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Affect Dysregulation As A Mediator Of The Relationship Between Childhood Trauma And Comorbid Substance Use Disorder And Bulimia Nervosa

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AFFECT DYSREGULATION AS A MEDIATOR OF THE RELATIONSHIP
BETWEEN CHILDHOOD TRAUMA AND COMORBID SUBSTANCE
USE DISORDER AND BULIMIA NERVOSA

by

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This dissertation, submitted by Brianna J. Crawford in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done and is hereby approved.

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PERMISSION

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Brianna Joelle Crawford
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To My Family

ABSTRACT

Eating disorders are serious, potentially life-threatening psychiatric disorders associated with a variety of negative medical, social, and psychological consequences. Comorbid mental disorders, such as substance use disorders, present an increasingly complex clinical picture. A significant body of research has been devoted to investigating the etiology of eating disorders and their comorbid conditions. One factor that has received research attention is that of childhood trauma experiences. Childhood trauma has been related to the development of both bulimia nervosa and substance use disorders, and more broadly, an impulsive, behaviorally dysregulated trajectory. Affect dysregulation is one factor proposed to play a role in the development of eating disorders, substance use disorders, and other forms of impulsive behavior. The current study sought to examine affect dysregulation as a mediator of the relationship between childhood trauma and comorbid substance use disorder and bulimia nervosa. Mediation analyses using a bootstrapping procedure were conducted. Findings suggest that a relationship exists between childhood trauma and the development of drug use disorders, but not alcohol use disorders, in individuals with bulimia nervosa through indirect and/or direct pathways. Additionally, affect dysregulation serves as a mediator of the relationship between childhood sexual abuse and comorbid drug use disorders and as an indirect pathway for the relationship between both childhood physical and emotional abuse and drug use disorders. Overall, affect dysregulation appears to function as a key mechanism

in the development of drug use disorders and bulimia nervosa in individuals with a history of childhood trauma.

CHAPTER I

INTRODUCTION

Eating disorders (EDs) are serious, potentially life-threatening psychiatric disorders that pose a variety of negative consequences, including medical, social, and psychological risks (Grilo & Mitchell, 2010; Striegel-Moore & Bulik, 2007). Complicating an already difficult treatment outlook, comorbid mental disorders such as substance abuse present an increasingly complex manifestation of the disorders and pose a unique treatment challenge. Substance use disorders (SUDs) rank among the most common forms of comorbidity associated with eating disorders (Wonderlich & Mitchell, 1997) and are purported to negatively impact the course of illness (Gregorowski, Seedat, & Jordaan, 2013; Harrop & Marlatt, 2010; Keel et al., 2003). Both the high rates of psychiatric comorbidity in the eating disorders (i.e. SUDs), and the heterogeneous nature of eating disorders themselves, have prompted researchers to consider various multi-factorial etiological models, including an emphasis on dieting, cultural ideals about thinness, affect regulation, and various genetic and biological abnormalities (Striegel-Moore & Bulik, 2007; Stice, 2001). Among the relationships investigated, childhood maltreatment has emerged as a significant risk factor for EDs (Thompson & Wonderlich, 2004) and for other forms of psychopathology, including SUDs (Smolak & Levine, 2007; Thompson & Wonderlich, 2004). In fact, childhood trauma has been considered a potential catalyst for an emotionally dysregulated, impulsive course of

behavior that includes disordered eating and substance use among other risky or negative behaviors (Corstorphine, Waller, Lawson, & Ganis, 2007; Myers et al., 2006; Steiger et al., 2010; Wonderlich & Mitchell, 1997). Further elucidating the influence of risk factors like childhood trauma, and specific mediators such as affect dysregulation, may facilitate a greater understanding of the behavioral manifestation of eating disorders complicated by comorbidity and inform the development of more efficacious treatment programs that better target the underlying pathology.

The purpose of the present investigation is to examine the role of childhood trauma in the development of comorbid eating and substance use disorders by exploring the potential function of affect dysregulation as a mediator of this relationship. The following bodies of literature are germane to this investigation and are reviewed below, particularly as they relate to affect dysregulation: 1) the relationship between childhood trauma and EDs; 2) the relationship between childhood trauma and SUDs; 3) the relationship between childhood trauma and comorbid disorders, particularly those characterized by impulsivity and behavioral dysregulation; and 4) mediators of the relationship between childhood trauma and EDs. Finally, the limited number of studies that have simultaneously examined relationships between childhood trauma, eating disorders, and substance use disorders are also discussed.

Relationship Between Childhood Trauma and Eating Disorders

Numerous studies have investigated the role of childhood trauma in the development of various forms of psychopathology, including eating disorders, mood and anxiety disorders, and impulsive or self-destructive behaviors (e.g. Corstorphine et al., 2007; Myers et al., 2006; Steiger et al., 2010; Thompson & Wonderlich, 2004;

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Wonderlich et al., 2001). While several forms of childhood maltreatment exist as potential risk factors for the development of eating disorders in particular, the majority of research in this area has focused on childhood sexual abuse (CSA). Two reviews have been instrumental in summarizing this literature, implicating CSA as a risk factor for EDs, and in further conceptualizing the basis of this relationship (Thompson & Wonderlich, 2004; Wonderlich, Brewerton, Jocic, Dansky, & Abbot, 1997). Both reviews were organized around six hypotheses, with the 2004 review serving as an update on research findings since 1995 when the first review was conducted. Wonderlich and colleagues (1997) employed a process whereby controlled research studies were identified and included in the review after being subjected to rigorous, two-tiered inclusion criteria that specified adequate sample size and appropriate measurement of both disordered eating and CSA based on either interview or sufficiently reliable and valid self-report questionnaire. Following this, each study was reviewed by a panel of the five authors in relation to each of the six research hypotheses. Three of the reviewers determined whether the results of the statistical analysis in each study supported or failed to support the hypothesis, while the other two authors' ratings for each hypothesis served to confirm reliability. Acceptable interrater reliability was determined for the total number of ratings ($\kappa = 0.92$).

The first hypothesis considered in the review addressed the existence of a significant relationship between CSA and bulimia nervosa (BN). Overall, the 1997 review concluded that there is a statistically significant relationship between CSA and BN and the 2004 review reported similar evidence. This conclusion was based on one of three findings: that 1) there was a significantly greater rate of EDs among CSA subjects

than among non-CSA subjects; 2) there was a significantly greater rate of CSA found among ED subjects than non-ED subjects, and/or 3) there was a statistically significant correlation between CSA and BN among subjects from the general population (Wonderlich et al., 1997). The second hypothesis assessed whether CSA is more likely to be associated with bulimic rather than anorexic symptomatology. In general, both reviews concluded that CSA is more likely to be associated with symptoms of BN (i.e. bingeing and purging, including binge purge type anorexia) than symptoms of pure restricting anorexia nervosa (AN). The third research hypothesis inquired whether CSA exists as a specific risk factor for EDs rather than more generally placing victims of CSA at risk for various forms of psychopathology. In each review, all of the studies included determined that CSA does not function as a risk factor specific to the development of EDs, but that it is related to general psychiatric impairment. Specifically, the studies reviewed found that rates of CSA within ED samples were similar or lower than rates of CSA found in groups of subjects with a wider variety of psychiatric dysfunction and that samples with victims of CSA were best characterized by a range of psychological disorders rather than just EDs (Thompson & Wonderlich, 2004; Wonderlich et al., 1997). The fourth hypothesis included in the review, which is central to this study, addressed whether comorbird psychological disorders are higher among eating disorder subjects with a history of CSA than without a history of CSA. In both the 1997 and 2004 reviews, the hypothesis that eating disorder subjects with a history of CSA experience greater rates of psychiatric comorbidity was supported. Of note, however, rates of comorbidity were not uniform across the various types of psychological dysfunction for ED subjects with a history of CSA; for instance, greater rates of PTSD were associated with CSA in ED

subjects, but not depressive disorder or borderline personality disorder (Steiger et al., 2001). The fifth hypothesis asserted that CSA is associated with the presence of more severe ED symptoms; however, this hypothesis was not supported by the literature reviewed, as none of the studies found CSA to be associated with greater magnitudes of ED psychopathology. The sixth hypothesis examined whether particular features of CSA, such as the disclosure of the abuse and subsequent perceived reactions, family environment, rape during adulthood, threat of force, and severity of the CSA, functioned to moderate the development of EDs. A majority of the studies reviewed provided some support for the moderating effect of such features of the CSA. Finally, the 2004 review also included a seventh hypothesis, which sought to examine the temporal relationship between CSA and disordered eating. In general, CSA appears to precede the onset of eating disturbances, although the measurement of this relationship is problematic. For example, Thompson, Wonderlich, Crosby, Redlin, and Mitchell (2002) explicitly explored the nature of this temporal relationship in a study of women who had experienced CSA and women who had experienced both CSA and rape during adulthood. In regard to the timing of ED symptom onset, the investigators concluded that CSA typically preceded the initiation of ED behaviors. However, when the specific ED symptoms were examined, the data failed to support a particular temporal ordering of symptoms. For example, neither dieting nor bingeing behaviors were found to consistently precipitate the cycle of BN behaviors among victims of CSA that has traditionally been conceptualized in the theories of BN (e.g., Fairburn & Wilson, 1993). Furthermore, in CSA subjects who either dieted *or* binged, impulsive or self-destructive behaviors typically occurred prior to the onset of the ED; but in subjects who endorsed

both dieting *and* bingeing, most impulsive and self-destructive behaviors were found to occur after the onset of bingeing. Therefore, while the ED symptoms and impulsive or self-destructive behaviors were found to occur following CSA, different patterns of ED behaviors were specified based on type of ED symptom. All of these findings, however, are limited by biases associated with retrospective recall bias.

Summary

CSA appears to serve as a significant risk factor for the development of eating disorders, particularly those characterized by symptoms of BN. The experience of CSA often precedes the development of ED symptoms; however, CSA is not a specific risk factor for the development of EDs, but rather psychological impairment in general and it does not appear to cause greater ED severity. Childhood sexual abuse is associated with significant comorbidity within ED samples and certain elements of the experience of CSA may moderate ED symptoms (Thompson & Wonderlich, 2004; Wonderlich et al., 1997).

