are abused or neglected, according to the Third National Incidence Study of Child Abuse and Neglect (Sedlak & Broadhurst, 1996). The prevalence of child abuse is unsettled as estimates depend on the type and severity of maltreatment assessed and the method used to assess maltreatment. Furthermore, because the base rates of childhood maltreatment and adult behavioral pathology differ by gender, examination of these factors must include consideration of these differential rates. Girls are about three times as likely as

boys to be abused in some way (Rohsenhow, Corbett & Devine, 1988) and are 12 times more likely to be sexually abused (Silverman, Reinherz, & Giaconia, 1996). Comparisons of the relative rates of physical abuse, emotional abuse, and neglect typically find no significant difference for boys and girls (Sedlak & Broadhurst, 1996). However, there is some evidence that males tend to underreport (cited in Brown & Anderson, 1991) and minimize (Varia, Abidin & Dass, 1996) abusive experiences more than females in retrospective reports. The relative prevalence of combined (physical and sexual) abuse is unclear with some studies reporting higher rates among females (Brown & Anderson, 1991; Sedlak & Broadhurst, 1996) and others indicating higher rates among males (Harrison, Fulkerson, & Beebe, 1997; Pierce & Pierce, 1985).

Between 17% and 35% of abused individuals become addicts (Browne & Finkelhor, 1986; Mullen et al. 1993). Substance use disorders are more prevalent in men than women, but in terms of treatment for substance abuse, women are less likely to complete treatment and have poorer prognoses than males in substance abuse treatment (Gutierres & Todd, 1997). Intranasal heroin use is rapidly increasing and is the drug of choice among a new cohort of young addicts, according to the report of the Community Epidemiology Work Group (National Institute on Drug Abuse, NIDA, 1995). Among drug treatment admissions, excluding alcohol-only users, heroin is now the leading primary drug of abuse in New York, Los Angeles, San Francisco, Boston, Newark and nearly equals cocaine in Seattle. The report also states that heroin or morphine caused 45% of drug-related deaths in Los Angeles (NIDA). The powerful euphoria of opiates and the (incorrect) perception among young abusers that heroin is not addictive have contributed to this increase in heroin abuse (NIDA).

There is a strong association between childhood maltreatment and later drug abuse. Among samples of substance abusers in treatment, the prevalence of reported childhood abuse ranges from 34% (Dunn, Ryan & Dunn, 1994) to 77% (Triffleman, Marmar, Delucchi, and Ronfeldt, 1995). Furthermore, the severity of alcohol problems may be related to severity of childhood sexual trauma (Ouimette, Wolfe, & Chrestman, 1996). In a large prospective design, Ireland & Widom (1994) found that childhood maltreatment predicted adult (but not juvenile) arrests for drug-related offenses, even after controlling for socioeconomic status (SES). Not only is childhood maltreatment prevalent among substance abusers, but substance abuse is also prevalent among survivors of abuse and neglect. Roesler and Dafler (1993) found that 66% of their sample of abused outpatients met DSM-III-R criteria for substance abuse or dependence at some time in their lives, although nonclinical samples show more modest prevalence rates. Community samples indicate that between 17% and 35% of people who were abused as children will become substance abusers (Browne & Finkelhor, 1986; Mullen et al. 1993). Although most survivors do not become substance abusers, a significant relationship exists.

Risk factors. The nature of the relationship between substance abuse and childhood trauma is not a simple one of cause and effect. Risk factors for child abuse or neglect include many of the risk factors for substance abuse such as ethnicity, family income and structure, parental psychopathology, and family discord (Sedlak & Broadhurst, 1996). These factors may influence the individual's development at cultural, social, psychological or biological levels. For example, it has been suggested that drug usage occurs principally as a result of social influences, while drug abuse and dependence

seem more strongly tied to psychological and biological factors serving to maintain the pattern of excessive drug use (Newcomb & Bentler, 1989).

Socioeconomic status. Consideration of economic status in research designs is essential due to its pervasive influence on ecological factors (e.g., high crime neighborhoods) and family factors (e.g., parent stress, unemployment) that contribute to child abuse, behavior problems, and drug addiction. Sedlak and Broadhurst (1997) found that children from low-income families were at far greater risk for all forms of maltreatment. Children from families earning less than $15,000 per year, compared with children from families earning more than $30,000, were at 21 times greater risk of physical abuse, 24 times greater risk of sexual abuse and up to 162 times greater risk of physical neglect. Some studies indicate that sociocultural factors are more powerful influences on later behavioral functioning than IQ or childhood abuse (Herrenkohl, Herrenkohl, Rupert, Egolf & Lutz, 1995).

Family factors. Child abuse is more likely to occur to children from problematic homes, even when demographic and social factors are considered (e.g., Mullen et al., 1993). Family structure, family conflict, and parental substance abuse have been associated with both drug use and child abuse, although the relation between these factors is just beginning to be examined (e.g., Dembo, Williams, Wothke, Schmeidler & Brown, 1992; Sheridan, 1995). Although social and family factors are significant influences, most studies have found that even after accounting for these influences, childhood abuse remains a significant predictor of substance abuse (Mullen et al.; Triffleman, Marmar, Delucchi, & Ronfedt, 1995). If substance abuse is related to impulsivity, these findings are in keeping with Eysenck's (1993) conclusion that the environmental variance in

impulsive behavior is largely specific (within-family) and that parenting styles and other family influences carry little weight.

Individual differences. Personality, temperament, and neuropsychological differences have also been associated with drug abuse. While many individual differences are innate, they may also result from traumatic experiences through physiological changes or psychological adaptation to the experience. Some theorists suggest that drug abuse represents such an adaptation: a form of self-medication to enhance self-esteem, reduce anxiety or depression, or alter level of arousal. The theory that an addict's drug choice reflects his or her particular psychological needs has been supported by a number of studies (Khantzian, Mack, & Schatzberg, 1974; Milkman & Frosch, 1973, Wieder & Kaplan, 1969). Eysenck (1967) theorized that drugs serve to maintain an individual's optimal level of arousal. For example, alcohol, opiates or other CNS depressants would lower an individual's level of arousal, while cocaine and stimulants would increase arousal. Khantzian (1985) suggests that opiate users have particular difficulty dealing with aggression, rage, and related depression. He proposes that these individuals are therefore attracted to the sedative property of opiates, which relieve the disorganizing and fragmenting effects of rage and aggression. Wilson, Passik, Fause, Abrams, and Gordon (1989) proposed that opiate addicts' abilities to regulate their own psychological and physiological processes are weaker than non-addicts' abilities. To test their hypothesis they developed a scale for self-regulation, based on a psychoanalytic approach to the Thematic Apperception Test, and found that opiate addicts' scores indicated poorer self-regulation than normal controls' scores. Taken together, these theories would predict that heroin addicts tend to be agitated, tense, angry individuals who lack adequate emotional

control and seek to manage their agitation through use of this CNS depressant. In fact, heroin addicts have been shown to have elevated rates of social anxiety (Grenyer, Williams, Swift, & Neill, 1992) and to crave opiates in response to depressed or anxious moods (Childress et al., 1994).

Cognitive ability. Some data supports suggestions that cognitive abilities may moderate the effects of childhood maltreatment on the development of social behavior. Masten and Coatsworth note that "in very adverse rearing environments, good intellectual skills appear to be very important for development," (1998, p. 213). Higher IQ appears to buffer some of the ill effects of parental substance abuse (Blackson, 1995) and parental criminal behavior (Kandel et al., 1988), conditions often associated with childhood maltreatment and the development of substance abuse problems. McNally and Shin (1995) found that veterans with higher IQ's are less likely to develop PTSD than those with lower IQ's, suggesting that cognitive abilities affect one's ability to cope with trauma. Furthermore, lower IQ children are more susceptible to drops in academic functioning under high stress (Garmezy, Masten & Tellegen, 1984) supporting the interpretation that cognitive disadvantage leads to poorer coping strategies for dealing with stressful situations (Stewart, 1996). One study found that IQ was a significant predictor of behavior problems in children and explained more variance than childhood abuse (Herrenkohl, Herrenkohl, Rupert, Egolf & Lutz, 1995). Drug abuse and disruptive behaviors might be viewed in this context as a less adaptive attempt to cope with distress and therefore a more likely choice by individuals lower in IQ. In fact, substance abusers have been found to have lower IQ's than controls in some studies (e.g., Tarter, Mezzich, Hsieh & Parks, 1995).

Child abuse and neglect have been related to poorer academic and intellectual functioning in childhood (Erickson, Egeland, & Pianta, 1989) and in adulthood (Perez & Widom, 1994). Cognitive deficits may be a direct result of the maltreatment (by battering, malnutrition, dehydration, or failure to thrive) or a result of the social and emotional effects (depression, hyperarousal, or social withdrawal). Abuse victims may also have lower IQ's because their parents have lower IQ's. Another possibility is that children with lower IQ's are at greater risk of being maltreated. Because there are no studies examining cognitive abilities before and after maltreatment, the cause of these cognitive impairments can not be determined.

Methodology. Because of serious shortcomings, the methodology of child abuse research has also been a subject of much discussion (Briere & Elliott, 1993; Briere, 1992b; Cicchetti, Carlson, Braunwald, & Aber, 1987; DiLalla & Gottesman, 1991; Widom, 1989). In particular, this literature has been criticized for poorly or inconsistently defined criteria for maltreatment, lack of differentiation between types of maltreatment, an over-reliance on retrospective and cross-sectional data, lack of appropriate control groups, and confounding socioeconomic backgrounds with maltreatment histories. The validity of both retrospective self-reports (Briere, 1992b; Loftus, 1993) and official reports of abuse by authorities shave been questioned in recent years. As an example of the discrepancy between these sources, one recent study found that approximately 40% of individuals with documented histories of physical abuse did not report being abused on self-report measures (Widom & Shepard, 1996).

Self-regulation

Theories of self-regulation. Discussions of self-control and self-regulation have

been conducted primarily by psychologists studying social cognition and those studying child development. Developmental theories, which emphasize the impact of earlier experiences on the course of development, provide a useful frame for understanding the development of substance dependence by abuse survivors. Wolfe (1987) outlined the effects of childhood traumatization on self-control, attachment to others, peer relationships and social competence and how this experience can lead to drug addiction and other problems. He defines self-control as the "ability to engage in a behavior that may involve immediately unpleasant consequences but long range pleasant outcomes" (p. 103). Wolfe emphasizes the role of parenting in the development of self-control and supports Patterson's suggestion that coercive parenting in particular leads to aggression and behavior problems (Patterson, DeBaryshe & Ramsey, 1989). Confirming the hypothesized importance of the relationship to self-regulation, subjects maltreated in childhood have been found more likely to report behavioral and affective dysregulation than subjects traumatized by a natural disaster (van der Kolk, Pelcovitz, Roth, Mandel, McFarlane & Herman, 1996).

The unique impact of an abusive relationship has been elaborated in contemporary attachment theory (Ainsworth, Blehar, Waters & Wall, 1978; Bowlby, 1988), which holds that secure attachments, the internalization of a responsive caregiver-child relationship, are necessary to learn how to regulate internal affective states and modulate behavior. Conversely, abusive early relationships are theorized to result in an insecure attachment, leading to an impaired capacity to regulate internal states and impaired social functioning (van der Kolk and Fisler, 1994). Abused children have been found more likely to have an insecure attachment classification than controls, even after controlling

for SES and welfare dependency (Cicchetti, Carlson, Braunwald, & Aber, 1987; Gauthier, Stollak, Messe & Aronoff 1996). The attachment patterns commonly seen in abused or neglected children give rise to undercontrolled behavior responses such as aggression against others, self-destructive behaviors, and poor affect regulation (van der Kolk & Fisler, 1994).

Cicchetti and Lynch's ecological-transactional model of development (1995) examines the impact of risk factors on child development. They review evidence that abusive parenting impairs attachment relationships and is a potent risk factor leading to physiological dysregulation, dysregulation of affect, and later social problems. Cicchetti and Lynch conclude that because abused children often have poor physiological regulation and have difficulty processing emotional stimuli they are prone to hyperarousal, impairing their judgement in stressful or ambiguous situations.

In contrast to the developmental approach, theories of self-regulation advanced by social psychologists have examined in depth psychological processes occurring over a shorter span of time. One of the more influential theories of self-control, by Block and Block (1980), proposed two dimensions of inhibitory control: ego control and ego resilience. Ego control refers to an individual's threshold for expression or containment of impulses, feelings, and desires. Ego resiliency refers to the capacity of the individual to modify their level of ego control in response to changes in their situation. In their study, teachers described preschool children low in ego control as more active, assertive, aggressive, competitive, outgoing, attention-seeking, unable to delay gratification, overreactive to frustration, jealous, and exploitive than overcontrolled children. Children high in ego resilience were better able to cope with stress and were more empathic, self-

accepting, novelty seeking, self-reliant, creative, and competent than children low in ego resilience. Reviewing studies of resilient maltreated children, Cicchetti and Lynch (1995) observed that ego overcontrol is one of the few variables that may serve a protective function for maltreated children. They hypothesize that a reserved, controlled approach to the environment might allow these children to avoid continued maltreatment incidents.