Thompson and Wonderlich (2004) further elaborated on three conceptual models that provide a basis for understanding the pathway from CSA to BN. In the first model, known as the shame and coping model, the individual becomes disgusted and ashamed of her body as a result of the abuse. She then makes efforts to modify it through starvation, or uses dieting to cope with the varying mood states associated with the trauma or to regain control. Such dietary restriction may then prompt bingeing or purging and contribute to more extreme forms of weight control (Thompson & Wonderlich, 2004; Andrews, 1997). The second model, titled the impulsive/affective mediational model, suggests that victims of childhood sexual abuse become increasingly vulnerable to

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underlying impulsive or self-destructive personality traits and behaviors following the trauma. This model assumes a particular sequential ordering, such that the individual is predisposed to develop the ED behaviors based on the existence of other dysregulated or impulsive behaviors (i.e. mediators), such as borderline personality disorder, dissociation, drug use, or PTSD (Thompson & Wonderlich, 2004; Wonderlich et al., 2001). Finally, in the third model, the sexual abuse experienced in childhood results in psychobiological dysregulation that impedes normal development and leads to various forms of impulsive and self-destructive behaviors, including eating disorders. In this scheme, the psychobiological dysregulation diminishes the individual's ability to effectively regulate behavior and affect, thereby leading to increased risk of developing a range of impulsive behaviors (Thompson & Wonderlich, 2004; Wonderlich et al., 2001). This third model will be emphasized in the current study.

Relationship Between Childhood Trauma and Substance Use

In addition to the relationship between childhood trauma (CT) and EDs, CT has also been linked to other forms of psychopathology, including SUDs. For instance, in their national survey of women's drinking, Wilsnack, Vogeltanz, Klassen, and Harris (1997) found that women who had experienced CSA were significantly more likely to endorse symptoms consistent with a SUD, including recent alcohol use, intoxication, problems due to drinking, alcohol dependence symptoms in the past 12 months, and lifetime use of prescribed psychoactive and illicit drugs, than women who denied a history of CSA. Given these findings, the authors suggested that CSA may function as a risk factor for the development of later substance abuse and other psychopathology (i.e. depression, anxiety, sexual dysfunction), and encouraged further exploration of potential

causal mechanisms. In particular, the authors alluded to the potential for substance use to function as an affect regulation mechanism among individuals with a history of CSA. In these cases, individuals may use substances to cope with or decrease negative affect or to block painful memories associated with the abuse (Wilsnack et al., 1997).

Based on findings from their study of CSA and its relation to psychopathology in a sample of 1,411 female adult twins, Kendler and colleagues (2000) similarly assert that CSA functions as a risk factor for the development of psychiatric disorders, including substance abuse, in adulthood. Within their sample of female twins, these investigators conducted clinical interviews to establish lifetime psychiatric diagnosis (major depression, generalized anxiety, panic disorder, BN) and history of substance abuse (alcohol dependence, drug dependence). A history of CSA was assessed through a self-report questionnaire. The following three levels of CSA were defined and assessed: 1) nongenital (sexual invitation, sexual kissing, exposure), 2) genital (sexual contact without intercourse – fondling, sexual touching), and 3) sexual intercourse. As part of the cotwin design of this study, each twin was also asked about CSA in her cotwin. Additionally, in an effort to rule out various potential explanations of the relationship between CSA and psychiatric illness, the investigators interviewed subjects' parents in regard to the existence of parental psychopathology. They also inquired about several indicators of family discord or dysfunction using retrospective self-report during the time the twins were growing up; both the twins and parents completed these questionnaires. Overall, the results indicate that CSA at any level significantly predicted at least some degree of psychiatric comorbidity in adulthood. More specifically, a history of nongenital CSA was significantly associated with both alcohol and drug dependence, while a history

of genital CSA was similarly associated with developing alcohol and drug dependence, as well as major depression and generalized anxiety. Childhood sexual abuse in the form of sexual intercourse was associated with an increased likelihood of developing all psychological and substance-related disorders assessed, with the highest risk related to the development of BN and alcohol and drug dependence. These results further suggest a "dose-response" relationship between CSA and psychiatric disorder, as risk of developing psychiatric illness increased with the degree of severity of the trauma. Analyses of the contribution of both familial dysfunction and parental psychopathology suggest that these factors have a limited impact on the twins' development of psychiatric illness or substance abuse, as the relationship between CSA and psychiatric illness decreased only minimally when they were entered as covariates. A particular strength of this study was its use of the cotwin control design, as it provides an additional opportunity to rule out the influence of familial factors (i.e. family history of mental illness, family dysfunction) in the link between CSA and the development of psychiatric illness later in life. This is based on the fact that both twins were exposed to the same family environment; the twin who experienced CSA consistently showed an increased risk of developing psychiatric and/or substance related disorders in adulthood. Finally, given the clear evidence of a relationship between CSA and the development of psychological dysfunction/substance abuse in adulthood, the authors recommend the further study of moderators of this relationship (i.e. factors related to the CSA experience itself – age, nature of abuse, etc.).

Finally, Maniglio (2011) conducted a review of studies on the role of CSA in the etiology of SUDs. Similar to findings cited previously, the author concluded that CSA

functions as a general and nonspecific risk factor for the development of substance use problems. Based on this finding, Maniglio went on to propose that psychological factors and/or psychiatric disorders may mediate the relationship between CSA and consequent SUDs. Maniglio specifically highlighted the potential role of diminished affect regulation strategies among victims of CSA, citing use of substances for coping or emotional escape purposes as evidence. As such, individuals with a CSA history may struggle with decreased self-esteem and self-efficacy, feelings of helplessness and inadequacy, and intrusive thoughts and negative affect resulting from the trauma. They may also experience symptoms related to formal diagnoses of post-traumatic stress disorder (PTSD), depression, and social anxiety disorder, among others. They may turn to substances to decrease corresponding negative affect and negative self-perception, and to increase the experience of positive affect. Unfortunately, substance use as a coping mechanism only functions as a temporary mask for underlying issues, thus further preventing them from being effectively dealt with. Because people may learn to rely on external mechanisms (substance use) for affect modulation purposes, their dependence on these substances may increase, leading to the development of SUDs (Maniglio, 2011).

Relationships Among Childhood Trauma, Substance Use Disorders, and Eating Disorders

This relationship between trauma and SUDs has also been examined specifically among eating disorder subjects and has often been discussed within the context of a broader relation between trauma and comorbid psychopathology, particularly of the impulsive and behaviorally dysregulated type. For example, Deep, Lilenfeld, Plotnicov, Pollice, and Kaye (1999) examined the rates of sexual abuse among women with

comorbid SUD and BN (BN+SUD), BN without comorbid SUD (BN-SUD), anorexia nervosa (AN), and control subjects without an eating disorder. It should be noted that they did not limit the age-range of sexual trauma to childhood, and thus, their sample includes women who experienced rape in adulthood as well as incest or other forms of sexual abuse in childhood and adolescence. The findings suggest that all eating disorder groups considered in the study had higher rates of sexual abuse than control subjects. The highest rates of sexual abuse were observed among BN+SUD subjects when compared to all other groups, with 65% of BN+SUD subjects endorsing at least one form of sexual trauma. The majority of sexually traumatic experiences in the BN+SUD group were characterized by rape. Individuals comprising the AN group had the lowest rates of sexual trauma among the ED groups and typically experienced it in the form of extrafamilial fondling, while individuals in the BN-SUD group most frequently experienced incest. Interestingly, when considering age at the time of abuse, individuals in the AN and BN-SUD groups generally experienced the trauma during early puberty and did not develop behaviors typically categorized as impulsive, such as substance abuse. However, the sexual trauma in the BN+SUD group often occurred later in adolescence and was associated with the development of such impulsive behavior. The authors suggest that the sexual abuse may be related to issues with impulse control. On the one hand, the difficulty with impulse control may result from the trauma, thereby leading some individuals with more impulsive traits to develop substance abuse problems, or alternatively, the poor impulse control and substance use behaviors may lead to high risk situations for sexual trauma, which may explain the particularly high rates of sexual abuse among the BN+SUD group (Deep et al., 1999).

Fullerton, Wonderlich, and Gosnell (1995) also examined the relationship between trauma and impulsive behavior among eating disorder subjects in their study of the clinical characteristics of 712 female eating disorder patients at an eating disorders clinic. In this study, in addition to completing self-report questionnaires on mood and eating disorder symptoms (Beck Depression Inventory, BDI, and Eating Disorder Inventory, EDI), subjects were interviewed by a trained clinician to determine abuse history and presence of alcohol problems, suicidal behavior, and shoplifting. Sexual abuse was endorsed by 29% of the sample, while physical abuse was reported by 25%; a history of both physical and sexual abuse was reported by 15% of the subjects. Subjects with a history of CT reported greater depressive symptoms and more eating disorder psychopathology than those who denied a history of abuse, as evidenced by higher mean scores on the BDI and various subscales of the EDI, respectively. Importantly, subjects who had been abused also endorsed higher rates of alcohol abuse, suicide attempts, and shoplifting, with the highest rates of comorbidity among those who had been both physically and sexually abused (Fullerton, Wonderlich, & Gosnell, 1995).

Corstorphine and colleagues (2004) investigated the relationship between childhood trauma and multi-impulsivity among individuals with eating disorders. This group of researchers defined multi-impulsivity as the presence of an eating disorder plus at least two of the following impulsive behaviors used for the purpose of regulating affect: repeated self-harm, overdosing, suicide attempts, compulsive spending or stealing, alcohol or drug abuse, or sexual disinhibition (Corstorphine et al., 2004). Among the 102 subjects who met DSM-IV criteria for an eating disorder and provided interview data on trauma history and impulsive behavior, 22.3% met the study definition for multi-

impulsivity. Subjects indicating a history of childhood trauma in any form also reported a significantly higher number of impulsive behaviors than those who denied a trauma history. Childhood sexual abuse, in particular, was the form of trauma most reliably associated with multi-impulsivity, and was specifically related to higher levels of self-injury and alcohol and drug abuse (Cortstorphine et al., 2004).

Finally, Wonderlich and colleagues (2001) also focused on CSA and its relation to disordered eating, substance use, and impulsive self-destructive behavior, with the additional consideration of developmental stage at the time of the trauma. These investigators studied the following four groups of women in regard to eating disorder psychopathology and impulsive or self-destructive behavior: 1) victims of CSA, 2) victims of rape in adulthood, 3) victims of both CSA and rape in adulthood, and 4) control subjects with no sexual trauma history. The subjects completed semi-structured interviews, including the Eating Disorder Examination (Fairburn & Cooper, 1993), and several self-report measures assessing disordered eating, impulsive behavior, and general psychopathology. Results do provide evidence of a relationship between CSA, EDs, and impulsivity, as victims of CSA reported higher levels of both ED behavior and substance use than controls. Interestingly, the results specify that sexual trauma that occurs during childhood may be more impactful than sexual assault that occurs later in life. Victims of rape during adulthood reported lower rates of ED psychopathology and substance use than CSA victims. Additionally, subjects who had experienced both CSA and rape during adulthood reported the highest levels of ED pathology and impulsivity. The investigators suggest that the trauma that occurs during childhood may sensitize the individual to later

traumatic events and may increase the risk of developing a range of impulsive, self-destructive, or affective disorders (Wonderlich et al., 2001).

Relationship Between Childhood Trauma and Impulsivity in Eating Disorders

As exemplified by many of the studies already reviewed here, relationships between CT and various forms of impulsive, self-destructive behavior, including substance abuse, have been well-established among individuals with EDs. Some studies have sought to clarify the tendency toward impulsivity by classifying ED subjects by personality traits and examining the relationship between these traits, their behavioral correlates (i.e. self-destructive behaviors), and a history of CT. Findings of such studies have the potential to inform mechanisms underlying the etiology of EDs and their comorbid disorders, particularly those characterized by impulsivity and behavioral dysregulation. Studies by Steiger et al. (2010) and Myers et al. (2006) are included among those considering the relation between impulsivity and CT in eating disorders and are reviewed below.

Steiger and colleagues (2010) assessed a range of psychopathological traits, ED symptoms, and CT history in a sample of 185 women with ED diagnoses and 93 women with no ED diagnosis. These investigators classified personality traits using the four higher-order personality dimensions from the Dimensional Assessment of Personality Pathology – Basic Questionnaire (emotional dysregulation, dissocial behavior, inhibition, compulsivity; Livesley, Jackson, & Schroeder, 1992), as well as trait impulsivity from the Barrat Impulsivity Scale (Patton, Stanford, & Barrat, 1995). They established ED diagnosis using the Eating Disorders Examination (Fairburn & Cooper, 1993) interview and CT history using the Childhood Trauma Interview (Fink et al., 1993). Childhood

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trauma in this study encompassed physical or sexual maltreatment occurring before age 14. Using indices of the psychological traits listed above, the investigators conducted a latent class analysis. The following three classes emerged from this analysis: 1) dissocial/impulsive, 2) inhibited/compulsive, and 3) low psychopathology. Overall, subjects with an ED endorsed higher scores on pathological trait dimensions than did control subjects. Members of the dissocial/impulsive group exhibited the highest scores of any group on measures of emotional dysregulation, dissocial behavior, and impulsivity, while members of the inhibited/compulsive group exhibited the highest scores on inhibition and compulsivity. Importantly, this study also examined class membership in relation to a history of CT. In general, higher rates of CSA were found among the ED subjects of any class (although rates of CSA were only elevated at a trend level among ED subjects in the inhibited/compulsive class) when compared with normal controls, a result that corroborates previous findings that CSA is associated with the risk of ED development (e.g., Smolak & Levine, 2007; Thompson & Wonderlich, 2004). Of particular relevance to the current study was the overall finding that a history of CT is most likely to be associated with eating disorders that are characterized by dissocial/impulsive tendencies. Specific findings also indicate that CSA was most frequently reported by individuals in the dissocial/impulsive group, although CSA was significantly associated with both dissocial/impulsive and low psychopathology classes. Additionally, childhood physical abuse (CPA) was significantly and exclusively associated with membership in the dissocial/impulsive class and membership in the dissocial/impulsive class was also significantly associated with an increased likelihood of combined CSA and CPA. Finally, when ED type was entered as a covariate, both

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dissocial/impulsive group membership and BN diagnosis were significantly associated with CPA and with combined CPA and CSA. In general, these findings emphasize the potential role of CT in the development of EDs, especially those that reflect impulsive and behaviorally dysregulated traits that may manifest in comorbid behaviors such as substance abuse (Steiger et al., 2010).

Like Steiger et al. (2010), Myers and colleagues (2006) highlighted a subset of BN subjects who endorsed various behavioral characteristics consistent with impulsivity to determine if they may represent a specific subtype of BN known as Multi-Impulsive Bulimia (MIB). Latent class analysis was used to empirically validate the clinical definition of MIB originally elaborated by Fichter, Quadflief, and Rief (1994). This definition suggests that individuals with BN who endorse at least three of six impulsive behaviors, such as severe alcohol and drug abuse, self-injury, suicide attempt, stealing, and sexual promiscuity, may have a unique personality profile and experience greater psychopathology and poorer clinical outcome than less impulsive individuals with BN (Fichter et al, 1994). One hundred and twenty-five women with DSM-IV diagnosed BN completed structured interviews to establish comorbid diagnoses and ED symptomatology. Subjects completed self-report measures assessing lifetime presence of impulsive behaviors (i.e. severe alcohol abuse/dependence, other drug abuse, sexual promiscuity, self-injury, and suicidal gestures) using questions taken from the Diagnostic Interview for Borderlines-Revised (Zanarini, Frankenbrug, & Vujanovic, 2002), as well as an additional item inquiring about stealing. Childhood trauma was assessed with the Childhood Trauma Interview (Fink et al, 1993); indicators of physical, sexual, and emotional abuse, as well as physical neglect were included. Additionally, Ecological

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Momentary Assessment (EMA) procedures were used to assess momentary mood state, ED symptoms, and self-destructive behaviors in real time. Incorporating the measures listed above, two classes emerged from the latent class analysis, a MIB group and a non-MIB group, with 44% of subjects meeting criteria for MIB. The concordance between clinical and empirical definitions of MIB was high; thus, the results supported the clinically defined classification of MIB, suggesting that the presence of three of six impulsive behaviors sufficiently categorizes individuals with multi-impulsive traits. Most relevant to the present study were the findings of greater CT history (i.e. higher rates of childhood sexual, physical, and emotional abuse) and increased comorbidity in the form of anxiety disorder diagnoses (obsessive-compulsive disorder, specific phobia, and posttraumatic stress disorder) among members of the MIB group when compared to the non-MIB group. The latter finding is a critical result, as it ties co-occurring anxiety, which has not generally been associated with the MIB group, to impulsivity. Finally, members of the MIB group were significantly more likely to participate in self-destructive behaviors, as measured by EMA , including self-injury, risky sexual activity, drunk driving, alcohol use, drug use, and stealing, than non-MIB group members. There were no significant differences between MIB and non-MIB members in terms of ED symptoms. Surprisingly, there were also no significant differences between the MIB group and the non-MIB group in terms of EMA measures of negative daily mood intensity or variability. Based on this finding, the authors suggest that individuals with MIB do not experience greater negative affect per se, but are more likely to engage in impulsive behaviors when experiencing negative affect. Given the general findings indicating higher rates of comorbid anxiety, self-destructive behavior, and childhood

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abuse history among individuals with MIB, the authors suggest that the ED symptoms

may function as an effort to regulate or cope with trauma-related anxiety (Myers et

al., 2006). This assertion has implications for etiological models of BN, particularly those

associated with comorbid impulsivity and its related behavioral correlates, including

substance abuse. The ED symptoms, as well as other self-destructive or dysregulated

behaviors, may in fact be efforts to regulate affect.

Other studies have similarly examined impulsivity in EDs with the additional goal

of further elucidating the link between mood, impulsivity, and subsequent ED behaviors.

For instance, Engel and colleagues (2007) studied the relationship between anger and

bulimic behaviors among 133 female subjects with DSM-IV diagnosed BN enrolled in an

EMA research protocol and assessed whether impulsivity functions as a moderator of this

relationship. Subjects completed semi-structured interviews to establish diagnosis and to

assess for core features of borderline personality disorder (i.e., DIB-R; Zanarini et

al., 2002), a subscale of which was used as an index of impulsivity. The EMA portion of

the study was conducted over a two-week period of time in which participants rated their

momentary mood state using the anger-hostility subscale of the Profile of Mood States

(McNair, Lorr, & Dropplemen, 1971) and endorsed the use of various ED behaviors in

real-time. Results provide evidence for a mood-behavior relationship, such that higher

mean levels of anger were related to an increased likelihood of engaging in bingeing and

purging. Thus, mood state does appear to function as an antecedent for bulimic behaviors.

Furthermore, the results suggest that impulsivity moderates this relationship, as

individuals with higher degrees of impulsivity were more likely to binge eat following an

increase in variability of their anger. However, when considering impulsivity alone

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(i.e. disregarding anger), more impulsive individuals did not differ from less impulsive individuals in BN behaviors, thus highlighting the role of level and variability of affect in subsequent behavior. The authors suggest that individuals experiencing increased levels of anger may seek to regulate this negative affect by engaging in binge eating and that impulsive individuals may be especially likely to use rash, self-destructive regulation methods when faced with increasing levels or variability of negative affect such anger (Engel et al., 2007).

Anestis and colleagues (2009) also investigated the tendency to engage in various forms of self-destructive behavior, including substance use, for the purpose of regulating labile affect among individuals with BN. Participants included 134 women who met diagnostic criteria for BN. Participants completed self-report questionnaires assessing affective lability (i.e. Affective Lability subscale of the DAPP-BQ; Livesley et al., 1992), impulsive traits and behavior, problems related to alcohol and drug use, reassurance seeking tendencies, anxiety, and depressive symptoms. The results suggest a significant relationship between affective lability and impulsive behavior, even when the presence of anxiety, depressive symptoms, and the general tendency toward lack of planning associated with an impulsive style were accounted for statistically. Thus, individuals who binge and purge and also endorse engaging in additional impulsive behaviors are likely to experience significant affective lability that may explain their tendencies toward this dysregulated behavior profile. Surprisingly, the results of this study failed to find a significant relationship between measures of affective lability and problems related to alcohol and drug use; the authors suggest a limitation in their measures of substance use, as they did not address motivation for use, as a potential explanation for a lack of

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significant findings in this domain, particularly as previous research has suggested the role of substance use in affect regulation (i.e. Cooper, Frone, Russell, & Mudar, 1995). Overall, the results of the Anestis et al. (2009) study further elaborate on the relationship between affect, behavioral manifestations of impulsivity, and eating disorders and provide support for the notion that individuals may utilize such dysfunctional behaviors to regulate negative affect and/or mood lability.