Expanding on the concept of ego control, Eisenberg & Fabes (1992) proposed a model of behavioral regulation that emphasizes affective regulation and intensity. Emotional regulation is postulated as one aspect of emotion-focused coping while emotional intensity is seen as the individual differences in the typical intensity with which individuals experience their emotions. They theorize that emotional regulation mediates behavioral and cognitive responses to stimuli. Emotional regulation and emotional intensity may interact to determine behavioral responses, with the most extreme behavior anticipated from individuals high in emotional intensity and low in emotional regulation.

Other self-control theorists place more emphasis on behavior. Equal importance is given to the behavioral and emotional aspects of control in Pulkkinen's theory (1982), where she identified two dimensions of aggressive impulse control: control of emotion and suppression of emotionally driven behavior. Children who do not control emotions and do not suppress emotional behaviors were the most aggressive in her study. Strong emotional control with less suppression of behavior resulted in constructive behavioral responses better peer relations, academic success, optimism, and self-confidence. Contrary to other theorists, Barkley (1997) proposed a model in which emotional control is dependent on behavioral inhibition. He hypothesizes that people with deficits in

behavioral inhibition, such as people with ADHD, will therefore show impaired emotional regulation as evidenced by greater emotional reactivity and hyper-responsiveness.

Baumeister and Heatherton (1996) have examined cognition in failures in self-regulation, which they define as "the capacity of human beings to alter their own responses and thus remove them from the direct effects of immediate, situational stimuli" (p. 1). They propose a strength model, suggesting that self-control is a limited resource that can be depleted by stress or strengthened by exercise. In this theory, self-regulation failure can occur whenever the costs even momentarily seem to outweigh the benefits. Baumeister and Heatherton emphasize cognitive processes in self-control such as the control of attention and the choice to acquiesce. They view the impact of emotion primarily as concentrating attention on the most immediate aspects of a situation, thereby making it more difficult to delay gratification. They cite alcohol abuse not only as an example of a failure of self-regulation, but as a mediating factor that reduces self-control by limiting self-monitoring and increasing one's attention to immediate stimuli.

Theory of self-control continues to be an active area of research. Although the theories mentioned span cognitive, social, and developmental psychology, they have some elements in common. Most of these theories treat self-regulation as composed of internal processes leading to behavioral outcomes. With the exception of Barkely (1997), these theories treat affect regulation as one factor influencing or subsumed under behavior regulation. Recent empirical findings support this role of emotion regulation. One of the few studies to examine the relative contributions of emotional and behavioral regulation suggests that the influence of emotional regulation is not independent of

behavioral regulation (Shields, Cicchetti, & Ryan, 1994). These researchers found that behavioral regulation appears to mediate maltreatment's effects on social competence but the influence of emotional regulation was less clear. In hierarchical regressions, behavioral regulation was a significant predictor after adding maltreatment status and emotional regulation, indicating that behavioral regulation contributes a unique and significant portion of variance of children's social competence. However, emotional regulation was not consistently a significant predictor of social competence. Recent work by Leith and Baumeister (1996) suggests that bad moods foster risk-taking by impairing self-regulation. In a series of studies they found that unpleasant moods accompanied by high arousal, such as anger or embarrassment (but not sadness), induce people to make less careful, reasoned decisions. Taken together, these theories suggest that the measure of self-regulation is in a person's behavior, rather than their mood.

Aspects of self-regulation. Although a number of constructs have been proposed to explain the dimensions of self-regulation or self-control, operational definitions have typically been limited to externalizing or "problem" behaviors. Factor analytic studies of children with externalizing behavior problems have consistently yielded factors including aggression/conduct problems, inattention, hyperactivity, and impulsivity (Dawes, Tarter, & Kirisci, 1997; Hesselbrock, 1986; Hinshaw, 1987; Martin et al., 1994; White et al., 1994). Martin and colleagues (1994) used a sample of boys at risk for developing substance abuse (because of family history of substance abuse) to identify four factors of their externalizing behaviors. They identified aggressivity, hyperactivity, inattention and impulsivity as four facets of an overarching single factor they termed behavioral dysregulation. Boys at risk for substance dependence were higher on all these factors

than controls without a family history of substance abuse. Martin and colleagues (1994) further suggested that these factors are associated with substance abuse by impairment of the executive cognitive functions that have been linked to both behavior problems and drug-taking behavior. Another study using high-risk boys recently confirmed these results. Dawes, Tarter and Kirisci (1997) tested the construct of behavioral self-regulation (BSR) as composed of three factors: inattention, impulsivity/hyperactivity, and aggression. They found that boys with a family history of substance abuse scored higher on this BSR construct than boys without this risk factor. BSR was also significantly associated with family dysfunction, deviant peer affiliations, and poor school performance. Limited confirmation of the association between these factors was obtained by Krueger, Caspi, Moffitt, White & Stouthamer-Loeber (1996) whose longitudinal study of adolescents indicated that low self-control, operationalized as delay of gratification, is a risk factor for delinquent and aggressive behavior disorders, but not internalizing disorders. Furthermore, these impulsive and aggressive delinquents scored lower than internalizing subjects on measures of ego control and ego resiliency.

A few studies have examined aspects of behavior problems in adults with most finding factors of aggression, motor impulsivity, and inattention or cognitive impulsivity (Chemtob, Hamada, Roitblat & Muraoka, 1994; Moss, 1989; Ohanessian, Stabenau & Hesselbrock, 1995), although some studies also found factors of psychopathy and hyperactivity (e.g. Ohanessian, Stabenau & Hesselbrock, 1995). Moss (1989) studied adult substance abusers using measures of psychopathy, hostility and IQ and noted significant intercorrelations between scales. He identified four orthogonal factors for this apparent common factor that were independent of family history of drug abuse:

impulsivity/narcissism/sociopathy, assaultive aggression, irritative aggression, and IQ. Although drawn from a limited range of measures, these factors reflect the findings of child studies. The principle indicators of self-regulation then appear to be aggression, inattention, impulsivity and, in children, hyperactivity. Other related factors such as psychopathy and sensation-seeking are strongly associated with drug abuse and might also be considered. However sensation-seeking, as the term implies, involves goal-directed behavior rather than undercontrolled behavior, while psychopathy refers more to a lack of empathy than it does to the regulation of behavior. Therefore these constructs are not as clearly related to failures in self-control as are aggression, inattention, impulsivity, and hyperactivity.

Maltreatment and Self-control in childhood

Maltreatment of children has a number of effects on children's self-regulation abilities. Abused and neglected children have been shown to have impaired behavioral and emotional regulation compared to non-maltreated children (Shields, Cicchetti, & Ryan, 1994). The initial effects of maltreatment may include aggression or hostility (Malinosky-Rummell & Hansen, 1993; Widom, 1989) and other externalizing problems as conduct disorder and ADHD (Browne & Finkelhor, 1986). Other research has emphasized longer term deficits in social competence compared to non-maltreated children (Manly, Cicchetti, & Barnett, 1994; Shields, Cicchetti, & Ryan, 1994). The impact of maltreatment appears to depend not only on the child but also on the type and severity of abuse perpetrated.

Types of maltreatment. Most studies examining the impact of abuse have either treated all abuse as homogeneous or have focused on sexual abuse, but different types of

abuse appear to have different consequences (c.f. Briere & Runtz, 1990; Egeland, Sroufe, & Erickson, 1983). Emotional abuse occurs in about 90% of the instances of abuse or neglect (Claussen & Cittenden, 1991). However, excluding emotional abuse, there is relatively little overlap in types of abuse with only about 6% of abuse victims in community samples experiencing multiple forms of maltreatment (Sedlak & Broadhurst, 1996). Sexual abuse, physical abuse, and neglect appear instead to be phenomenologically distinct with unique sequelae (Briere & Runtz, 1990). In the past decade more studies have distinguished between types of maltreatment under study. Only a handful, however, have compared maltreatment groups to examine whether social and psychological sequelae differ by type of abuse.

Verbal and psychological abuse are often overlooked because of their intangibility and prevalence. It has been argued that all forms of child maltreatment incorporate some psychological abuse and that psychological damage is the primary impact of all maltreatment (Claussen & Crittenden, 1991; Hart & Brassard, 1987). In this review, emotional or psychological abuse is defined as psychologically damaging acts of commission that do not involve physical contact. This definition would include experiences of being screamed at, criticized, humiliated, threatened with abandonment or injury, or witnessing violence against other family members. Only a few studies have separated emotional abuse from other forms of abuse. Mullen and colleagues (1996) reported that the impact of emotional abuse was more similar to that of sexual abuse than to physical abuse, with outcomes including teenage pregnancy, low self-esteem, suicide attempts, depression, and other psychiatric problems. Briere and Runtz (1990) also found that low self-esteem was a unique effect of psychological abuse. In the Minnesota

Mother-Child Project, verbally abused preschool children were noted to be angry, avoidant and low in ego control (Egeland, Sroufe & Erickson, 1983). Varia, Abidin, & Dass (1996) also noted poor self-control in these children. Overall, emotional abuse appears to have the greatest impact on the child's self-esteem and affective regulation.

The most common forms of maltreatment are neglect and emotional abuse, which are also the most difficult to define. Unlike other forms of abuse, neglect is an act of omission rather than commission in which the basic needs of the child are not provided. Neglect tends to be more chronic and pervasive than physical abuse (Pakizegi, 1985), but its effects are similarly pervasive. In a study of actively abused children, neglect was more strongly related to current functioning than severity of physical injury (Claussen & Crittenden,1991). Another study comparing neglected and physically abused individuals found that the experience of neglect predicted greater psychopathology as measured by the SCL-90 and more dysfunctional attachment styles than physical abuse (Gauthier, Stollak, Messe, & Aronoff, 1996). Neglected children have lower IQ, lower school achievement and more disciplinary problems than abused children who were not neglected (Kendall-Tackett & Eckenrode, 1996; Perez & Widom, 1994).

Some researchers have subdivided neglect into components such as physical neglect, emotional neglect, and educational neglect (e.g., Erickson, Egeland & Pianta, 1989; Sedlak & Broadhurst, 1996). The Minnesota Mother-Child Project (Egeland, Sroufe, & Erickson, 1983; Erickson, Egeland & Pianta, 1989) followed 267 high risk families to assess the effects of different types of abuse on the children's development from infancy through age 6. Based on observations and interviews, they assigned children to one of six groups: physically neglected, emotionally neglected (mother

psychologically unavailable), physically abused, verbally abused, sexually abused, and adequately parented. At 2 and 4 years, children in both neglected groups had more problems in more areas of functioning than the children in the other groups. These children showed less intellectual and social competence, poorer school performance, and more behavior problems. They describe the physically neglected children as having "difficulty pulling themselves together to deal with tasks (p. 468)" while the emotionally neglected children appeared the most impaired of all groups at 2 and 4 years, exhibiting a large number of pathological behaviors and a high dependency on teachers. By 6 years of age, the physically neglected group appeared the most impaired, with more varied and severe problems than other groups. Compared to the emotionally neglected group, the physically neglected group had more internalizing and anxiety problems and lower IQ's. The emotionally neglected group was noted to have more aggressive and externalizing behavior problems than other groups. Overall, neglect is associated with impaired intellectual development, and extensive behavioral and psychological difficulties.

Sexual abuse is distinctive from other types of abuse in several ways. It is usually perpetrated by an individual outside the family (Mullen et al., 1996; Silverman, Reinherz & Giaconia, 1996) suggesting distinct family dynamics. A specific effect of sexual abuse noted in a number of studies is that survivors of sexual abuse are more likely to develop sexual problems as adults than individuals experiencing other types of abuse (Briere & Runtz, 1990; Friedrich, 1993; Kolko, Moser & Weldy, 1990). In childhood, this effect of sexual abuse is evident as increased dependency and need for closeness (Erickson, Egeland & Pianta, 1989). In a community sample, women who were sexually abused were more likely to attempt suicide, abuse alcohol, and develop internalizing

disorders in early adulthood (Silverman, et al., 1996). Cicchetti & Lynch (1995) concluded that sexually abused children display PTSD symptoms at a higher rate than children experiencing other forms of abuse. Sexually abused children were noted in the Minnesota Mother-Child study as more anxious and inattentive than children in other groups (Erickson, et al., 1989). Overall, sexual abuse is associated with impaired intimate relations and internalizing disorders, but not behavior problems or aggression.

Unlike the sexual abuser, the perpetrator of physical abuse is usually a family member who is often responsible for creating a disrupted and violent family environment (Mullen et al., 1996; Silverman, et al., 1996). In these situations, physical and psychological abuse frequently occur together, as the battered child is subjected to verbal threats and witnesses violence against others in the family (Briere & Runtz, 1990; Ouimette, Wolfe, & Chrestman, 1996). A common finding is that physical abuse has a specific effect of increasing anger and aggression in survivors of this type of abuse (Briere & Runtz, 1990; Widom, 1989). Another related finding is that men who have been physically abused in childhood are more likely to behave violently toward their partner as an adult and are more likely to become separated or divorced (Malinosky-Rummell & Hansen, 1993; Mullen, et al., 1996). Dembo and colleagues (1992) found that physical abuse was more associated with delinquent behaviors in males than was sexual abuse. Physically abused individuals are lower in self-control as preschoolers (Egeland, et al., 1983) and as adults (Varia, Abidin & Dass, 1996). Despite these findings, most studies have found that the effects of physical abuse alone are not as severe as some other types. It is the frequency with which physical abuse co-occurs with other forms of abuse, especially emotional abuse and sexual abuse, that leads to much

worse outcomes for many individuals reporting a history of physical abuse. Children who are physically abused are six times more likely to be sexually abused than controls (Mullen et al., 1993). These few individuals who experience both sexual and physical abuse are at much greater risk for substance dependence and psychiatric hospitalization (Harrison, et al., 1997; Mullen et al, 1996). Physical abuse is therefore a risk factor for later aggression but more often interacts with other types of abuse to increase an individual's vulnerability to adverse outcomes.