Mediators of the Childhood Trauma-Eating Disorder Relationship

Various mediators have been proposed to explain the link between CT and ED behavior. Anxiety and dissociation (Kent, Waller, & Dagnan, 1999); borderline personality disorder, self-denigration, and disclosure experiences (Everill & Waller, 1995); and affective distress and alexithymia (Hund & Espelage, 2005) among others, have been cited as significant mediators. The following additional mediators of this relationship are considered most relevant to the current study and are briefly reviewed here: behavioral impulsivity (Wonderlich et al., 2001), PTSD (Holzer, Uppala, Wonderlich, Crosby, & Simonich, 2008), and ineffectiveness and affective instability (Groleau et al., 2012).

Wonderlich and colleagues (2001) examined mechanisms related to the development of eating disorder behavior following an early childhood experience of sexual abuse. Twenty female children, ages 10-15, took part in this study, which assessed ED behaviors, body image, substance use, mood, impulsivity, and self-concept. Children with a sexual abuse history endorsed greater ED behaviors, impulsive behavior, and drug abuse than control subjects. Among the variables tested, behavioral impulsivity was identified as the strongest mediator of the relationship between CSA and ED behavior

(including purging, restricting, and weight dissatisfaction). Drug use functioned as a secondary mediator for the CSA and ED behavior relationship. The authors note that factors typically assumed to influence the development of EDs, including depression, self-concept, perfectionism, and self-perception, were not identified as significant mediators or influential variables in this relationship. Overall, the results suggest that children who experienced CSA may develop a behavioral trajectory characterized by impulsive and self-destructive tendencies, which may include ED behavior and drug use. In regard to the development of EDs, children with a sexual abuse history may not be as impacted by issues of self-esteem, body image, or dieting (Wonderlich et al., 2001).

Holzer and colleagues (2008) investigated PTSD as a mediator of the relationship between sexual trauma and EDs; they explicitly examined the role of specific components of PTSD as mediational influences. Seventy-one female participants with a history of sexual trauma that occurred at any stage of development and 25 control subjects completed a semi-structured interview assessing ED symptoms and a self-report index of PTSD symptoms. Three components of PTSD were evaluated: arousal, avoidance, and re-experiencing. Overall, trauma victims endorsed greater levels of ED and PTSD symptoms than control participants, thus implying a relation between sexual trauma and ED symptoms. Post-traumatic stress disorder was identified as a significant mediator of this relationship. In particular, the avoidance and arousal components that comprise PTSD emerged as significant mediators. Given these findings, the authors suggest that ED behaviors may function as an effort to regulate the state of emotional and physiological arousal associated with PTSD. Similarly, the ED behaviors may help the individual cope with social isolation consistent with the avoidance component of PTSD

and maintain an avoidance of negative affect associated with a trauma history (Holzer et al., 2008). Thus, the ED symptoms may function in an affect regulation capacity.

Groleau and colleagues (2012) examined the relationship between childhood emotional abuse (CEA) and symptoms of BN with a particular focus on identifying potential mediators of this relationship. They studied 176 women with BN and 139 normal-eater control group participants in relation to CT history, ED symptoms, and psychological characteristics (i.e. ineffectiveness, perfectionism, depression, and affective instability). Overall, the findings support a relationship between childhood trauma and BN in this sample; rates of childhood physical, sexual, and emotional abuse were greater among participants with BN than control group participants. Unlike CSA and CPA, however, CEA was associated with severity of ED symptoms. In regard to mediators of the CEA-ED relationship, the ineffectiveness construct of the Eating Disorder Inventory-2 (EDI-2; Garner, 1991), a proxy for general self-esteem, significantly mediated the relationship between CEA and severity of ED symptoms overall. In relation to this finding, the authors suggest that CEA effectively diminishes one's self-esteem such that one engages in ED behaviors to compensate for deficient self-worth. Additionally, the affective instability construct of the DAPP-BQ (Livesley et al., 1992) was found to effectively mediate the relationship between CEA and issues of self-control related to food. Based on this finding, the authors suggest that the ED behavior may serve as a coping mechanism for individuals with affective lability, allowing them to assert a sense of control over their emotions. Overall, Groleau and colleagues interpreted their findings as evidence that, following CEA experiences, ED behaviors may develop as means of maintaining adequate self-esteem and regulating affect (Groleau et al., 2012).

Based on this brief review, affect regulation appears to be influenced by CT experiences and to exert an influence on the development of psychopathology, including that of EDs. Affect regulation and dysregulation and its relation to CT, SUDs, and EDs is reviewed next.

Affect Dysregulation

Affect dysregulation has been recognized as an important variable underlying the development of psychopathology following CT and has been implicated in the etiology of disorders characterized by behavioral dysregulation, impulsivity, and self-destructiveness, including EDs and SUDs (Briere, 1992; van der Kolk & Fisler, 1994; Wonderlich et al, 1996; Wonderlich et al., 2007; Wonderlich, Wilsnack, Wilsnack, & Harris, 1996). Behaviors associated with these disorders have been hypothesized to serve an affect-regulating function, albeit ineffective in the long-term and often self-damaging (Briere, 1992; Heatherton & Baumeister, 1991; Hull, 1981; Smyth et al., 2007). The present study seeks to examine affect dysregulation as a mediator of the relationship between childhood trauma and comorbid BN and SUD. Therefore, studies examining affect regulation in relation to CT and the development of EDs and SUDs are reviewed next.

Affect regulation has generally been defined as an effort to influence the experience and expression of emotion in accord with one's goals and values (Fruzzetti, Crook, Erikson, Lee & Worrall, 2008 cited in Haynos & Fruzetti, 2011). According to a comprehensive definition provided by Gratz (2007), affect regulation involves a) an awareness and acceptance of emotions; b) the ability to engage in goal-directed behavior and inhibit impulsive behavior when experiencing negative affect; c) the capacity to use

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appropriate strategies to modulate the intensity and duration of emotional responses; and d) a willingness to experience negative emotions as part of life (Gratz & Roemer, 2004 cited in Gratz, 2007, p. 1094). Based on this definition, efforts to regulate emotions should be distinguished from efforts to control emotion. Effective emotion regulation emphasizes the functionality inherent in all emotions and the capacity to control one's behavioral response to an emotion, rather than controlling the existence or the experience of the emotion itself (Gratz, 2007). It is also important to clarify the influence of emotional intensity and reactivity (i.e. emotional vulnerability) in regard to affect regulation. Intense and reactive emotional responses are not inherently dysregulated; rather, emotion regulation incorporates the ability to adaptively respond to the experience of emotions regardless of their intensity or reactivity (Gratz, 2007). Affect dysregulation then involves an inability to experience, express, or effectively manage one's behavioral response to emotional arousal (Haynos & Fruzetti, 2011). Self-destructive behaviors such as substance abuse and bingeing and purging have been identified as behavioral efforts to regulate affect; thus, various etiological models of these behaviors incorporate deficits in effective affect regulation.

Several theoretical perspectives have considered affect dysregulation as a consequence of CT, particularly as it relates to the development of subsequent psychopathology. Among them, van der Kolk and Fisler (1994) discuss deficits in the ability to regulate intense emotions and impulses as one of the widest ranging consequences of trauma, as it impacts coping in somatic, cognitive, affective, and interpersonal domains, and as it influences the development of one's personality and sense of self. Unfortunately, CT contributes to a failure to develop effective self-

regulatory processes including the ability to identify and express affect and the capacity

to experience and effectively modulate emotions and their behavioral correlates

(including impulse control). Often, CT victims are unable to develop adaptive response

strategies, particularly as they are not able to fully process the meaning of a situation

outside of the need to react quickly. As such, in an effort to control or cope with

emotional arousal, individuals who have experienced CT often engage in self-destructive

behaviors such as self-injury, substance use, and eating disorders (van der Kolk &

Fisler, 1994).

Briere (1992) provides a similar interpretation of the function of self-destructive

behaviors, describing them as "tension reducing behaviors." Briere asserts that tension-

reducing behaviors, such as bingeing, purging, and substance use, emerge as learned

responses to the ongoing negative affect and tension related to childhood abuse

experiences. Thus, the self-destructive behaviors relate less to acting out, addiction, or

behavioral dyscontrol than to the individual's overt efforts to cope with the emotional

strife and affect-laden memories resulting from the prior trauma experience. The

behaviors can often be characterized by their ability to soothe, distract from, block out, or

numb emotional pain, even if only temporarily. Unfortunately, such behaviors are

maintained via negative reinforcement, which then impedes the individual from

developing more effective coping skills. Briere describes the following series of events

leading to the use of tension-reducing behaviors and their subsequent negatively

reinforcing qualities. The individual first experiences or anticipates an interpersonal event

that, due to its similarity to some aspect of the abuse, triggers significant and intolerable

dysphoria. This negative affect then leads the individual to engage in dissociation and/or

the use of "tension-reducing behaviors" that function to numb emotional pain, restore a sense of control, distract from the negative mood state, or bring relief. Because these behaviors are effective in ameliorating or avoiding the negative affect in the moment, they are negatively reinforcing. However, because the actual affect has not been effectively regulated, the individual is likely to experience guilt or distress at a later time, thus precipitating the need for additional avoidance strategies and self-destructive tension-reducing behavior, which contributes to their overall ineffectiveness (Briere, 1992).

**Affect Dysregulation Following Childhood Trauma
and its Relation to Eating Disorders**

Wonderlich and colleagues (1996) studied disordered eating and other self-destructive behaviors among women receiving treatment for incest. When compared to women without a history of incest, the survivors of incest had a significantly greater likelihood of experiencing body dissatisfaction, engaging in ED behaviors including bingeing and purging, and endorsing other self-destructive behaviors such as alcohol abuse, suicidal gestures, self-injury, and smoking. The authors hypothesized that individuals with an incest history experienced significant affective distress related to memories of the trauma and subsequently engaged in these self-destructive behaviors in an attempt to regulate their mood. The authors further asserted that affective distress may be one factor that mediates the relationship between CSA and the development of EDs (Wonderlich et al., 1996).