There are some indications that physical abuse in particular, is a risk factor for substance abuse later in life (Harrison et al., 1997; Silverman, et al., 1996). Roesler and Dafler (1993), examining a community sample of sexually abused adults, found that those who were also physically abused were more likely to develop substance abuse. Interestingly, substance abuse was unrelated to the parents' alcoholism, emotional abuse, or type of sexual abuse. A study of adult victimization and substance abuse found that opiate users were physically attacked more than users of other drugs and were more likely to develop PTSD than other drug users (Cottler, Compton, Mager, Spitznagel & Janca, 1992). This finding could be interpreted as suggesting a particular psychological vulnerability among opiate abusers, as evidence that opiate use satisfies a need induced by physical abuse, or that opiate users simply have poorer social judgement and place themselves at risk of injury more often than other drug users. Taken together, these findings raise the hypothesis that the experience of physical abuse might place one at higher risk of substance dependence than other forms of childhood maltreatment.

Different types of child maltreatment have been shown to lead to some specific outcomes. These abuse subgroups may also differ in their self-regulation abilities.

Victims of physical neglect are suspected of being more internalizing and inattentive while emotional neglect is anticipated to lead to more aggression and externalizing behaviors. Sexual abuse is expected to have an impact similar to physical neglect with more internalizing and inattention expected due to the likelihood of depression. Physical abuse is expected to lead to greater aggression, while emotional abuse is expected to increase impulsivity and hostility due to impaired affect regulation.

Severity of abuse. Conclusions about the impact of abuse vary in part because research criteria for child maltreatment have ranged from severe injury to poor parenting. Maltreatment is usually treated as a dichotomous variable, however, the division between abused and non-abused groups is frequently arbitrary. Abuse and neglect occur in varying frequency and severity, so maltreatment is best treated as a continuous variable. Furthermore, the extent of abuse appears related to children's functioning. Manly, Cicchetti, and Barnett (1994) found that severity and type of abuse were powerful predictors of child outcomes even when the dichotomous maltreatment grouping was not significant. They found that severity of abuse predicted counselor ratings of both social competence and behavior problems in school-age children.

Childhood maltreatment and Self-control in adulthood

Childhood maltreatment has been directly associated with poor behavioral regulation in adulthood, although most of these studies have relied on retrospective reporting of maltreatment by adults. Several types of behavioral disinhibition in adults have been linked to childhood abuse including self-injury (Shearer, 1994; Wagner & Linehan, 1994; Westen, Ludolph, Misle, Ruffins & Block, 1990; Van der Kolk, Perry, & Herman, 1991), risky sex (Zierler et al., 1991), and aggressive behavior (DiLalla &

Gottesman, 1991).

In adolescents, poor self-regulation is often manifest as criminal behavior. Abused children are more likely than nonabused children to become juvenile delinquents, and delinquents (especially girls) are more likely than normals to become drug addicts (Dembo, Williams, Wothke, Schmeidler & Brown, 1992; Ireland & Widom, 1994; Lewis, & Bucholz, 1991). To examine this, Dembo and his colleagues (1992) with a mostly male sample of 399 juvenile detainees in Florida, used structural equation modeling to support the hypothesis that childhood abuse experiences and psychopathology of family members contributes to adolescent delinquency and drug abuse. Mannuzza and colleagues (1991) followed a group of impulsive-hyperactive school children for eleven years and found that all the boys who later developed substance abuse disorders were diagnosed with an antisocial or conduct disorder first or concurrently. These findings support White (1997) who concluded in her review that aggression and delinquency precede alcohol and other drug use. Juvenile delinquency appears to moderate, if not mediate the relationship between having been abused and the development of drug addiction and this relationship interacts with gender.

Continuity of self-regulation. Problems in self-control that develop in childhood are likely to continue into early adulthood, regardless of their cause. A number of studies support the continuity of behavior problems. Ohannessian, Stabenau and Hesselbrock (1995) examined retrospective reports of childhood temperament and compared them with adult behavior ratings. They found high correlations between childhood and adult behavior scales suggesting significant continuity of temperament.

The Dunedin Multidisciplinary Health and Development Study followed a cohort

of New Zealand children born in 1972 (Caspi, Moffitt, Newman & Silva, 1996; Henry, Caspi, Moffitt & Silva, 1996; Mullen et al., 1996). These children were observed and classified at age 3 as either inhibited, well adjusted, confident, reserved or undercontrolled. In these studies, Caspi and colleagues rated the undercontrolled children in preschool as low in modulating impulsive expression and sensitive to stress as expressed in negatively charged affective expressions. At ages 9 and 15, the self-control of the undercontrolled children was related to parent and teacher-rated externalizing behavior problems. At age 18, their preschool self-control rating discriminated violent offenders from nonviolent offenders and nonoffenders (Caspi et al., 1996; Henry, et al., 1996).

In another longitudinal study in New Zealand, Fergusson, Lynskey & Horwood (1996) demonstrated the continuity between disruptive disorders in 7 to 9 year old children and conduct disorder 7 years later. Children showing disruptive behavior as 7 to 9 year olds were more than 16 times as likely to have conduct disorder in adolescence than children without behavior problems. 88% of the children in this study continued in either the problem or non-problem category, indicating strong continuity in these behaviors. These findings support earlier work by Hesselbrock (1986), which found that hyperactivity, conduct problems, and aggressiveness in children were predictive of antisocial personality in adulthood. In her discussion of the "violence breeds violence" hypothesis, Widom (1989) reviews a variety of studies showing the stability of aggressive behavior over the course of an individual's life. This is not surprising given findings that aggression is one of the most stable human traits, second only to intelligence (Olweus, 1979). Thus it appears that affective and behavioral self-regulation is a stable and

predictable pattern over time, with early disruptive behavior predicting poor behavioral regulation in adulthood.

Adult Self-regulation and Drug abuse

As described above, maltreated children are prone to become behaviorally undercontrolled and this appears to be linked to substance abuse. Drug abuse may serve to help maltreatment victims cope with the consequences of the abuse (Miller, Maguin & Downs, 1997; Roesler & Dafler, 1993; Simmons, Sack, & Miller, 1996). Kaplan (1980) theorized that sexual and physical abuse lead to self-derogation and depression in some victims and that substance use is a method for coping with overwhelming emotional consequences of the abuse. This approach is in keeping with Khantzian's self-medication hypothesis (1985) discussed earlier.

A substantial literature exists on characteristics of adult substance abusers who seem to have poorer self-control than normal subjects (King, Jones, Scheuer, Curtis & Zarcone, 1990). One of the most common findings is that drug abusers have antisocial personality traits. 40% to 50% of male drug and alcohol abusers meet criteria for antisocial personality disorder (Gerstley, Alterman, McLellan, & Woody, 1990). "Antisocial" has been used to describe people meeting the behavioral criteria for antisocial personality disorder and an overlapping group of people who have the personality characteristic of psychopathy (Cleckley, 1976) or uncooperativeness (Svrakic, Svrakic & Cloninger, in press, cited in Virkkunen & Linnoila, 1997). These two types are assessed by the two factors of Hare's Psychopathy Checklist (Harpur & Hare, 1994). Factor 1 assesses psychopathic traits and is stable over time. Factor 2, which declines with age, taps the antisocial behaviors and socially deviant lifestyle and is much more

strongly associated with alcohol and drug dependence disorders (Harpur & Hare, 1994; Rutherford, Alterman, Cacciola & McKay, 1997). This differentiation suggests that the primary linkage between substance abuse and antisocial behavior may be in the lifestyle and actions of these people rather than in their character, morals, or capacity for empathy.

Cloninger's typology provides another look at behavioral traits associated with drug dependence (Cloninger, Sigvardsson, & Bohman, 1988). Cloninger and colleagues proposed two types of alcoholics: Type I alcoholics are described as rigid, anxious, dependent, introverted and susceptible to social influence while Type II alcoholics are aggressive, impulsive, gregarious and antisocial. He and his colleagues examined three personality dimensions as risk factors for alcoholism: novelty seeking, harm avoidance and reward dependence. Novelty seeking included qualities similar to sensation seeking as well as some impulsive, inattentive, and aggressive traits. Individuals high in harm avoidance are described as sensitive, worried, and anxious. Reward dependence involves sensitivity to social cues and appears closely related to empathy. Low harm avoidance and high novelty seeking were the factors most strongly predictive of early-onset (Type II) alcoholism in a prospective design (Cloninger, Sigvardsson, & Bohman, 1988) and predicted early-onset substance use in a longitudinal study from age 6 to adolescence (Masse and Tremblay, 1997). Early-onset alcoholism is associated with antisocial behavioral traits and both may share the same neurobiological underpinnings (Virkkunen & Linnoila, 1997). Type II alcoholics appear to have the poorest behavioral control, the earliest onset of substance abuse, and the poorest prognosis. In a test of Cloninger's theory of early-onset alcoholism, Masse and Tremblay (1997) followed children from kindergarten to adolescence and found that later substance abuse could be predicted by

impulsive, reckless, and hyperactive behavior in kindergarten.

Behavioral dysregulation in childhood and adulthood appears to be prodromal to drug abuse. Using retrospective reports of childhood behavior, Hesselbrock (1986) found that hyperactivity, conduct problems, and aggressiveness in childhood were predictive of substance abuse in adulthood. Ohannessian, Stabenau and Hesselbrock (1995) confirmed the link between behavioral dyscontrol and substance abuse in adults with a sample of 229 subjects. They identified five dimensions of adult behavioral problems and used logistic regression to examine these factors as predictors of abuse of alcohol and drugs, alcohol only or drugs only. Antisocial behavior (e.g.,getting into fights, trouble with the law, destructive to people and things) was the strongest predictor of drug abuse and drug and alcohol abuse, confirming the results of studies on Hare's psychopathy Factor 2 (Harpur & Hare, 1994; Rutherford, Alterman, Cacciola & McKay, 1997). Inattention and depression were also significant predictors of drug and alcohol abuse but not of drug-only abuse. This study suggests that behavioral self-regulation is related to substance abuse and that the type of self-regulation failures may differ by the type of drug abused.

This chapter has presented findings related to childhood maltreatment and the development of substance abuse. The ability to modulate one's behavior may mediate this relationship. Theoretical and empirical work have indicated that impaired self-control is a common consequence of childhood maltreatment, especially physical abuse, emotional abuse and emotional neglect. Poor self-control in childhood (e.g., hyperactivity, aggressiveness, inattention, and impulsivity) has been shown to have considerable stability over time, leading to behavior problems in adolescence and substance abuse in adulthood. This study seeks to replicate this finding and examine

whether the various types childhood abuse impact different aspects of self-regulation in adulthood. This study also seeks to confirm the relationship between adult behavioral regulation and drug addiction.

Research Questions

The purpose of this study is to better understand the role of behavioral self-regulation in the development of substance abuse among survivors of childhood abuse. This study defines self-regulation as a behavioral trait consisting of inattention, aggression, and impulsivity in adults. This study seeks to answer the following questions:

1. Does the severity of maltreatment in childhood predict later heroin addiction?
2. Is the extent of maltreatment in childhood related to overall problems in self-regulation (elevated levels of impulsivity, inattention, or aggression) as an adult?
3. Can the type and extent of problems in behavioral self-regulation predict later heroin addiction?
4. Is the type and extent of maltreatment associated with the type of problems in behavioral self-regulation?

HYPOTHESES

The following hypotheses were proposed:

1. After controlling for SES, IQ, and gender, childhood maltreatment measures would predict whether individuals are in the heroin addict or control groups.
2. After controlling for SES, IQ, and gender, childhood maltreatment measures would predict the extent of problems in behavioral self-regulation.
3. After controlling for SES, IQ, and gender, self-regulation (total) would predict whether individuals are in the heroin addict or control groups.
4. The type and severity of maltreatment (CTQ subscales) were expected to be significantly related to self-regulation scales (impulsivity, aggression, and inattention). Victims of physical neglect are suspected of being more inattentive while emotional neglect is anticipated to lead to more aggression. Sexual abuse is expected to have an impact similar to physical neglect with more inattention expected due to the likelihood of depression. Physical abuse is expected to lead to greater aggression, while emotional abuse is expected to increase impulsivity and hostility due to impaired affect regulation.

METHODS

Sample

The sample of 130 subjects consists of a group of opiate abusers and a control group. The substance abuse sample is taken from a population of individuals seeking treatment for opiate dependence between February 1996 and July 1996 at a University of Vermont research and treatment facility funded by the National Institute on Drug Abuse (NIDA). This clinic provides outpatient treatment for opioid dependence using buprenorphine, an alternative to methadone. Free treatment was provided to all participants, and each patient participated in one of eight ongoing research protocols examining buprenorphine for the treatment of opioid dependence. Subjects were paid approximately $25 for their participation in a two to four hour research assessment, occurring after approximately two weeks in treatment. Demographic data was collected at intake to the treatment clinic on these same subjects, including measures of personality and temperament (e.g., impulsivity, sensation-seeking), psychopathology, and addiction severity. It should be noted that many patients repeated treatment, but only data from their first treatment or the treatment with the most completed data is used in this analysis.

Demographic and clinical data was also collected from a control group of 60 subjects, recruited from the community by newspaper advertisement. The ad simply stated "Volunteers needed for a personality study," the range of compensation, and a phone number. Respondents to this ad were screened by phone to attempt to match the addict group's mean education, income, gender, race, age and full scale IQ. The screening criteria for control group subjects were (1) no reported illicit drug use or alcohol abuse in the last 30 days and no history of addiction to alcohol or drugs, (2) less

than 16 years education, and (3) 35% female. Control subjects were paid approximately $50 for completion of an assessment battery. Exclusion criteria for both groups included age below 18 or above 60, and evidence of uncontrolled major psychiatric disorder. All subjects received and signed an Informed Consent agreement prior to participation (see Appendix A).

Measures

Reported abuse history is assessed with the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994). The CTQ is a 70 item self-report instrument that assesses childhood trauma in four areas: physical and emotional abuse, physical neglect, emotional neglect, and sexual abuse, allowing differentiation by type and severity of trauma (see Appendix B). Items are endorsed on a 5-point Likert scale. Initial studies of the CTQ indicate good reliability: test-retest reliability ranged from 0.80 to 0.88 and internal consistency was 0.79 to 0.95 (Bernstein et al., 1995; Bernstein et al., 1994). In a recent study of adolescents, Cronbach's alpha was .97 for the total scale and the factor structure was confirmed (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997). Good convergent and divergent validity is reported with interview data (Bernstein et al., 1994) and therapists ratings (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997).

While many findings support the reliability of maltreatment self-reports (Brewin, Andrews & Gotlib, 1993; Dill, Chu, Grob & Eisen, 1991), the validity or accuracy of such reports remains controversial (Briere, 1992b; Loftus, 1993). To avoid definitional problems in this study, subjects are not dichotomized into abused/nonabused categories based on CTQ scores. Scale scores are treated as indicators of a continuum of experiences from no maltreatment to severe combined forms of abuse.

Self-regulation factors. The components of behavioral self-regulation assessed were impulsivity, hostility, and inattention.

Hostility is assessed with the Buss Durkee Hostility Index (BDHI; Buss & Durkee, 1957). This is a 75-item true-false questionnaire with subscales for Verbal Hostility, Assault, Indirect Hostility, Irritability, Negativism, Resentment, Suspicion and Guilt (see Appendix C). Factor analysis of the scales yielded two factors: a behavioral component and an attitudinal component (Buss & Durkee, 1957). Although the factor structure has been criticized for its instability, the Buss Durkee Hostility Index has been the most frequently used measure of aggressiveness and has been shown to have predictive validity in a variety of clinical samples (Moreno, Fuhriman & Selby, 1993; Williams, Boyd, Cascardi, & Poythress, 1996). The BDHI correlates well with other measures of anger and hostility (Moreno, Fuhriman & Selby). BDHI reliability is good with an internal consistency alpha coefficient of .92 (Williams, Boyd, Cascardi, & Poythress) and a test-retest correlation of .92 (Moreno, Fuhriman & Selby).

Inattention is assessed with the Cognitive subscale of the Barratt Impulsivity Scale, 10th edition (BIS-10, Barratt, 1994) which asks respondents to rate, from 0 to 4, how much the items describe them currently(see Appendix D). The construct validity of this approach is supported by evidence that impulsivity is a function of attention (Dickman, 1993). The BIS-10 is a 34 item questionnaire with subscales for cognitive impulsivity, motor impulsivity, and non-planning impulsivity. The cognitive scale includes eleven items like "I don't 'pay attention' ", " I concentrate easily", "I am a steady thinker", and "I often have extraneous thoughts when thinking." Reliability of this scale is modest with reported test-retest reliability of .43 (Luengo, Carrillo-de-la-Pena, &

Otero, 1991) and internal consistency reliability alphas ranging from .60 (Carrillo-de-la-Pena, Otero, & Romero, 1993) to .18 (Luengo, Carrillo-de-la-Pena, & Otero). This scale correlates significantly with behavioral measures of inattention such as the Matching Familiar Figures Test (MFF-20; Carrillo-de-la-Pena, Otero, & Romero).

Impulsivity is assessed with the impulsivity scale of the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1978). The EPQ is a 63 item true-false questionnaire with subscales for impulsivity, venturesomeness and empathy (see Appendix E). The 24-item impulsivity subscale, also known as the I.5, has an internal consistency reliability of .80 to .85 (Carillo de la Pena, Otero, & Romero, 1993; Eysenck & Eysenck, 1978). This scale emphasizes motor impulsivity, correlating well with other behavioral indicators of impulsivity such as the motor impulsiveness scale of the BIS-10 (Luengo, Carrillo-de-la-Pena, & Otero, 1991), motor restlessness, and teacher ratings (White, et al., 1994).

Socioeconomic status. The Hollingshead Four Factor Index of social status (1975) assesses socioeconomic status (SES). A revision of the original two-factor scale, this index is based on a model of social status nominally incorporating four factors: occupation, gender, education and marital status. However, gender does not enter into the computations, so the resulting composite score (from 8 to 66) is actually based only on three factors. This measure is widely used in psychological research , and is highly reliable and well validated (Gottfried, 1985; Hollingshead, 1975).

IQ is assessed with four subtests of the Wechsler Adult Intelligence Scales - Revised (WAIS-R, Wechsler,1981): two verbal subtests (Vocabulary and Information) and two performance subtests (Picture Completion and Block Design). These subtests

were chosen because they correlate most highly with full scale IQ. The validity coefficient for this short form is .93 (Sattler, 1990).

Data Analysis

Data were available for 60 subjects in the Control group and 70 subjects in the Addict group. The sample is 98% white (which is representative of the Vermont population) and 60% male, with a mean age of 35 years (*SD* = 9.1), mean SES of 38 (*SD* = 9.1) and mean IQ of 100 (*SD* = 14.3). Sample demographics by Addict status, shown in Table 4, indicate the Control and Addict Groups were not significantly different on these variables. No data were missing for Control subjects. In the Addict group, measures of self-regulation (impulsivity, aggression, and inattention) were missing in clusters because they had been administered together. To insure that these and other missing measures were missing at random, logistic regression was used to confirm that the absence of a measure was not significantly related to the other variables. Two Addicts were dropped because they were missing both self-regulation and maltreatment data. Missing data was imputed for 21 Addict subjects as follows: five cases missing IQ, three cases missing self-regulation measures, 13 cases missing maltreatment measures. Missing scores for IQ, self-regulation measures, Physical Neglect and Sexual Abuse were estimated with linear regression based on the full sample of 128 subjects, using significantly correlated variables as predictors initially. Nonsignificant predictors were then dropped and the resulting recalculated regression formulas are detailed in Table 1. Missing values for Emotional Neglect and Physical and Emotional Abuse were replaced with the group mean since other variables were not found to be significant predictors of these variables. Although the imputed scores could have an impact on some analyses, the

overall effect is probably negligible as the imputed values represent only 7% of the addict data and less than 1% of the total data.

A Self-regulation composite score was calculated by combining the Hostility, Inattention, and Impulsivity scores. Because these three scales have different metrics, the scores were first standardized and then averaged in order to weight the factors equally. A Maltreatment Total score was calculated by summing the four CTQ factor scores, as described by Bernstein et al. (1994).

Preliminary Analysis

Distributions of the continuous variables were examined. Physical neglect, Physical and Emotional Abuse, Sexual Abuse, and Maltreatment Total distributions were non-normal with skew greater than 1.0. A natural log transformation produced acceptable distributions for Maltreatment, Physical Neglect, and Physical & Emotional Abuse. Sexual Abuse could not be transformed into a normally distributed variable so the sample was divided into three groups: no sexual abuse (CTQ score = 1), low abuse (score between 1 and 2), high abuse (score greater than 2). Means and standard deviations are shown in Table 4.

Pearson's correlations between maltreatment, demographic and self-regulation variables are shown in Table 2 and several trends are noteworthy. Addict status was significantly correlated with all variables except age, gender and race. Addict status and SES are positively correlated, indicating that higher SES is associated with a higher likelihood of being in the Addict group. The direction of this association is unexpected but is most likely an artifact of attempting to select control subjects with low SES to match the addict group. The self-regulation measures were significantly positively

correlated with all maltreatment measures except sexual abuse group. The correlation between the Maltreatment Total score and the Self-regulation composite was of moderate magnitude (r=.37, p<.01). The self-regulation measures, except inattention, were significantly negatively correlated with age. This is consistent with literature noting a decline in aggression with age.

The only highly correlated measures (r >.70) were some scales of the Childhood Trauma Questionnaire. The scales are derived from factors that are not orthogonal and have been reported to have correlations ranging from .22 to .73 with a mean intercorrelation of .52 in a validation sample (Bernstein & Fink, 1993). In this sample, CTQ scale correlations ranged from .28 to .88 with a mean intercorrelation of .57. The most highly correlated scales are the Emotional Neglect, Physical Neglect, and the Physical and Emotional Abuse scales. These three scales (untransformed) were averaged to form a single scale named "Nonsexual Abuse." The Nonsexual Abuse score approximates a normal distribution.

Gender was significantly correlated with only one other variable, IQ (see Table 2). To assess whether the correlations between maltreatment scores, demographics and dysregulation scores differed between genders, Pearson's correlations were calculated separately for males and females and the difference examined. Because the sampling distribution of correlations is skewed and non-normal, Fisher's transformation is commonly applied when correlations are compared:

$$r' = (0.5)\ \log_e|1+r/1-r|$$

The differences between the transformed male and female correlations were then calculated and are reported in Table 3. These difference scores were tested for

significance using Fisher's *z* statistic:

$$z = \frac{r_m' - r_f'}{\sqrt{(1/N_m - 3) + (1/N_f - 3)}}$$

Of the 21 intercorrelations between measures of maltreatment and measures of self-regulation, only two were significantly different at α=.05 and only one of these at α = .01 (between Hostility and Emotional Neglect). Gender appears to have little effect on the relationship between these variables, therefore gender will be treated as a covariate in subsequent regression analyses. As shown in Table 3, however, females have significantly higher correlations than males between Inattention and Addiction , and between SES and impulsivity. The correlations between IQ and SES were in different directions for females (r = -.20) and males (r = .21) and the difference was significant at the .05 level.

Addict and Control groups were compared on fifteen variables and tested for significance using a Bonferroni-corrected α = .05/15 =.003. One-tailed tests were used for the maltreatment and self-regulation measures because research consistently shows opioid abusers to be more deviant than normal controls on psychosocial and behavioral indices (e.g. Brooner, King, Kidorf, Schmidt & Bigelow, 1997; Rounsaville, Weissman, Kleber, Wilber, 1982). It was therefore anticipated that Addicts would score higher than Controls on measures of self-regulation and maltreatment. It was expected that the groups would not differ on demographics due to the selection process used in recruiting the Control subjects. Two-tailed tests were used to compare demographic variables. Normally-distributed variables were tested using the independent samples t-test and chi-

squared tests for categorical variables.

To test the first three hypotheses, hierarchical regression analyses are used. In the first step SES, IQ, and gender are entered, and then the maltreatment or self-regulation measure. The incremental improvement in the model was tested for significance at the .01 level, two-tailed. The .01 level was selected to control for experimentwise error with the seven multivariate analyses proposed. A power analysis indicated that even using this more conservative alpha level there is adequate power to reject the null hypotheses. Logistic regression analysis was used when Addiction group status, a dichotomous variable, was the dependent variable. This procedure fits the logistic function of a binary dependent variable to a linear combination of the explanatory variables. The significance of individual predictors is tested with the Wald χ^2 statistic, which is computed by dividing a logistic regression coefficient (B) by its standard error and squaring the result. The odds ratio of a predictor, calculated by raising *e* to the B power, is the value by which the odds of being in the Addict group change when the predictor increases by one unit. An odds ratio greater than one indicates that the odds are increased; if the value is less than one, the odds are decreased. The significance of the overall model is evaluated by the model χ^2 statistic, which is computed as twice the difference in the log-likelihood of the model from the log-likelihood with only intercepts in the model. In linear regression, R^2 is used to estimate the proportion of variance in the dependent variable that is explained by the predictors. In logistic regression there is no statistic with a similar interpretation, although several analogous statistics have been proposed. In this study Nagelkerke's pseudo-R^2 statistic is provided for comparison, which reflects the goodness of fit and

ranges from 0 to 1. In all regressions, residuals are examined to confirm that the assumptions of the tests have not been violated.