Wonderlich et al. (1996) proposed a similar hypothesis regarding the function of ED and other dysregulated behaviors. They examined CSA as a risk factor for the

development of BN in a representative national sample of 1099 women in the US, both in terms of the cognitive (i.e. excessive concern regarding shape and weight) and behavioral (i.e. bingeing and purging) elements of BN. Their results supported a relationship between CSA and the development of bulimic behavior. However, they failed to support a significant link between the experience of CSA and excessive concerns related to shape and weight. The authors assert that their findings lend greater support to the idea that CSA contributes to long-term affect dysregulation, predisposing abuse victims to a greater risk of developing bulimic behaviors, alcohol abuse, and other self-destructive behaviors for the purpose of regulating negative affect (Wonderlich et al., 1996).

Wonderlich and colleagues (2007) studied the relationship between CT history and mood and behavior among 123 women with BN in an EMA study. Consistent with studies previously reviewed (e.g. Thompson & Wonderlich, 2004), CT was generally associated with a history of anxiety disorders and CSA, in particular, was associated with a history of mood disorders. Curiously, none of the CT types examined in this study were significantly associated with a lifetime substance use disorder, contrasting findings of other studies (e.g. Kendler et al., 2000; Maniglio, 2011, Wilsnack et al., 1997). Ecological momentary assessment measures also exhibited a link between CSA and purging behaviors (vomiting and laxative use) and CSA and self-destructive behaviors. Finally, a history of CEA was significantly associated with severity of ED pathology, as well as with higher levels of negative affect and a greater degree of affective lability, particularly in regard to anger-hostility ratings. These findings generally suggest that certain forms of CT can have a unique impact on aspects of mood and behavior in women with BN, some of which are characterized by increased affective intensity and lability

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and a propensity for engaging in self-destructive behaviors. The authors specifically highlighted the unique role of CEA in influencing ED severity and daily negative mood variables. As such, emotion dysregulation resulting from CEA was suggested as a mediator of the relationship between CEA and ED behavior, as the ED behavior may allow for avoidance of one's increasing negative affect, overall mood lability, and memories associated with the experience of emotional abuse (Kent & Waller, 2000 in Wonderlich et al., 2007).

Affect Dysregulation and Eating Disorders

The connection between mood and ED behaviors has been well-established and various affect regulation models of EDs have been proposed. Smyth and colleagues (2007) specified the nature of the mood-behavior relationship in BN using an EMA protocol among 131 female participants with a BN diagnosis. Over the course of a two-week period, participants provided momentary indices of positive affect, negative affect, anger/hostility and stress several times per day (particularly in relation to a BN-event – bingeing or purging), and reported on binge and purge behaviors using a palmtop computer device. Analyses were conducted both between days (i.e. comparing mean mood and stress on BN-event days versus non-BN-event days) and within days (i.e. comparing mood within the course of a single day and immediately preceding and following a binge and/or purge event). The within-days analysis provided an opportunity to assess specific affective and behavioral antecedents and consequences related to binge and purge behaviors and allowed the investigators to more clearly solidify the relationship between momentary mood states and bulimic behaviors. In general, the findings do support a mood-behavior relationship. Specifically, between days analyses

suggested that BN-event days (vs. non-BN-event days) were typically characterized by greater negative affect, anger/hostility, and stress, as well as lower positive-affect. Within-days analyses revealed that increased negative affect, stress, and anger/hostility scores and diminished levels of positive affect preceded a binge or vomit event. Following a binge or vomit event, individuals experienced decreased negative affect, stress, and anger/hostility scores, as well as increased levels of positive affect. Furthermore, temporal analyses reveal the potential for the negative reinforcement of the binge/purge behavior. Generally, mood is lower on BN-event days. Mood is significantly diminished in the minutes leading up to the BN-event, but improves rapidly following the event. The authors suggest that the BN behavior functions as an affect regulation mechanism in this way. Engaging in the binge or purge behavior allows for escape from or avoidance of the negative affect (i.e. the aversive stimulus) that precedes the behavior; removal of the aversive stimulus is an inherent property of negative reinforcement, which increases the likelihood that the behavior (i.e. binge or purge) will occur again (Smyth et al., 2007).

Heatherton and Baumeister (1991) developed a model asserting that binge-eating functions as an escape from self-awareness and thus functions as an affect regulation method. The primary idea behind this model is that the binge itself functions as the escape/avoidance mechanism, based on one's desire to escape from an acute state of [negative] self-awareness. The model implies that individuals who engage in bingeing set for themselves high standards and continuously measure themselves against lofty personal ideals. They continually engage in self-evaluation related to their ability to meet their standards, and thus they are acutely attuned to instances of personal failure or

inadequacy. This tendency toward self-evaluation is related to an enhanced level of self-awareness, particularly focused on self-critical perceptions. Any perception of one's failure is likely to produce negative affect, including feelings of anxiety and depression. High levels of negative affect prompt a shift of the cognitive set such that attention is narrowed to the immediate circumstances and higher, self-reflective thinking is actively avoided. This leads to a state of cognitive and behavioral disinhibition, thereby removing limits on eating and allowing for bingeing to occur. In this state, the focus is shifted to taste and sensation rather than self-critical comparison to one's standards that would typically motivate the individual to engage in dietary restraint or planful eating. In the disinhibited state, the individual is also more susceptible to irrational thinking characterized by distorted beliefs about food, one's body, abilities to exert control over life events, and even one's desire to be someone else (Heatherton & Baumeister, 1991).

Wedig and Nock (2010) applied a functional analytic approach to understanding binge and purge behavior. They sought to examine the specific functions underlying both bingeing and purging behaviors by assessing the particular reinforcers that promote and maintain them. After surveying 298 women who engaged in bingeing and purging in the past three months with regard to their views of the function of their behavior, they completed a confirmatory factor analysis that provided support of the following four-function model. Two of the four functions are classified as intrapersonally reinforcing, while the remaining two functions are considered interpersonally reinforcing. Intrapersonally reinforcing functions are characterized by their affect regulating properties. These functions include automatic-negative reinforcement, which removes an aversive stimulus (i.e. high negative affect) via binge/purge behavior, and automatic-

positive reinforcement, which increases a desired stimulus (i.e. positive affect) following

binge/purge behavior. Interpersonally reinforcing functions relate to social or

communicative functions. Specifically, social-negative reinforcement is associated with

the use of binge/purge behaviors to avoid or remove feared social interactions, while the

social-positive reinforcement function of binge and purge behavior relates to attention

seeking efforts or relief in one's ability to communicate needs (Wedig & Nock, 2010).

This four-function model of binge and purge behavior clearly emphasizes an affect

regulation component and appears consistent with, and expands on, other models of the

affect-regulating properties of BN behavior described above (i.e. escape from

self-awareness, Heatherton & Baumeister, 1991). This model is also consistent with, and

has been applied in similar forms to, other types of self-destructive psychopathology,

including self-injury and substance use, which have yielded similar findings (Wedig &

Nock, 2010). In regard to alcohol, its functional basis is consistent, in part, with the

motivational and escape theory models discussed below (i.e., Cooper et al., 1995;

Hull, 1981).

Stice (2001) developed and prospectively tested a dual-pathway model of BN

behavior in a community sample of 231 adolescent girls. The model provides evidence

for the idea that both the pressure to be thin and thin-ideal internalization predict

increased body dissatisfaction, which in turn contributes to both dieting and negative

affect, and which lead to bingeing and purging behaviors. Thus, thin-ideal internalization,

pressure to be thin, dieting, and negative affect all function as risk factors for the

development of BN. In relation to the negative affect component of the model, Stice

suggests that negative affect may precipitate BN symptoms because eating often leads to feelings of comfort and provides means of distraction from affective distress.

Steinberg, Tobin, and Johnson (1990) were also interested in exploring the role of BN behaviors in affect regulation. They studied 180 patients with EDs in terms of their mood states prior to and following a binge-purge episode using an adjective rating method of mood states in the following four categories: depression, fragmentation, anxiety, and relief. Importantly, patients were divided into two subgroups based on symptoms reflecting borderline pathology (though not formally diagnosed). The purpose of comparing borderline vs. non-borderline subgroups was to determine if bingeing and purging serves different functions among individuals with borderline characteristics (i.e. labile affect, fragmentation, depressed mood, and use of external means of mood regulation). Results indicate that both borderline and non-borderline subgroups experienced a reduction in negative affect (i.e. anxiety, fragmentation) following the binge-purge episode; however, the borderline group experienced a significantly greater reduction in anxiety and also reported a reduction in depression when compared to the non-borderline group. The authors suggest that since the borderline group had greater initial levels of depression, the major function of the binge-purge behavior within this group is to modulate their depressed mood. Interestingly, the non-borderline group reported an increase in depression following a binge-purge episode. The authors noted that this outcome may reflect the guilt associated with having engaged in binge eating following dietary restraint and compensatory purging. Overall, the results of this study highlight the mood-regulating function of bingeing and purging behavior, as well as the

importance of assessing the unique functions that this behavior serves for different groups or individuals engaging in it (Steinberg, Tobin, & Johnson, 1990).