To examine the third hypothesis, that type and severity of abuse predicts factors of self-regulation, a canonical correlation analysis is used for each type of maltreatment. Canonical correlation analysis weights the predictor variables and two or more dependent variables in a way that maximizes the correlation between these two sets of variables, called variates. This analysis results in several orthogonal solutions with each subsequent solution have a smaller canonical correlation than the preceding solution. The overall correlation between variates will be tested at the .01 level, two-tailed. The results of this analysis include the set of weights or canonical coefficients and the canonical loadings or structure coefficients. The loadings are an indication of the overlapping or shared contribution of a variable to its variate, while the canonical coefficients are analogous to regression beta weights and indicate a unique contribution by each variable.

RESULTS

Group comparisons

I hypothesized that the Addict group would have higher scores on measures of maltreatment and behavioral dysregulation than the Control group while the groups were expected to have similar demographics. Table 4 shows that subjects in the Addict group are not significantly different from Control subjects in age, gender, race, SES, or IQ. Addicts scored higher than Controls on all measures of maltreatment and self-regulation except Sexual Abuse. On the categorical variable of Sexual Abuse, a chi-square test showed this variable differed at p=.005, and was therefore not significantly different between groups after correcting for experimentwise error.

Hypothesis testing

The first hypothesis, that maltreatment is a significant predictor of Addict status after controlling for SES, IQ, and gender was examined using a hierarchical logistic regression analysis. SES, IQ, and Gender were entered in the first step, resulting in a prediction model that was significant (α=.01) with a pseudo-R^2 of .158, indicating that these variables explain a small portion of the variance in the prediction of Addict. Table 5 presents a summary of the results of this regression. SES and Gender were not significant predictors, however IQ was significant. The odds ratio indicates that a 1-point increase in IQ predicts a small but significant decrease in the odds of being in the Addict group. Maltreatment Total was entered in a second step, significantly improving prediction over the demographic covariates (χ^2 = 13.69, df =1, p =.0002). The resulting overall model was significant (χ^2 = 29.79, df =4, p < .0001) with a pseudo- R^2 of .278. As

hypothesized. Maltreatment was a significant predictor, with an increase in Maltreatment predicting a large increase in the odds of being an Addict. IQ remained a significant predictor in this model. Two way interactions were tested and did not add significantly to the prediction.

To explore the role of type of maltreatment in the prediction of addiction, an additional regression analysis was conducted. The previous regression was repeated with Maltreatment replaced by Nonsexual Abuse and Sexual Abuse Category in the second step. Sexual Abuse category was dummy coded, with D1 contrasting the no-abuse and low-abuse groups and D2 contrasting the low-abuse and high-abuse groups. As summarized in Table 6, this model was significant ($\chi^2 = 34.15$, df =6, $p < .0001$) with a pseudo- R^2 of .313. In this model, only Nonsexual Abuse was a significant predictor (Wald $\chi^2 = 8.24$, df =1, $p < .005$) with an odds ratio of 2.42 (95% CI 1.32 - 4.42).

The second hypothesis, that Maltreatment is a significant predictor of the Self-regulation composite score, was examined using multiple linear regression. The covariates of SES, IQ, and Gender were entered first in a multiple linear regression analysis. This model was not significant, $R^2 = .052$ (see Table 7), however a small but significant improvement in prediction resulted when Sexual and Nonsexual Abuse were added to the model, F change (3,123) = 4.83, $p = .003$. The resulting model was significant, F (6, 123) =3.65, $p=.002$, and accounted for 39% of the variance in Self-regulation. As shown in Table 7, none of the covariates were significant predictors of Self-regulation, while Nonsexual Abuse was. Two-way interactions significantly improved the prediction but none were individually significant.

Hierarchical logistic regression was used to test the third hypothesis, that the Self-regulation composite score improves prediction of Addict status over the prediction using SES, IQ, and gender. As in the analysis in Table 5, the covariates were entered first, resulting in a prediction model that was significant. Self-regulation was entered in a second step, significantly improving prediction over the covariates ($\chi^2 = 36.15$, df = 1, $p<.0001$). The resulting overall model was significant ($\chi^2 = 52.25$, df =4, $p < .0001$) and explained a large portion of the variance in prediction of Addict status. Table 8 presents a summary of the analysis and indicates that none of the covariates was a significant predictor in the final model. Self-regulation problem score was significantly associated with increased odds of being in the Addict group. The addition of two-way interactions did not significantly improve the prediction. This regression was subsequently repeated with Impulsivity, Hostility, and Inattention substituted for the Self-regulation composite. In the last step of this analysis, only Impulsivity was a significant predictor of Addict status (Wald $\chi^2 = 23.19$, $p < .0001$) with an odds ratio of 1.43 (95% CI= 1.24 - 1.65).

Because both Maltreatment and Self-regulation were found to be significant predictors of addiction, three additional analyses were conducted to examine the relative strength of Maltreatment and Self-regulation as predictors. A hierarchical logistic regression was again used, first adding the covariates, then Maltreatment in another step, then Self-Regulation in a final step. The resulting overall model was significant and is summarized in Table 5, Step 3. Self-regulation significantly improved the prediction over that obtained with Maltreatment and the covariates. In this final model, only Self-regulation remains a significant predictor. Most of the variance explained by childhood

maltreatment was absorbed by self-regulation. leaving maltreatment with insignificant weight in the final model. This model correctly classifies over 80% of the sample and explains about half of the variance in addict classification. Another regression analysis was done with Maltreatment total replaced by Nonsexual Abuse and Sexual Abuse Category (see Table 6, Step 3). This more detailed model was significant ($\chi^2 = 61.95$, df $=7$, $p < .0001$) with a large pseudo-R^2 of .51. Once again, only Self-regulation remained a significant predictor at the .01 level in this model (Wald $\chi^2 = 20.51$, $p < .0001$) with an odds ratio of 5.14 (95% CI 2.53-10.43). A third regression was run to see if Self-regulation could predict Maltreatment, reversing the direction of the previous analysis. In this linear regression, Self-regulation was a significant predictor ($F = 20.362$, 1, 127, $p<.001$), explaining 13.9% of the variance in Maltreatment.

The final hypothesis predicting unique effects for each type of maltreatment could not be fully tested since three of the abuse scales were combined into a single index of nonsexual abuse. The hypothesis was examined using three canonical correlation analyses with Hostility, Inattention, and Impulsivity as the dependent variables. The first analysis examined the relations between Nonsexual Abuse and these dependent variables with SES, IQ, and Gender as covariates. In this analysis only the first solution was significant, explaining 10.3% of the variance in the Self-regulation variate. The second analysis substituted Sexual Abuse for Nonsexual Abuse in the analysis. As shown in Table 9, the canonical correlation incorporating Sexual Abuse was not significant. The structure coefficients or canonical loadings in Table 9 indicate that Nonsexual Abuse is strongly related to the three dependent variables, especially Impulsivity and Hostility,

while Sexual Abuse is not as strongly related. To further explore the relation between type of abuse and behavioral self-regulation, a third canonical correlation analysis was run with both Nonsexual Abuse and the dummy variables for Sexual Abuse. Although this produced a correlation the same size as the correlation using only Nonsexual Abuse, it was not statistically significant due to the additional degrees of freedom.

DISCUSSION

Demographics

Although recruited separately, the addict and control groups did not differ in SES, IQ, age, race, or gender. Both groups were predominantly white, lower income people of average intelligence. Contrary to expectations, gender was not significantly associated with addiction, maltreatment or self-regulation. This result was quite robust with none of the analyses -- correlations, t-tests, regressions, or canonical correlations -- finding a significant role for gender in relation to childhood abuse, addiction, or behavioral dysregulation. Few studies have examined gender differences among heroin addicts, but in studies of opiate addicts' psychopathology, findings have been mixed with Steer and Schut (1979) finding no differences by gender and Brooner et al. (1997) finding significant differences. Most studies of other populations have shown male gender and low IQ associated with impulsivity and aggression. The present results contradict these typical findings, perhaps because most other studies do not have matched control groups and use statistical approaches to account for gender and IQ differences. By selecting a control group to match the gender and educational level of the addict group, we have a sample that, by design, is not representative of the community.

Gender, SES and IQ together were able to predict heroin addiction better than chance but only full-scale IQ was a significant predictor individually. These findings are consistent with the work of Tarter and colleagues (Dawes, Tarter, & Kirisci, 1997; Tarter, Mezzich, Hsieh, & Parks, 1995), providing moderate support for the association between cognitive abilities and substance abuse. Contrary to expectations, however, IQ was not significant in the prediction of self-control problems. Although Herrenkohl and others

(1995) found that IQ discriminated between maltreated children with and without behavior problems, this study is one of the first to examine these variables in adults. The present results indicate that IQ does not influence behavioral self-regulation but may moderate the development of substance dependence.

Maltreatment

Previous work has shown maltreatment to be a predictor of alcohol and other drug abuse (e.g., Mullen et al., 1993). In general, these studies have not related findings to the type of drugs involved, with the exception of alcohol. The present study confirms and extends these findings to show that heroin addicts report a history of more severe abuse than controls and that the severity of maltreatment is related to the risk for addiction to heroin.

The association between maltreatment and later behavior is believed to involve a person's adaptation to the experience of the abuse or neglect. Briere and Runtz (1990) argued that abuse types are distinct with distinct outcomes. This data generally supports their theory, finding distinct associations for sexual and nonsexual abuse. As expected, sexual abuse had little association with externalizing problems. Correlations, univariate comparisons, and multivariate analyses with sexual abuse yielded no significant association with behavioral self-regulation or addiction. Although these findings are consistent with reviews comparing sexual and physical abuse (e.g., Brown & Anderson, 1991; Silverman et al., 1996), they are at odds with other reviews demonstrating a linkage to substance (primarily alcohol) abuse in comparison with nonabused subjects (e.g. Browne & Finkelhor, 1986; Mullen, 1990). In contrast, nonsexual abuse strongly predicted both undercontrolled behavior and substance dependence. The pattern of self-

regulation associated with nonsexual abuse is similar to that expected for physical and emotional abuse, however the types of maltreatment were so highly correlated their unique relationships with self-regulation could not be explored. Future research using a measure with orthogonal factors would clarify this point.

Other measurement issues may have influenced the finding of apparent differences between sexual and nonsexual abuse. Unlike the Nonsexual Abuse variable, Sexual Abuse was trichotomized, limiting its variance and potentially obscuring some effects. While the natural log transformation applied to Maltreatment Total, Physical Neglect and Physical/Emotional Abuse is often used to compensate for skewed maltreatment distributions, it inflates correlations with these variables and interpretation of transformed data must consider this effect. Although these results point to potential differences in the pathway to heroin addiction for survivors of sexual and nonsexual abuse, these results remain to be replicated and sexual abuse should continue to be considered a risk factor for substance abuse.

Self-regulation

In this study, problems in adults' self-regulation (elevated levels of impulsivity, inattention, or aggression) is predicted by the severity of maltreatment in childhood but not by demographics. This confirms and extends the findings of Manly et al. (1994) who found that maltreatment severity predicted behavior problems in children and is consistent with Cicchetti and Lynch's ecological-transactional model of developmental psychopathology (1995), which emphasizes the role of early experiences in later social behavior.

While behavioral problems have been established as risk factors for alcoholism

(Cloninger et al., 1988; Hesselbrock, 1986) and undifferentiated drug abuse disorders (Mannuzza et al., 1991; Masse & Tremblay, 1997; Ohannessian et al., 1995) the present results extend these findings, indicating that poor self-regulation is associated with the abuse of heroin, specifically. In fact, self-regulation was quite potent as a predictor of addiction: after accounting for the variance explained by SES, IQ, gender, and even maltreatment severity, self-regulation alone explained about one-fifth of the variance in addiction. The emerging picture of heroin users as hostile, distractible, and especially impulsive is in keeping with the characterization of Khantzian's (1985) self-medicating addict and Cloninger et al.'s Type II alcoholic. Cloninger's Type II addicts, however, are theorized to be predominantly male, while gender was not predictive of substance dependence in this sample. It remains to be seen if the antisocial-nonantisocial typology emerging in recent alcoholism literature (e.g., Cloninger et al.; Hesslebrock, Hesslebrock & Stabenau, 1995) will be replicated with heroin-dependent samples

The role of self-regulation

What is the role of behavioral self-regulation in the development of substance abuse considering child abuse experiences? Self-regulation appears closely associated with maltreatment, specifically nonsexual types of maltreatment. These variables are significantly correlated and each one predicts addiction. In fact, in this sample they predict each other. In explaining the variance in addiction status, there is a high degree of overlap between the variance explained by nonsexual abuse and the variance explained by self-regulation. However, self-control is more important to the prediction of addiction, explaining more shared variance and more unique variance than nonsexual abuse. After controlling for demographics and maltreatment, it was found that those

people who are one standard deviation higher in behavioral problems are about four times as likely to be addicts. In contrast, after controlling for demographics and self-regulation, maltreatment variables did not have *any* significant impact on the odds of being an addict.

Although causal relations can not be determined from this correlational data, some directions emerge from the data. Figure 1 shows three possible roles for self-regulation. It seems unlikely that self-regulation is a moderator variable (see Figure 1, Model A), influencing the size or direction of the relation between nonsexual abuse and heroin addiction, because the relation disappears in the presence of self-regulation and because no significant interactions were detected. A more likely interpretation is that self-regulation is a mediating variable (Model B), because nonsexual abuse predicts self-regulation which, in turn, predicts addiction. The mediation model is consistent with the findings of Shields, Cicchetti & Ryan (1994), who found that self-regulation mediated the effects of maltreatment on children's social competence. This explanation is also congruent with theories of the precursors and sequelae of disruptive behavior advanced by developmental psychologists and addiction researchers. For example, one interpretation drawing on Cicchetti's work is that self-regulation problems develop later as a result of an inadequate rearing environment. In this approach, poor self-regulation derives from the maltreatment experience, providing a rationale for the large overlap in portion of the variance in addiction explained by these two variables.

The finding that self-regulation also predicts maltreatment, generates another possibility. Early problems in self-regulation, due perhaps to temperament (e.g., arousal level), might increase the child's likelihood of being abused and later of becoming a substance abuser. In this case (Figure 1, Model C) the relation between nonsexual abuse

and heroin addiction is a spurious one that drops out because it is explained by the common factor of self-regulation. White (1997) similarly proposed that the association between alcohol use and aggression is spurious because both are predicted by self-regulation and family factors. While the association between early temperament and adult behavior is well recognized, the role of temperament in victimization is less certain. In a prospective study carefully designed to address common methodological limitations in child abuse research, Weiss, Dodge, Bates and Pettit (1992) attempted to clarify the influence of temperament, marital violence, and SES on the behavior of maltreated children. They concluded that child temperament could not account for the significant relation between physical abuse and later child aggression. While temperament may contribute to subsequent maltreatment, it seems that there is at least some influence in the opposite direction. A more complex bidirectional relationship, in which the parent and child shape each other's behavior, could also explain these findings. There may be other alternatives, but this brief discussion of causal relations must necessarily be incomplete.

Methodological considerations

. This research addresses some previous criticisms by differentiating between types of maltreatment, by using a matched control group that allows separation of maltreatment and socioeconomic effects and by focusing on addiction to a particular drug. However, certain characteristics of this sample must be held in mind. The ethnicity of this sample is not representative of most heroin abusing populations, so these results may not generalize to other areas. Sociocultural influences may differ significantly in other populations. Heroin abusers seeking treatment are not representative of all addicts and may represent a subgroup with greater resources, both financial and psychological, than the larger

population of heroin addicts.

The measures used in this study must be considered in applying the results to other groups. This study is a secondary analysis of data previously collected for other purposes. As such some of the measures used are not ideal. For example, behavioral dyscontrol would be better studied with a more reliable measure of inattention. In this study, all measures are obtained from the same source – the subject. Without diverse informants or methods of data collection, method variance can not be controlled for in these analyses. The uncertain validity of retrospective childhood abuse reports limits generalization to populations self-reporting abuse, which may differ substantially from populations whose abuse history is determined by other means (e.g. police reports or social services investigations).

Conclusions and directions for future research.

In summary, the results of the present study describe correlates of childhood abuse and heroin addiction. This study points to the importance of considering psychological processes in examining maltreatment outcomes. This study strengthens findings about the effects of maltreatment and provides a link to current studies of substance abuse risk factors. The findings also begin to detail some characteristics of heroin addicts.

This research does not examine the genesis of maltreatment, but could be extended to examine the cycle of abuse. These results point to the importance of considering temperament or other enduring child characteristics when examining relationships in the abuse cycle. Processes in the perpetuation of abuse could be illuminated by incorporating information about the caretakers' history and functioning.

For example, adding measures of family substance abuse history or family relationships, which are often covariates in studies of this nature, could strengthen future studies. Such data on the relationship between parent and child is needed to examine the role of social influences and will be especially important in examining sexual abuse.

This study highlights the potential importance of behavioral self-regulation yet self-regulation processes remain only dimly understood. For example, research on the role of affective regulation in relation to behavioral regulation could help explain why some substance abusers have internalizing disorders while others develop externalizing problems.

Future studies might examine the nature of the relation between addiction and self-regulation. Perhaps addiction and self-regulation share a common biological ground -- frontal lobe dysfunction. Barratt (1993) notes that impulsivity and antisocial personality appear largely genetically-based with pathological serotonin levels and executive functioning in the frontal lobes implicated. Impaired frontal lobe functioning has been implicated in behavioral dysregulation (Barkeley, 1997; Deckel, Hesselbrock, & Bauer, 1996) and is associated with impulsive aggression in boys at risk for substance abuse (Giancola, Moss, Martin, Kirisci & Tarter, 1996). In this area, research at the physiological and psychological levels is becoming increasingly integrated.

Whatever the relationship between self-regulation and addiction, the strength of the association is encouraging in one sense. There is evidence that self-regulatory abilities can be improved through new interventions such as mental simulation (Taylor, Pham, Rivkin & Armor, 1998) and behavioral self-control training (Hester, 1995). The capacity for improving self-control suggests a possible intervention for substance abusers.

The present results might lead clinicians to more carefully consider the type of abuse a client reports when assessing that person and developing appropriate treatment plans. The most common reason for referral of children for psychological services is externalizing behavior problems. These behaviors often occur with Attention-Deficit/Hyperactivity Disorder or Post-traumatic Stress Disorder and treatment may become focused on the child's activity level or traumatic experiences. However, these results suggest that a careful assessment for nonsexual abuse or neglect and consideration of the child's IQ is warranted in each case. Treatment for high risk children, regardless of gender, might therefore include some strategies for increasing social competence and reducing susceptibility to drug abuse.

The results of this study and other supporting research could have implications for policy-makers attempting to address issues as diverse as violence in schools, drug abuse prevention programs, childcare policies and criminal recidivism. Poor self-control is often viewed by our society as a moral failure, and therefore deserving of condemnation and intolerance. However, examination of the precursors and sequelae of misbehaviors makes blame harder to place and points to the need for policies designed to intervene at multiple levels.

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Appendix A

INFORMED CONSENT

PERSONALITY CHARACTERISTICS, LIFE EXPERIENCES AND THOUGHT PROCESSES

You are invited to participate in a research study to examine personality characteristics, life experiences and thought processes. This study is sponsored by the National Institute on Drug Abuse and the University of Vermont. This research may be important for understanding how personality, past experiences and thought processes are related to drug abuse.

Over the next several hours, you will fill out a series of questionnaires asking about how you feel, how you think, and how you behave. Additionally, you will fill out a questionnaire asking about experiences in your family when you were growing up. Some of the questions are on sensitive topics, such as physical and sexual abuse and thoughts of suicide. You do not need to answer the questions related to abuse history if they make you feel uncomfortable.

There are no right or wrong answers on any of these questionnaires. We just want you to answer the questions honestly and thoughtfully. You will fill out one questionnaire at a time, and ten in total.

After you have completed several questionnaires, a research assistant will then ask you questions for about a half hour. These questions are designed to assess how people think and how they feel. Additionally, one series of questions will relate to past experiences in your family life and your relationships with significant others or spouses. We would like you to try your best on all these assessments and to answer the questions the best you can. After you have answered several of these assessments, you will again complete some more questionnaires.

When you have completed all the questionnaires and the interviews, you will play a card game. You do not need any previous experience with cards to be able to understand this game. You will have the opportunity to earn money in this card game; however, you will not lose any money in this game.

In total, the whole series of questionnaires and the interviews should take about three to four hours to complete. Please answer all the questions slowly and thoughtfully. You may take a break at any time during these assessments.

COMPENSATION You will be compensated a minimum of $15 for completing the entire series of questionnaires. In addition to the $15, you will receive the amount of money that you win in the card game ($0 to $20, average earnings about $5 to $10). You will receive this compensation after you have completed all the questionnaires and the card game.

You may also win additional money in one of the questionnaires. This questionnaire asks you to choose between certain amounts of money now and larger amounts of money delayed in time. You may win one of your choices on this questionnaire ($10 to $85).

POSSIBLE BENEFITS. You should understand that you will not directly benefit by participating in this study. However, you may help us to understand factors that are related to drug abuse.

RISKS/DISCOMFORTS/INCONVENIENCES. The primary risk associated with participation in this research is frustration with the number and quality of the assessments. You may get bored filling out the questionnaires. If this is the case, you should take a break. The order of the questionnaires and

assessments is designed to reduce boredom. The questionnaires will be divided up such that only a few need to be competed at once, and please remember that you are free to take a break at any time.

Please understand that you are free not to participate in this study or to withdraw from it at any time. If you chose to withdraw from the study, you may keep any money you earned prior to withdrawing (i.e., earnings from the immediate and delayed questionnaire). However, you will not be compensated the $15 or the card game earnings unless you complete the entire series of questionnaires.

If you decide not to participate in this study or to withdraw from this study, your decision will not prejudice your future medical care at the University of Vermont or Fletcher Allen Health Care. The investigators also retain the right to terminate your participation in the study if in their judgment continued participation would put you in physical or psychological danger.

In the event of physical injury resulting from research procedures, medical treatment will be available, including first aid, emergency treatment and follow-up as needed. Payment for any treatment will be provided by you or your third party payor, if any (health insurance, Medicare, and so forth). It is not the policy of the University of Vermont or Fletcher Allen Health Care to provide free medical treatment in the event of research-related injury.

Your identity on the records relevant to this study will not be made public. Any publications resulting from this research will not mention your name.

If you have any questions about this study, please contact Dr. Bickel or Dr. Petry at the University of Vermont (802-656-4560). You may contact the Institutional Review Board Administrator, Nancy Stalnaker, at the University of Vermont (231 Rowell, 802-656-4067) for more information about your rights as a participant in a research study or on how to proceed should you believe that you have been injured as a result of your participation in this study.

I agree to participate and I acknowledge that I will receive a signed copy of this form.

_____ _____

Participant Date

_____ _____

Investigator Date

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Appendix B

CTQ

INSTRUCTIONS: These questions ask about some of your experiences growing up as a child and a teenager. For each question, circle the number that best describes how you feel. Although some of these questions are of a personal nature, please try to answer as honestly as you can. Your answers will be kept confidential.

	Never True	Rarely True	Sometimes True	Often True	Very Often True
1. When I was growing up, there was someone in my family whom I could talk to about my problems	1	2	3	4	5
2. When I was growing up, people in my family criticized me	1	2	3	4	5
3. When I was growing up, I didn't have enough to eat	1	2	3	4	5
4. When I was growing up, people in my family showed confidence in me, encouraged me to achieve	1	2	3	4	5
5. When I was growing up, someone in my family hit me or beat me	1	2	3	4	5
6. When I was growing up, I felt that I better take care of myself, because no one else would	1	2	3	4	5
7. When I was growing up, people in my family argued or fought with each other	1	2	3	4	5
8. When I was growing up, I lived in a group home or a foster home	1	2	3	4	5
9. When I was growing up, I knew that there was someone to take care of me and protect me	1	2	3	4	5
10. When I was growing up, there was someone outside of my family (like a teacher or neighbor) who was like a parent to me	1	2	3	4	5
10a. When I was growing up, someone in my family yelled and screamed at me	1	2	3	4	5
11. When I was growing up, I saw my mother or one of my brothers or sisters get hit or beaten	1	2	3	4	5
12. When I was growing up, someone in my family made sure I went to school unless I was sick	1	2	3	4	5
13. When I was growing up, people in my family called me things like "stupid" or "lazy" or "ugly"	1	2	3	4	5
14. When I was growing up, I was living on the street by the time I was a teenager or even younger	1	2	3	4	5

	Never True	Rarely True	Sometimes True	Often True	Very Often True
15. When I was growing up, there was someone in my family whom I admired and wanted to be like	1	2	3	4	5
16. When I was growing up, my parents were too drunk or high to take care of me	1	2	3	4	5
17. When I was growing up, I rarely got the love or attention that I needed	1	2	3	4	5
18. When I was growing up, people in my family got into trouble with the police	1	2	3	4	5
19. When I was growing up, there was someone in my family who helped me feel that I was important or special	1	2	3	4	5
20. When I was growing up, I had to protect myself from someone in my family by fighting, hiding, or running away	1	2	3	4	5
21. When I was growing up, I felt like there was someone in my family who wanted me to be a success	1	2	3	4	5
22. When I was growing up, I had to wear dirty clothes	1	2	3	4	5
23. When I was growing up, I lived with different people at different times (like relatives or foster families)	1	2	3	4	5
24. When I was growing up, I believe that one of my brothers or sisters might have been molested	1	2	3	4	5
25. When I was growing up, I felt that I was loved	1	2	3	4	5
26. When I was growing up, the other kids that I hung out with seemed like my "real family"	1	2	3	4	5
27. When I was growing up, I rarely had a father (or step-father) around the house	1	2	3	4	5
28. When I was growing up, my parents tried to treat all of us children the same	1	2	3	4	5
28a. When I was growing up, I thought that my parents wished I had never been born	1	2	3	4	5
29. When I was growing up, I got hit so hard by someone in my family that I had to see a doctor or go to the hospital	1	2	3	4	5
30. When I was growing up, there was someone in my family who made sure that I stayed out of trouble	1	2	3	4	5
31. When I was growing up, people in my family hit me so hard that it left me with bruises or marks	1	2	3	4	5