Haedt-Matt and Keel (2011) conducted a meta-analysis of studies examining the affect regulation model of binge eating using EMA procedures. The Haedt-Matt and Keel study reviews the major affect-regulation theories (i.e. general affect regulation, escape theory, restraint theory, and expectancy theory) relevant to binge eating and provides the following summary of their theoretical predictions: increases in negative affect lead to binge eating. Differences exist among the models as to whether binge eating will contribute to decreased negative affect. In fact, restraint, escape, and expectancy theories do not require that binge eating is followed by, and thus maintained by, reductions in negative affect following the binge. General affect regulation models applicable to multiple forms of psychopathology do predict that the behavior functions to produce a reduction in negative affect (Gross, 2007 cited in Haedt-Matt & Keel, 2011). However, in the case of binge eating, a modification suggests that, due to the guilt and possible anxiety related to weight gain that arises as a result of engaging in disinhibited eating and loss of control, it is the purging behavior that follows the binge that functions to reduce the negative affect (Haedt-Matt & Keel, 2011). Nevertheless, the Haedt-Matt and Keel meta-analysis tested the following two hypotheses: 1) negative affect is greater prior to the binge and is an antecedent of binge eating and 2) negative affect is lower following the binge than prior to the binge. Results of the meta-analysis produced mixed findings. Across studies, the first hypothesis was supported: negative affect was greater just before the binge episode when compared to both average mood ratings and affect preceding regular eating episodes. Based on this, negative affect does appear to function as an

antecedent of binge eating in BN and Binge Eating Disorder (BED). The second

hypothesis yielded mixed results across studies and was not supported overall; generally,

there was a significant increase in negative affect following a binge episode. In analyses

of purging behavior following a binge episode, negative affect decreased significantly

when compared to affect prior to purging (and thus after bingeing). However, negative

affect following purging did not differ significantly from affect prior to the binge. Haedt-

Matt and Keel discussed alternative explanations for the failure to support the decrease of

negative affect following a binge, as such a mechanism would provide the basis for a

negative reinforcement model that maintains the behavior. One explanation, based on the

role of reduced self-awareness in the escape theory of binge eating (Heatherton &

Baumeister, 1991), suggests that EMA procedures may not be ideal for measuring change

in affect due to need for accurate self-awareness to report mood in the moment when

prompted by EMA. Another potential explanation discussed by Haedt-Matt and Keel

proposes a trade-off of negative affect; the negative affect (i.e. anger/hostility) prior to

the binge may be traded for a different form of negative affect (i.e. guilt) following a

binge. In this way, binge behavior may be reinforced through the decrease in aversive

affect prior to the binge rather than an overall decrease in negative affect. The authors

recommend that future studies include a greater exploration of multiple components of

negative affect, as studies included in the meta-analysis addressing this issue were too

few to draw conclusions. The authors also discussed the reinforcement value associated

with increases in positive affect during a binge, as well as decreases in negative affect

following purging (Haedt-Matt & Keel, 2011). Based on the multiple models suggesting

affect-regulating mechanisms in EDs, as well as multiple studies providing evidence in

support of various components of these models, further investigations utilizing multiple methodologies will be important for more clearly drawing inferences about the function underlying binge and purge behaviors in BN.

Affect Dysregulation and Substance Use

A significant body of research has explored the strategic use of alcohol as a means of regulating affect. In a review of this literature, Sher and Grekin (2007) elaborated on the relationship between instances of positive and negative affect and alcohol use. Various forms of data, including EMA and laboratory studies of emotion-induced drinking, have validated the notion that drinking is used for emotion regulation purposes and have exhibited that alcohol can function to decrease negative emotions and increase positive emotions. However, they specified the following caveat: while alcohol consumption may help regulate affect in the moment, it often leads to a variety of negative consequences in the long-term. For instance, alcohol consumption and intoxication often contribute to greater negative affect and impinge on cognitive processes that are important for more effective forms of emotion regulation. Alcohol intoxication often leads to behaviors that elicit negative reactions from self and others, such as regret, shame, or other stressors (i.e. legal issues), which then magnify negative affect. In terms of long-term outcomes, significant alcohol use may be associated with withdrawal symptoms and anxiety, often precipitating further use, as well as cognitive impairments that further impede one's ability to cope effectively. Individuals fail to recognize this pattern and rely on the use of alcohol when they expect negative outcomes, especially when they possess few alternative means of coping with it. In this way, alcohol is used for the purpose of "self-medication," a pattern which has frequently been found as

a method of "coping" with symptoms of mood and anxiety disorders. Unfortunately, people who are motivated to drink to escape, experience emotional relief, or self-medicate generally consume greater amounts of alcohol and experience alcohol-related problems (Sher & Grekin, 2007).

Various specific models examine the role of emotion dysregulation in precipitating alcohol use, particularly among individuals who exhibit coping deficits. A motivational model of alcohol use proposed by Cooper and colleagues (1995) elaborates on coping and mood enhancement motives of alcohol use (i.e. as applied by Luce, Engler, & Crowther, 2007 below). The authors acknowledge regulation of emotional experience as an overarching purpose of alcohol use; however, they assert that alcohol use is precipitated by different behavioral antecedents and motives (and is followed by unique consequences) and thus represents distinct behavior that is based on the function it serves. For instance, drinking to cope represents a strategic effort to escape, avoid, or modulate negative affect whereas drinking for mood enhancement occurs for the deliberate purpose of increasing positive mood states (Cooper et al., 1995). Following an experimental test of their hypotheses, Cooper and colleagues identified expectancies (i.e. belief that alcohol reduces negative affect), coping (reliance on alcohol to cope to the exclusion of other methods, problem avoidance), and negative emotions as antecedents related to the coping motive for drinking. In contrast, expectancies, such as the belief that alcohol improves social and emotional experience and sensation seeking were antecedents associated with drinking to enhance mood. Drinking to cope appears to occur in reaction to the experience of negative affect and is part of an ineffective coping style that occurs in the absence of more effective coping methods or when deficits in coping exist. The authors

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identified greater reliance on emotion-focused coping, expectancies for tension-reduction, increased levels of depressed mood, and more drinking problems as characteristics of individuals acting on the drinking to cope motive. In fact, drinking to cope had a direct effect on drinking problems, while drinking to enhance mood was mediated by additional factors. This suggests that drinking to cope exists as the motive most significantly tied to alcohol problems. Overall, the Cooper et al. (1995) study illustrates the mood-behavior relationship and characterizes alcohol use by its affect-regulation versus mood-enhancement motives. The authors emphasize the importance of assessing the particular mood-regulating motive for alcohol use, as multiple pathways to alcohol problems exist and treatment efforts should be directed at the specific antecedents and functions associated with the distinct behavior pathway (Cooper et al., 1995).

Like Heatherton and Baumeister's model of binge eating as an escape from self-awareness, Hull (1981) developed a model that implies a similar affect-regulating function of alcohol use. Hull's model primarily specifies that alcohol consumption impedes cognitive processes involved in self-awareness; specifically, alcohol decreases one's sensitivity to personal information associated with current and past behaviors or self-relevant feedback that has the potential to produce further negative affect. The decreased focus on negative information related to the self leads to psychological relief and dissipates negative affect. The impetus to consume alcohol, therefore, is the increasing awareness of self-threatening information and the resulting negative affect. Engaging in alcohol use promotes avoidance of those cognitive processes that contribute to the awareness of threats to the self including past errors, feedback from others, and self-criticism. Alcohol intoxication is most effective in mediating avoidance in

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individuals who experience stressors that are self-relevant and in individuals who are

highly self-aware (Sher & Grekin, 2007; Hull, 1981).

**Affect Dysregulation and its Relation to Eating Disorder
and Substance Use Behavior**

Other studies have examined the role of emotion dysregulation in the

development of various forms of dysregulated behavior, including both disordered eating

and substance use, unrelated to a history of trauma. Two such studies emphasize deficits

in emotion regulation and the use of self-destructive coping mechanisms in the

development and maintenance of both ED and SU behavior. Aldao, Nolen-Hoeksema,

and Schweizer (2010) conducted a meta-analytic review of six primary emotion

regulation strategies and their role in the following four forms of psychopathology:

anxiety, depression, EDs, and SUDs. Of the six emotion regulation strategies evaluated,

rumination, avoidance, and suppression were identified as maladaptive strategies, while

acceptance, reappraisal, and problem solving were designated as adaptive emotion

regulation strategies. Unsurprisingly, the maladaptive emotion regulation strategies were

often more strongly related to overall psychopathology. However, when type of

psychopathology was considered, relationships between maladaptive emotion regulation

strategies and EDs and SUDs (i.e., small to medium effect sizes) were generally weaker

than the relationships between maladaptive strategies and anxiety and depression (i.e.,

medium to large effect sizes). Given this initially surprising finding, the authors

hypothesized a more complex association between the function of particular emotion

regulation mechanisms and the nature of both EDs and SUDs. For instance, in one

alternative explanation, the authors suggested that the relationship between EDs/SUDs

and these maladaptive emotion regulation strategies is moderated by reward sensitivity.

As such, individuals who are characteristically high in reward sensitivity may be more

likely to rely on the use of substances or food (i.e. binge eating) to cope with their

dysregulated affect, thereby meeting their needs for both reward and reduction of

negative affect, and ultimately increasing their likelihood of developing EDs and/or

SUDs. In a second explanation offered by the investigators, ED and SU behaviors may

independently function as emotion regulation strategies, thus reducing the need to

integrate other (maladaptive) emotion regulation strategies such as suppression,

avoidance, or rumination. Because there was evidence of an association between the

investigated maladaptive emotion regulation strategies and EDs and SUDs, although

weaker than the associations in anxiety and depression, the authors further suggest that

binge eating and substance use may be part of a group of maladaptive emotion-regulation

strategies that individuals implement for coping purposes (Aldao et al., 2010).

Luce and colleagues (2007) investigated disordered-eating behaviors and motives

for alcohol use among a non-clinical sample of college women with the goal of further

elucidating the relationship between ED behaviors and alcohol use. Based on responses

to the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994),

participants were divided into the following three probable ED groups: 1) BN, purging

subtype; 2) Binge Eating Disorder (BED); and 3) Eating Disorder Not Otherwise

Specified (EDNOS). They also included a non-eating disordered control group, which

was comprised of individuals who denied binge eating and purging behaviors on the

EDE-Q. Members in each group were evaluated with regard to their alcohol consumption

patterns (i.e. drinking episodes: total, by weekday, by weekend) and rates (i.e. binge

drinking) over the past month, as well as their motives for drinking, which included the following based on the Motives for Drinking measure (Cooper, 1994): social, coping, mood enhancement, and conformity. Group comparisons of alcohol consumption patterns and rates revealed that individuals in the probable BED group engaged in significantly greater weekend alcohol consumption and binge drinking than women in the probable EDNOS and control groups. In terms of drinking motives, members of the control group were more likely to endorse drinking for mood enhancement purposes when compared with the probable EDNOS group, while members of the probable BN and BED groups were significantly more likely than EDNOS and control group members to use alcohol for the purpose of coping. Based on these findings, and the notion that drinking and engaging in ED behaviors are likely part of a larger, dysfunctional mood-regulation strategy, the authors recommend further evaluation of the functional relationship between ED behaviors and alcohol use (Luce et al., 2007).