	Never True	Rarely True	Sometimes True	Often True	Very Often True
32. When I was growing up, I belonged to a gang	1	2	3	4	5
33. When I was growing up, the punishments I received seemed fair	1	2	3	4	5
33a. When I was growing up, I had sex with an adult, or with someone who was a lot older than me (someone at least 5 years older than me)	1	2	3	4	5
34. When I was growing up, there was someone older than myself (like a teacher or a parent) who was a positive role model for me	1	2	3	4	5
35. When I was growing up, I was punished with a belt, a board, or a cord (or some other hard object)	1	2	3	4	5
36. When I was growing up, people in my family got high or drunk	1	2	3	4	5
37. When I was growing up, people in my family looked out for each other	1	2	3	4	5
38. When I was growing up, my parents were divorced or separated	1	2	3	4	5
39. When I was growing up, people in my family said hurtful or insulting things to me	1	2	3	4	5
40. When I was growing up, I believe I was physically abused	1	2	3	4	5
41. When I was growing up, people in my family tried to keep me away from bad influences	1	2	3	4	5
42. When I was growing up, there was an adult or another responsible person around the house when I was home	1	2	3	4	5
43. When I was growing up, I got hit or beaten so badly that it was noticed by someone like a teacher, neighbor or a doctor	1	2	3	4	5
44. When I was growing up, people in my family seemed out of control	1	2	3	4	5
45. When I was growing up, people in my family encouraged me to stay in school and get an education	1	2	3	4	5
46. When I was growing up, I spent time out of the house and no one knew where I was	1	2	3	4	5
47. When I was growing up, the punishments I received seem cruel	1	2	3	4	5

	Never True	Rarely True	Sometimes True	Often True	Very Often True
47a. When I was growing up, I felt that someone in my family hated me	1	2	3	4	5
48. When I was growing up, people in my family felt close to each other	1	2	3	4	5
49. When I was growing up, someone tried to touch me in a sexual way or tried to make me touch them	1	2	3	4	5
50. When I was growing up, people in my family pushed me or shoved me	1	2	3	4	5
51. When I was growing up, there was enough food in the house for everyone	1	2	3	4	5
52. When I was growing up, everyone in my family had certain chores that they were supposed to do	1	2	3	4	5
53. When I was growing up, someone threatened to hurt me or tell lies about me unless I did something sexual with them	1	2	3	4	5
54. When I was growing up, I was frightened of being hurt by someone in my family	1	2	3	4	5
55. When I was growing up, someone tried to make me do sexual things or watch sexual things	1	2	3	4	5
56. When I was growing up, someone in my family believed in me	1	2	3	4	5
56a When I was growing up, someone molested me	1	2	3	4	5
57. When I was growing up, I believe that I was emotionally abused	1	2	3	4	5
58. When I was growing up, people in my family didn't seem to know or care what I was doing	1	2	3	4	5
59. When I was growing up, there was someone to take me to a doctor if I needed it	1	2	3	4	5
59a When I was growing up, I had the best family in the world	1	2	3	4	5
59b When I was growing up, people in my family had secrets I wasn't supposed to share with anyone	1	2	3	4	5
60. When I was growing up, I believe that I was sexually abused	1	2	3	4	5
61. When I was growing up, my family was a source of strength and support	1	2	3	4	5

CTQ Scale Items

Items are listed in order of their factor loadings, largest to smallest. * indicates reverse coded items.

Factor I. Physical and Emotional Abuse (23 Items)
31, 47, 35, 29, 54, 50, 39, 43, 47A, 10A, 40, 13, 57, 44, 58, 2, 28A, 11, 20, *28, 7, 17, 36.

Factor II. Emotional Neglect (21 Items)
*21, *19, *56, *61, *34, *48, *30, *37, *1, *25, *15, *4, *10, *45, *41, 28A, 17, *28, 58, *9

Factor III. Physical Neglect (11 Items)
*51, 22, 8, 3, *9, 23, 14, *59, 16, 6, 20.

Factor IV. Sexual Abuse (5 Items)
60, 56A, 55, 49, 53.

Appendix C

Hostility-Guilt Inventory
(Buss & Durkee, 1957)

Answer True or False to the following items
(indicates item is scored if answered False.)*

Assault subscale

9. Once in a while I cannot control my urge to harm others.
17. I can think of no good reason for ever hitting anyone.*
25. If somebody hits me first, I let him have it.
33. Whoever insults me or my family is asking for a fight.
41. People who continually pester you are asking for a punch in the nose.
1. I seldom strike back even if someone hits me first.*
49. When I really lose my temper I am capable of slapping someone.
57. I get into fights about as often as the next person.
65. If I have to resort to physical violence to defend my rights, I will.
70. I have known people who pushed me so far that we came to blows.

Indirect subscale

2. I sometimes spread gossip about people I don't like.
10. I never get mad enough to throw things.*
26. When I am mad, I sometimes slam doors.
34. I never play practical jokes.*
18. When I am angry I sometimes sulk.
42. I sometimes pout when I don't get my own way.
50. Since the age of ten, I have never had a temper tantrum. *
58. I can remember being so angry that I picked up the nearest thing and broke it.
75. I sometimes show my anger by banging on the table.

Irritability subscale

4. I lose my temper easily but get over it quickly.
27. I am always patient with others.
20. I am irritated a great deal more than people are aware of.
35. It makes my blood boil to have somebody make fun of me.
66. If someone doesn't treat me right, I don't let it annoy me.*
12. Sometimes people bother me just by being around.
44. I often feel like a powder keg ready to explode.
52. I sometimes carry a chip on my shoulder.
60. I can't help being a little rude to people I don't like.
71. I don't let a lot of unimportant things irritate me.
73. Lately I have been kind of grouchy.

Negativism subscale

3. Unless somebody asks me in a nice way, I won't do what they want.

12. When someone makes a rule I don't like I am tempted to break it.
19. When someone is bossy, I do the opposite of what he asks.
36. When people are bossy, I take my time just to show them.
28. Occasionally when I am mad at someone I will give him the silent treatment.

Resentment subscale
5. I don't seem to get what's coming to me.
13. Other people always seem to get the breaks.
29. When I look back on what's happened to me I can't help feeling mildly resentful.
37. Almost every week I see someone I dislike.
45. Although I don't show it, I am sometimes eaten up with jealousy.
21. I don't know any people that I downright hate.*
53. If I let people see the way I feel, I'd be considered a hard person to get along with.
61. At times I feel I get a raw deal out of life.

Suspicion subscale
6. I know that people tend to talk about me behind my back.
14. I tend to be on my guard with people who are somewhat more friendly than I expected.
22. There are a number of people who seem to dislike me very much.
30. There are a number of people who seem to be jealous of me.
38. I sometimes have the feeling that others are laughing at me.
46. My motto is "Never trust strangers."
54. I commonly wonder what hidden reason another person may have for doing something nice for me.
62. I used to think that most people told the truth but now I know otherwise.
67. I have no enemies who really wish to harm me.*
72. I seldom feel that people are trying to anger or insult me.*

Verbal subscale
7. When I disapprove of my friend's behavior, I let them know it.
15. I often find myself disagreeing with people.
23. I can't help getting into arguments when people disagree with me.
31. I demand that people respect my rights.
39. Even when my anger is aroused, I don't use "strong language."*
43. If somebody annoys me, I am apt to tell him what I think of him.
47. When people yell at me, I yell back.
51. When I get mad, I sat nasty things.
55. I could not put someone in his place, even if he needed it.*
59. I often make threats I don't really mean to carry out.
68. When arguing, I tend to raise my voice.
63. I generally cover up my poor opinion of others.*
74. I would rather concede a point than get into an open argument about it.*

Guilt subscale

8. The few times I have cheated, I have suffered unbearable feelings of remorse.
16. I sometimes have bad thoughts which make me feel ashamed of myself.
24. People who shirk on the job must feel very guilty.
32. It depresses me that I did not do more for my parents.
40. I am concerned about being forgiven for my sins.
48. I do many things that make me feel remorseful afterward.
56. Failure gives me a feeling of remorse.
64. When I do wrong, my conscience punishes me severely.
69. I often feel that I have not lived the right kind of life.

Appendix D

PERSONAL EVALUATION - BIS - 10

Name:_____ Date:_____

DIRECTIONS:
People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and circle the appropriate number on the right side of the page. Do not spend too much time on any statement. Answer quickly and honestly.

	Rarely/ Never	Occa-sionally	Often	Almost Always/ Always
1. I plan tasks carefully	0	1	3	4
2. I do things without thinking	0	1	3	4
3. I make-up my mind quickly	0	1	3	4
4. I am happy-go-lucky	0	1	3	4
5. I don't "pay attention"	0	1	3	4
6. I have "racing" thoughts	0	1	3	4
7. I plan trips well ahead of time	0	1	3	4
8. I am self-controlled	0	1	3	4
9. I concentrate easily	0	1	3	4
10. I save regularly	0	1	3	4
11. I "squirm" at plays or lectures	0	1	3	4
12. I am a careful thinker	0	1	3	4
13. I plan for job security	0	1	3	4
14. I say things without thinking	0	1	3	4
15. I like to think about complex problems	0	1	3	4
16. I change jobs	0	1	3	4
17. I act "on impulse"	0	1	3	4
18. I get easily bored when solving thought problems	0	1	3	4
19. I have regular health check ups	0	1	3	4
20. I act on the spur of the moment	0	1	3	4

	Rarely/ Never	Occa- sionally	Often	Almost Always/ Always
21. I am a steady thinker	0	1	3	4
22. I change residences	0	1	3	4
23. I buy things on impulse	0	1	3	4
24. I can only think about one problem at a time	0	1	3	4
25. I change hobbies	0	1	3	4
26. I walk and move fast	0	1	3	4
27. I solve problems by trial-and-error	0	1	3	4
28. I spend or charge more than I earn	0	1	3	4
29. I talk fast	0	1	3	4
30. I have extraneous thoughts when thinking	0	1	3	4
31. I am more interested in the present than future	0	1	3	4
32. I am restless at the theater or lectures	0	1	3	4
33. I like puzzles	0	1	3	4
34. I am future oriented	0	1	3	4

Appendix E

Impulsivity Scale of the Eysenck Personality Questionnaire
Eysenck & Eysenck (1978)

Please answer each question by putting a circle around the "Yes" or "No" following the question. There are no right or wrong answers, and no trick questions. Work quickly and and do not think too long about the exact meaning of the questions.

PLEASE REMEMBER TO ANSWER EACH QUESTION

3. Do you often long for excitement?	Yes	No
7. Do you feel at your best after taking a couple of drinks?	Yes	No
9. Do you save regularly?	Yes	No
12. Do you often buy things on impulse?	Yes	No
15. Do you generally do and say things without stopping to think?	Yes	No
16. Do you prefer quiet parties with good conversation to "wild" uninhibited ones?	Yes	No
18. Do you often get into a jam because you do things without thinking?	Yes	No
21. Would you often like to get high (drinking liquor or smoking marijuana)?	Yes	No
24. Are you an impulsive person?	Yes	No
27. Do you usually think carefully before doing anything?	Yes	No
30 Do you often do things on the spur of the moment?	Yes	No
33. Do you often enjoy breaking rules you consider unreasonable?	Yes	No
34. Are you rather cautious in unusual situations?	Yes	No
36. Do you mostly speak before thinking things out?	Yes	No
39. Do you often get involved in things you later wish you could get out of?	Yes	No
42. Do you get so "carried away" by new and exciting ideas, that you never think of possible snags?	Yes	No
45. Do you get bored more easily than most people, doing the same old things?	Yes	No
48. Would you agree that planning things ahead takes the fun out of life?	Yes	No
51. Do you need to use a lot of self-control to keep out of trouble?	Yes	No
54. Would agree that almost everything enjoyable is illegal or immoral?	Yes	No
56. Are you often surprised at people's reactions to what you do or say?	Yes	No
57. Do you get extremely impatient if you are kept waiting by someone who is late?	Yes	No
60. Do you think that an evening out is more successful if it is unplanned than if it is arranged at the last moment?	Yes	No
63. Do you get very restless if you have to stay around home for any length of time?	Yes	No

Please check to see that you have answered all the question

Table 1

Method of Replacing Missing Data

Measure	Estimate Used
IQ	56.18 + (4.06 * Years of Education) - (6.20 * Gender)
Aggression	32.85 + (7.67*Addict Status) - (.27*Age) + (6.20*Phys/Emot Abuse) - (6.09*Physical Neglect)
Inattention	13.79 + (3.47*Addict Status) + (3.765*Phys/Emot Abuse) - (4.01* Physical Neglect)
Impulsivity	9.24 + (7.34*Addict Status) - (.14*Age) + (1.13*Phys/Emot Abuse)
Physical Neglect	3.44 - (.138*Years of Education)
Emotional Neglect	Mean of all subjects
Phys/Emot Abuse	Mean of all subjects
Sexual Abuse	0.84 + (.41*Gender)

Notes: Phys/Emot Abuse = Physical and Emotional Abuse
Gender coded Male=1, Female=2
Addict Status coded Addict=1, Control=0

Table 2

Correlations between Demographic, Self-regulation, and Maltreatment Variables (N=128)

	Addict	Age	Gender	Race	SES	IQ	Inattn	Hostil.	Impul.	S-r	EmNg‡	PhyNg‡	SxAb	PhEm	Nonsx	Maltr‡
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Addict status	--	-.02	-.10	.04	.21*	-.23*	.33**	.35**	.64**	.54**	.26**	.39**	.23*	.32**	.32**	.34**
2. Age		--	-.08	.05	-.09	.12	-.06	-.19*	-.25**	-.21*	-.10	-.11	-.06	.03	-.06	.08
3. Gender			--	-.02	-.05	-.19*	.01	.00	-.11	-.04	.07	-.08	.13	.05	.06	06
4. Race				--	.01	.00	-.06	-.05	.01	-.03	.04	.01	.01	.09	.04	04
5. SES					--	.04	.02	.16	.17	.13	.05	.04	-.01	.08	.05	07
6. IQ						--	-.11	-.13	-.15	-.16	-.04	-.16	-.17	-.13	-.13	.15
7. Inattention							--	.36**	.58**	.79**	.23**	.16	.14	.33**	.25**	28**
8. Hostility								--	.55**	.78**	.28**	.23**	.09	.38**	.30**	32**
9. Impulsivity									--	.87**	.23**	.27**	.12	.36**	.28**	30**

	Addict	Age	Gender	Race	SES	IQ	Inattn	Hostil.	Impul.	S-r	EmNg‡	PhyNg‡	SxAb	PhEm	Nonsx	Maltr‡
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
10. Self-regulation										--	.31**	.27**	.15	.44**	.34**	37**
11. Emotional Neglect‡											--	.81**	.32**	.88**	.95**	94**
12. Physical Neglect‡												--	.34**	.77**	.88**	.88**
13 Sexual abuse group													--	.28**	.31**	.53**
14. Physical & Emotional Abuse														--	.94**	.92**
15. Nonsexual Abuse															--	.96**
16. Maltreatment‡																--

Note. * $p < .05$ ** $p < .01$ two-tailed. ‡ log-transformed variable.

Variables 1, 3, 4, and 13 are categorical. Variable 10 is a composite of Variables 7, 8, and 9. Variable 15 is a composite of Variables 11, 12, and 14. Variable 16 is a composite of Variables 11, 12, 13, and 14.

Table 3

Difference between Correlations of Maltreatment and Self-regulation Variables for Males and Females (N=128)

	1	2	3	4	5	6	7
1. Inattention	--	.00	-.12	-.25	-.20	-.46*	-.18
2. Aggression		--	.06	-.52**	-.29	-.22	-.27
3. Impulsivity			--	-.32	-.19	-.23	-.16
4. Emotional Neglect				--	-.21	-.34	-.25
5. Physical neglect					--	-.20	-.24
6. Sexual abuse						--	-.23
7. Physical & Emotional Abuse							--

Note. Correlations transformed by Fisher's z. *p <.05, ** p<.01 two-tailed.

Table 4

Demographic, Self-Regulation and Maltreatment Scores by Addict Status

Variable	Mean (*SD*)		Statistic			
	Addict	Control	Type	df	Value	*p*
Age	35.0 (7.7)	35.4 (10.5)	t	126	.20	.423
SES	39.71 (7.63)	35.90 (10.29)	t	126	-2.35	.009
IQ	97.0 (13.1)	103.5 (14.9)	t	126	2.64	.005
Race (% white)	97	98	χ^2	1	.23	.634
Gender (% male)	65	55	χ^2	1	1.25	.263
Maltreatment‡	2.11 (.32)	1.88 (.29)	t	126	4.06 ††	.000
Nonsexual Abuse	2.35 (.74)	1.88 (.68)	t	126	3.72 ††	.000
Emotional Neglect	2.65 (.82)	2.23 (.77)	t	126	2.99 †	.002
Physical Neglect‡	.59 (.32)	.32 (.32)	t	126	-4.72 ††	.000
Phys / Emot Abuse‡	.85 (.38)	.60 (.38)	t	126	-3.75 ††	.000
Sexual Abuse Category			χ^2	2	9.48	.005
None (%)	48.5	75.0				
Low (%)	35.3	18.3				
High (%)	16.2	6.7				
Self-Regulation Total	.412 (.650)	-.467 (.717)	t	126	7.27 ††	.000
Hostility	34.50 (10.02)	26.63 (11.02)	t	126	4.23 ††	.000
Impulsivity	13.85 (4.70)	6.50 (4.08)	t	126	-9.40 ††	.000
Inattention	19.58 (6.19)	15.32 (5.90)	t	126	3.97 ††	.000

Note. † $p < .003$, one-tailed, †† $p < .001$, one-tailed. ‡ Log-transformed variable.

Table 5

Summary of Hierarchical Logistic Regression Predicting Addict Status from Maltreatment and Self-regulation ($N = 128$)

Variable	B	SE B	Wald χ^2	p	Odds Ratio	95% CI
Step 1: $\chi^2 = 16.10, 3, p<.005$. Pseudo-$R^2$=.16. -2 Log Likelihood = 160.85						
SES	.054	.022	6.15	.013	1.05	1.01-1.10
IQ	-.043	.015	8.38*	.004	.95	.93 -.98
Gender	-.640	.401	2.55	.110	.53	.24-1.16
Step 2: $\chi^2 = 29.93, 4, p< .0001$. Pseudo-$R^2$=.28. $\Delta\chi^2 = 13.83, 1, p< .0005$.						
SES	.054	.023	5.49	.019	1.06	1.01-1.10
IQ	-.040	.015	6.96*	.008	.96	.93-.99
Gender	-.787	.433	3.30	.069	.46	.19-1.06
Maltreatment‡	2.356	.684	11.86**	.000	10.55	2.76-40.34
Step 3: $\chi^2 = 55.924, 5, p< .0001$. Pseudo-$R^2$=.47. $\Delta\chi^2 = 26.00, 1, p< .0001$.						
SES	.048	.026	3.40	.065	1.05	1.00-1.10
IQ	-.035	.017	4.04	.044	.97	.93-1.00
Gender	.692	.481	2.07	.150	.50	.20-1.29
Maltreatment‡	1.417	.756	3.51	.061	4.12	.94-18.16
Self-Regulation	1.546	.348	19.75**	.000	4.69	2.37-9.28

Note. * $p < .01$ two tailed, ** $p < .001$ two tailed. ‡ Log-transformed variable.

CI= Confidence Interval

Table 6

Summary of Hierarchical Logistic Regression Predicting Addict Status from Nonsexual Abuse, Sexual Abuse, and Self-regulation (N = 128)

Variable	B	SE B	Wald χ^2	p	Odds Ratio	95% CI
Step 1: same as in Table 5, Step 1						
Step 2: χ^2 = 34.15, 6, p< .0001. Pseudo-R^2=.31. $\Delta\chi^2$ = 18.05, 3, p< .0004.						
SES	.059	.023	6.27	.012	1.06	1.01-1.11
IQ	-.040	.016	6.44	.011	.96	.93-.99
Gender	-.791	.447	3.13	.077	.45	.19-1.09
Nonsexual	.883	.308	8.24*	.004	2.42	1.32-4.42
Sexual D1	-.252	.801	.10	.753	.777	.16-3.74
Sexual D2	-1.10	.475	5.31	.021	.335	.13-.85
Step 3: χ^2 = 61.95, 7, p< .0001. Pseudo-R^2=.51. $\Delta\chi^2$ = 27.80, 1, p< .0001.						
SES	.052	.027	3.71	.054	1.05	1.00-1.10
IQ	-.035	.018	3.74	.053	.97	.93-1.00
Gender	-.728	.504	2.08	.149	.48	.18-1.30
Nonsexual	.499	.344	2.11	.147	1.65	.84-3.23
Sexual D1	-.393	.880	.20	.656	.68	.12-3.79
Sexual D2	-1.284	.539	5.68	.017	.28	.10-.80
Self-Regulation	1.637	.361	20.51**	.000	5.14	2.53-10.43

Note. * p < .01 two tailed, ** p < .001 two tailed. CI= Confidence Interval

Table 7

Summary of Hierarchical Linear Regression Predicting Self-regulation from Sexual and Nonsexual Abuse ($N = 128$)

Variable	B	SE B	β	*p*
Step 1: $R^2 = .052$ (F=2.253, 3, 124, n.s.).				
SES	.012	.008	.136	.123
IQ	-.010	.005	-.184	.040
Gender	-.109	-.146	-.066	.459
Step 2: $\Delta R^2 = .101$ ($\Delta F = 4.83, 3, 121, p=.003$). F= 3.647, 6, 121, $p=.002$.				
SES	.010	.007	.110	.162
IQ	-.008	.005	-.139	.110
Gender	-.134	.143	-.081	.351
Nonsexual	.335	.098	.309**	.001
Sexual D1	.043	.252	.017	.866
Sexual D2	.049	.157	-.029	.757

Note. ** $p < .001$ two tailed.

Table 8

Summary of Hierarchical Logistic Regression Predicting Addict Status from Self-regulation Composite ($N = 128$)

Variable	B	SE B	Wald χ^2	p	Odds Ratio	95% CI
Step 1: See Table 5, Step 1						
Step 2: $\chi^2 = 52.25, 4, p < .0001$. Pseudo-$R^2 = .45$. $\Delta\chi^2 = 36.15, 1, p < .0001$.						
SES	.046	.026	3.30	.069	1.05	1.00-1.10
IQ	- .036	.017	4.43	.035	.97	.93-1.00
Gender	- .610	.464	1.73	.189	.54	.22-1.35
Self-regulation	1.71	.341	25.18**	.000	5.54	2.84-10.81

Note. * $p < .01$ two tailed, ** $p < .001$ two tailed. CI= Confidence interval.

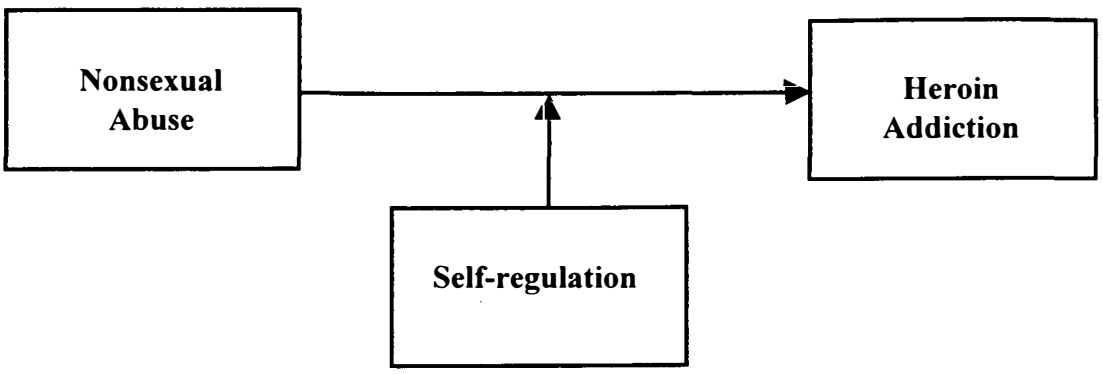
Table 9

Summary of Canonical Correlation Analyses for Sexual and Nonsexual Abuse Predicting Self-regulation Variables (N = 128)

Variable	Canonical Loadings		
	Nonsexual Abuse	Sexual Abuse	Both
Independent			
SES	-.441	-.638	-.440
IQ	.415	.503	.415
Gender	.164	.369	.165
Nonsexual Abuse	-.819		-.818
Sexual Abuse D1		-.354	-.302
Sexual Abuse D2		.233	.228
Dependent			
Hostility	-.839	-.664	-.836
Inattention	-.602	-.418	-.605
Impulsivity	-.912	-.969	-.914
Canonical Correlation	.404 **	.304, n.s.	.404, n.s.
χ^2, df, p	29.80, 12, .008	15.82, 15, .394	27.74, 18, .066
Variance in Dependent Variables Explained by			
Independent Variables	10.3%	4.8%	10.4%

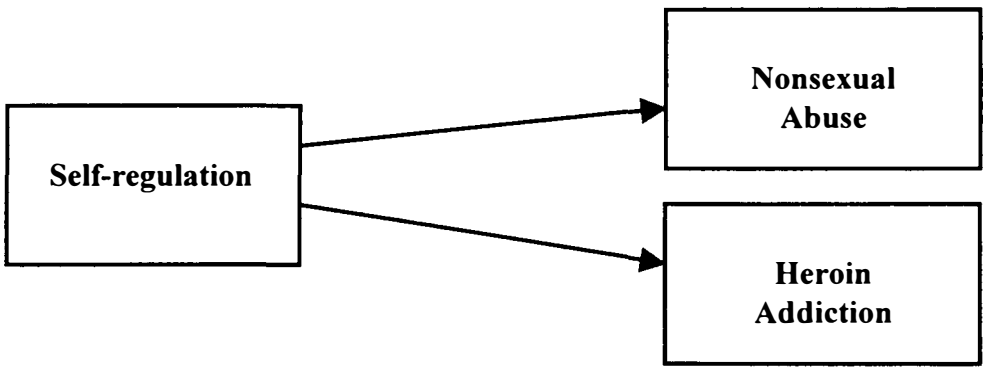
Note. ** $p < .01$ two-tailed, n.s. = not significant

Figure 1. Alternative Relations between Maltreatment, Self-regulation and Addiction



Model A: Self-regulation as moderator.

Model B: Self-regulation as mediator.



Model C: Self-regulation as common factor.