Purpose of the Current Study

This study has reviewed evidence related to the following lines of research: the relationship between CT and EDs and between CT and SUDs; CT associated with the development of psychopathology, particularly that characterized by impulsivity and behavioral dysregulation; and mediators of the relationship between CT and EDs. Additional evidence regarding the influence of affect dysregulation following CT, and in the development of EDs and SUDs, was also reviewed. Considering findings resulting from this research review, the purposes of the current study are to 1) further examine the relationship between experiences of CT and comorbid BN and SUD and 2) explore affect

dysregulation as a mediator of this particular relationship. Hypotheses include the following:

1. There will be a direct effect of childhood trauma on the presence of comorbid substance use in bulimia nervosa, such that individuals with BN who have a more severe CT history will be more likely to exhibit comorbid SUDs (i.e. alcohol use disorder, drug use disorder).

2. Affect dysregulation will be a significant mediator of the relationship between childhood trauma and comorbid BN and SU.

CHAPTER II

METHODS

This study utilized a pre-existing data-set collected from an NIMH-funded research protocol that examined the daily experiences of female participants with BN using EMA methodologies (e.g. Smyth et al., 2007; Wonderlich et al., 2007). An array of instruments, including semi-structured interviews, written self-report measures, and EMA, were implemented as part of the original study protocol. However, EMA data is not included in the present study. The current study focused explicitly on the cross-sectional measures that allow for testing the two hypotheses stated above. The decision to analyze a pre-existing data set was based on factors related to the availability and nature of the clinical sample captured in this data set and the quality of the measures, particularly those involving trauma-related interview data, already included in the protocol. The following is a description of the participants included in the original study and the procedures relevant to this investigation that were conducted as part of the study protocol. Statistical analyses performed on the data specifically for the current study are also described.

Participants

Participants included 125 females who met diagnostic criteria for BN, as determined by a Ph.D. level research interviewer administering the Structured Clinical Interview for DSM-IV (SCID-I/P; First, Spitzer, Gibbon, & Williams, 1995). Participants

received remuneration of $100 per week for their completion of the two-week study protocol with an additional $50 bonus for at least 85% adherence on the set of EMA assessments.

Initial study recruitment procedures, including a telephone screening, yielded 154 participants. Following more rigorous diagnostic assessment and subsequent failure to meet inclusion criteria, an additional 11 participants were excluded. Thus, 143 participants initiated the EMA protocol. An additional seven participants dropped out of the EMA protocol prior to completion and three participants failed to provide complete EMA data. The total number of participants who completed the EMA protocol was 133. Two participants provided incomplete data on the DAPP-BQ and were removed from analyses, resulting in a total of 131 participants with complete data. Additionally, six subjects were removed from the mediation analyses due to incomplete data on the CTI. This yielded a total of 125 participants.

Measures

Participants completed the following measures as part of the diagnostic interview and self-report assessment portions of the study. The EMA assessment protocol is not reported here.

Structured Clinical Interview for DSM-IV Axis I Disorders, Patient-Edition (SCID-I/P)

The SCID-I/P (First et al., 1995) is a semi-structured clinical interview used for the purpose of establishing the diagnosis of DSM-IV Axis I disorders. It is both well-researched and frequently used as a sufficiently reliable and valid diagnostic instrument. In this study, the SCID-I/P was used as the primary measure to establish the diagnosis of

BN. It was also used to assess for the presence of current and lifetime comorbid Axis-I disorders, including anxiety disorders, depression, and substance use disorders. Each participant received a "present" or "absent" rating for each diagnostic category. Additionally, this measure was used to collect screening information related to treatment history. Kappa coefficients were used to determine interrater reliability on 25 randomly selected cases from this sample. Kappa coefficients were calculated at 1.00 for BN, anxiety, depression, and substance use diagnoses. Analyses for the current study used the "present" rating for lifetime diagnoses of alcohol use, drug use, and combined alcohol and drug use as dependent variables.

Eating Disorder Examination (EDE)

The EDE (Fairburn & Cooper, 1993) is an investigator-administered interview used to gather data regarding current ED symptomatology. The EDE is comprised of the following four subscales that represent the core psychopathology of EDs: restraint, eating concern, shape concern, and weight concern. Subscale scores each range from 0, indicating low pathology to 6, indicating high pathology. The EDE also includes frequency measures of binge eating and compensatory behavior (i.e. purging). The global EDE score was used in this study as an index of overall eating disorder symptomatology; it is calculated as a mean of the four subscales. The EDE is widely used in treatment outcome studies for BN, and thus, has sufficient and well-documented validity and reliability (Fairburn & Cooper, 1993). Intraclass correlation coefficients used to determine interrater reliability based on 25 randomly selected cases from this sample ranged from 0.65 on the restraint subscale to greater than 0.98 on the eating concern, weight concern, and shape concern subscales.

Child Trauma Interview (CTI)

The CTI (Fink et al., 1993) is a structured interview that is used to assess the following forms of CT: physical, sexual, and emotional abuse; physical neglect; separation; and witnessing domestic violence. Of the types of trauma measured, the current study incorporated physical, sexual, and emotional abuse as independent variables. Trained raters evaluated the traumatic experiences reported by participants on seven point scales in terms of both the frequency and severity of the traumatic episode. The highest severity rating for each subject for each form of trauma (CSA, CPA, CEA) provided the measure of trauma used as the predictor variable. Severity ratings ranged from 0 to 6. The CTI has been found to exhibit convergent validity with measures of PTSD and personality disorders (Fink et al., 1993). Interrater reliability ratings for the CTI for severity and frequency of abuse range from 0.92 – 0.99.

Diagnostic Interview for Borderlines-Revised (DIB-R)

The DIB-R (Zanarini, Frankenbrug, & Vujanovic, 2002) is a semi-structured interview that provides a measure of the following core features of borderline personality disorder: affect regulation, cognitive disturbance, impulse action patterns, and interpersonal relationships. The DIB-R has exhibited sound psychometric properties (Zanarini, Gunderson, Frankenburg, & Chauncey, 1989). In the current study, the intraclass correlation coefficients that determine interrater reliability based on 25 randomly selected cases ranged from 0.75 on the cognition scale to 1.0 on the interpersonal scale, and 0.98 for the total score. The Affect Scale score, a measure of affect dysregulation, was used as a mediator variable in the current study.

**Dimensional Assessment of Personality Pathology –
Brief Questionnaire (DAPP-BQ)**

The DAPP-BQ (Livesley & Jackson, 2002) is a 290-item self-report measure comprised of the following 18 scales: affective lability, anxiousness, callousness, cognitive dysregulation, compulsivity, conduct problems, identity problems, insecure attachment, intimacy problems, narcissism, opppositionality, rejection, restricted expression, self-harm, social avoidance, stimulus seeking, submissiveness, and suspiciousness. This instrument provides a dimensional assessment of personality traits thought be associated with personality disorders. The DAPP-BQ has exhibited sufficient psychometric properties; internal consistency ranges from 0.83 to 0.94 and test-retest reliability over a three week period ranges from 0.81 to 0.93 (Livesley & Jackson, 2002). In the current study, coefficient alpha for the subscales of the DAPP-BQ ranged from 0.80 on the callousness scale to 0.94 on the insecure attachment scale. The Emotion Dysregulation Superfactor was used as a mediator in the present study.

Procedures

Study recruitment methods included local newspaper advertisements; printed fliers posted in clinics, on campuses, in the community; presentations at local health care facilities; and information packets providing study information mailed to treatment providers who see ED patients. Individuals interested in participating in the study contacted research staff and were screened for inclusion (DSM-IV diagnostic criteria for BN) and exclusion criteria (i.e. males, less than 18 years of age, current psychotic disorder, inability to read). Eligible participants were invited to an information meeting, at which they were given additional study information, completed the informed consent

procedure, and provided a blood sample to assess medical stability (i.e. electrolyte screen). Participants who remained interested in the study then completed three to four hours of assessments over the course of two scheduled assessment visits with a Ph.D. level assessor. The SCID-I/P, EDE, CTI, DIB-R and DAPP-BQ were completed during the two assessment sessions. After the first assessment visit, participants were trained on the EMA assessments; this form of assessment is not reported here.

Statistical Analyses

Descriptive Statistics

Descriptive statistics, including frequencies and means (standard deviations), were used to characterize the sample in regard to demographic variables and in relation to the variables of interest, childhood trauma history and lifetime substance use disorders. Frequencies and percentages were calculated for each type of trauma (CSA, CPA, CEA). Mean trauma severity scores were reported for CEA, CPA, and CSA.

The frequency of lifetime alcohol use disorder diagnosis and lifetime drug use disorder diagnosis were reported. Additionally, the mean (standard deviation) level of affect dysregulation was calculated based on the Affect Scale of the DIB-R.
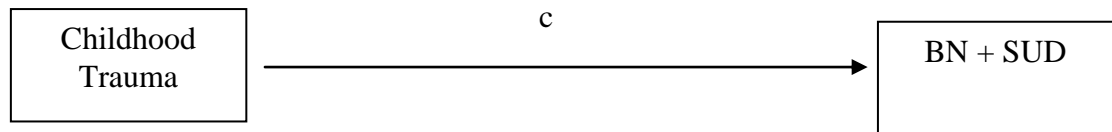
Mediation Analyses

The primary purpose of the current study was to use mediation analyses to determine if affect dysregulation served as a significant mediator of the relationship between CT and SUDs in individuals with BN. Both of the hypotheses stated above were tested through the process of mediation analysis. Preliminary mediation analyses were run to determine which of the two mediators (DAPP-BQ Emotion Dysregulation Superfactor or DIB-R Affect Scale), both measures of affect dysregulation, provided
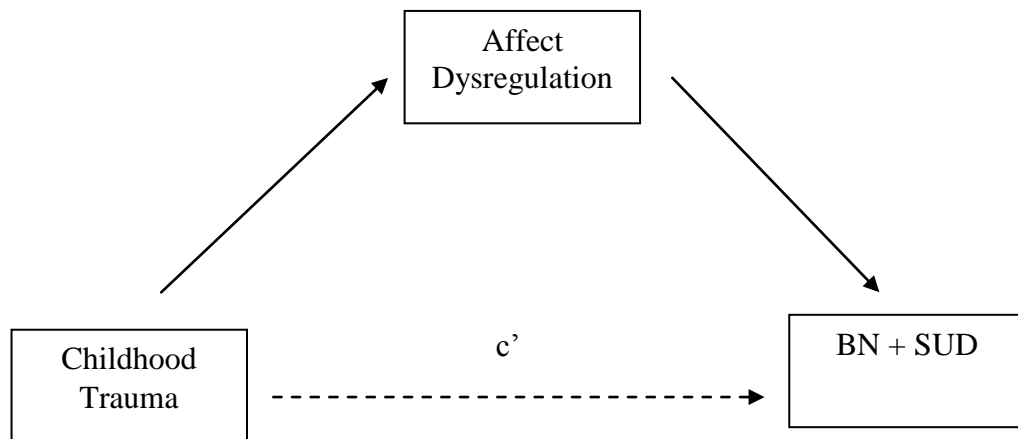
stronger evidence of mediation. Mediation can be defined as an instance in which a predictor influences a dependent variable indirectly through at least one intervening variable, the mediator (Preacher & Hayes, 2008). Baron and Kenny (1986) provide a useful framework consisting of several criteria for examining the influence of a mediator in their causal steps analysis. The first criterion asserts that there must be a significant effect when the dependent variable is regressed on the independent variable. The second criterion asserts that the association between the independent variable and the proposed mediator is significant. The third criterion asserts that the relation between the mediator and the dependent variable must be significant. Finally, the test of mediation assumes that the significance of the relationship between the independent variable and the dependent variable is reduced or eliminated when the mediator is added to the model. It is important to note that the causal steps model (Baron & Kenny, 1986) assumes that lack of significance related to any of the previous criteria renders the mediation effect insignificant. Additionally, Baron and Kenny's causal steps model is thought to be one of the lowest in power, thus diminishing its ability to detect an indirect effect of the mediator (Hayes, 2009).

Given some of the limitations of the causal steps model (Baron & Kenny, 1986), including the required significance of the direct effect of the independent variable on the dependent variable, bootstrapping analyses represent a viable alternative. The Bootstrapping approach, elaborated by Preacher and Hayes (2008), incorporates many of the same assumptions as the Baron and Kenny approach and modify others. For instance, bootstrapping similarly relies on the procedure of using regression to determine the direct effect of the independent variable on the dependent variable (see Figure 1; path c').

Regression using the independent variable to predict the mediator is then conducted (path a), followed by regression using the independent variable plus the mediator to predict the dependent variable (path b). The indirect effect, or the effect of the mediator, is calculated as the product of paths a and b while the total effect (denoted c) is computed as the sum of the indirect (i.e. product of paths a and b) and direct effects (path c').

```
┌──────────────┐                c                  ┌──────────────┐
│  Childhood   │ ────────────────────────────────▶ │   BN + SUD   │
│   Trauma     │                                   │              │
└──────────────┘                                   └──────────────┘
```

    a) Direct Pathway

```
                    ┌──────────────┐
                    │    Affect    │
                    │ Dysregulation│
                    └──────────────┘
                  ↗                  ↘
┌──────────────┐          c'        ┌──────────────┐
│  Childhood   │ - - - - - - - - -▶ │   BN + SUD   │
│   Trauma     │                    │              │
└──────────────┘                    └──────────────┘
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    b) Indirect/Mediated Pathway

Figure 1. Proposed mediation model: Affect dysregulation as the mediator of the relationship between childhood trauma and substance use disorders in bulimia nervosa.

Bootstrapping does not require a significant direct effect for overall significance of the mediator (Preacher & Hayes, 2008), as is required by the causal steps approach (Baron & Kenny, 1986). Additionally, the bootstrapping procedure is unique in its method and assumptions. It is a nonparametric procedure that does not require the assumption of normality of the sampling distribution. It also provides a powerful test of the indirect effect (Hayes, 2009; Preacher & Hayes, 2008). For these reasons, the bootstrapping approach is thought to be the method of choice for mediation analysis (Hayes, 2009; Preacher & Hayes, 2008). Specifically, the bootstrapping method is based on a re-sampling procedure that involves repeatedly selecting a sample from the dataset (approximately 5000 times), with replacement, and estimating the indirect effect for each subset. This method allows for multiple estimates of the indirect effect and provides an empirical approximation of the sampling distribution for the indirect effect. The variability in the estimate (standard error) is calculated; the multiple estimates are used to generate confidence intervals, which are ordered from smallest to largest, establishing the upper and lower bounds of the confidence interval. The divergence from zero is used to determine the significance of the indirect effect (Hayes, 2009; Preacher & Hayes, 2008).

In the current study, the bootstrapping approach was used to test the significance of the indirect effect of the mediator. The maximum severity score within each category of childhood trauma (CEA, CPA, CSA) served as the independent variables. The dependent variable was the presence or absence of substance use, a dichotomous value, thus requiring use of logistic regression. Two mediation models (one for the DIB-R mediator and one for the DAPP-BQ mediator) were generated for both lifetime drug use disorder and lifetime alcohol use disorder as the two dependent variables. Affect

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dysregulation, as the proposed mediator was represented by two different measures:

1) the Affect Scale from the DIB-R and 2) the Emotion Dysregulation Superfactor from

the DAPP-BQ (see preliminary analyses). Based on the nature of the independent and

dependent variables included in this analysis, the general mediation analysis using the

bootstrapping approach (Figure 1) was conducted as follows: 1) logistic regression was

used to determine the direct effect of childhood trauma on substance use disorders in

individuals with BN (addressing hypothesis 1), 2) linear regression (given the continuous

scale of the mediators) was conducted using childhood trauma to predict affect

dysregulation (path a), and 3) logistic regression was conducted using both childhood

trauma and affect dysregulation to predict substance use disorder (path b). The indirect,

or mediation effect, was calculated as the product of paths a and b (addressing hypothesis

2). The total effect was calculated as the sum of the indirect (path a x b) and direct (path

c') effects. All mediation analyses were conducted using the INDIRECT macro for SPSS

(Hayes, 2012). Results are reported below in both narrative and table form.

Secondary Analyses

Three additional sets of analyses were conducted to further characterize the

relationships between CT, affect dysregulation, and SUDs in participants with BN.

Differences in affect dysregulation based on presence or absence of CT (CEA, CPA,

CSA) history were examined using t-tests. Similarly, differences in affect regulation

scores based on the presence or absence of SUD (lifetime alcohol use disorder, lifetime

drug use disorder) were calculated using t-tests. Finally, chi-square analyses were used to

describe proportional differences in frequency of SUD diagnoses (alcohol use disorder,

drug use disorder) by presence or absence of CEA, CPA, and CSA. In these analyses,

presence or absence of CT was indicated by scores of greater than 3 on the CTI for each

form of trauma.

CHAPTER III

RESULTS

Descriptive Analyses

One hundred twenty-five female participants who met DSM-IV criteria for BN were included in the mediation analyses. Participant characteristics, including race, education, and relationship status, are summarized in Table 1. The mean age of the sample was 24.88 years (SD = 7.24) and the majority of participants identified themselves as white (98.6%), single/never married (64.8%), and having completed at least some college (62.4%).

Participants were also characterized in terms of clinically-relevant variables, including psychiatric diagnoses (SCID-I/P), childhood trauma (CTI), global ED symptomatology (EDE), and affect dysregulation (DIB-R, Affect Scale); these results are summarized in Table 2. Based on the SCID-I/P, the majority of participants met DSM-IV criteria for both lifetime and current mood disorders (87.2% and 54.4%, respectively), as well as lifetime and current anxiety disorders (60.0% and 52.0%, respectively). A majority of participants also endorsed alcohol use consistent with an alcohol use disorder (56.0%). Lifetime drug use disorders were less commonly diagnosed in this sample (27.2%).

Table 1. Subject Demographics.

Demographic Variables	N (%)
Race	
White	121 (96.8)
Native American	2 (1.6)
Asian	1 (0.8)
Other	1 (0.8)
Highest Level of Education	
Some high school	1 (0.80)
High school graduate	16 (12.8)
Trade/technical school	6 (4.8)
Some college	78 (62.4)
College graduate	19 (15.2)
Graduate study	3 (2.4)
Graduate degree	2 (1.6)
Marital Status	
Single, never married	81 (64.8)
Married (first marriage)	10 (8.0)
Divorced/widowed/re-married	8 (6.4)
Monogamous relationship - Living with partner	11 (8.8)
Monogamous relationship - Not living with partner	5 (4.0)
Divorced/Not presently married	10 (8.0)

In regard to experiences of childhood trauma, as measured by the CTI, emotional abuse was the most commonly endorsed form of abuse (88.0%), followed by physical abuse (79.2%), and sexual abuse (44.0%). The mean severity score for childhood emotional abuse found in this sample (2.44, SD = 1.26) generally reflects low to

Table 2. Clinical Characteristics.

Clinical Variables	N (%) / Mean (SD)
SCID-I/P Diagnoses	
Lifetime Mood Disorder	109 (87.2%)
Current Mood Disorder	68 (54.4%)
Lifetime Anxiety Disorder	75 (60.0%)
Current Anxiety Disorder	65 (52.0%)
Lifetime Alcohol Use Disorder	70 (56.0%)
Alcohol Abuse	30 (24.0%)
Alcohol Dependence	40 (32.0%)
Lifetime Drug Use Disorder	34 (27.2%)
Drug Abuse	13 (10.4%)
Drug Dependence	21 (16.8%)
CTI	
Sexual Abuse	55 (44.0%)
Mean Severity (SD)	1.38 (1.79)
Physical Abuse	99 (79.2%)
Mean Severity (SD)	2.29 (1.61)
Emotional Abuse	110 (88.0%)
Mean Severity (SD)	2.44 (1.26)
EDE (Global Score)	3.32 (1.12)
DIB-R (Affect Scale)	1.49 (0.62)

Note. SCID = Structured Clinical Interview for DSM-IV Axis I Disorders, Patient-Edition; CTI = Childhood Trauma Interview; EDE = Eating Disorders Examination; DIB-R = Diagnostic Interview for Borderlines-Revised; SD = standard deviation.

moderate levels of emotional abuse, which may include experiences such as being yelled

at in a frightening manner or being criticized, insulted, rejected, or humiliated. The mean

childhood physical abuse score (2.29, SD = 1.61) in this sample is generally consistent

with experiences of being hit with the hand or an object on either bare skin or through

clothing that may or may not have left visible markings; being pushed, restrained, or

shaken; or being locked in a room or forced to stand in place for an extended period of time. The mean childhood sexual abuse score (1.38, SD = 1.79) in this sample generally reflects non-contact sexual experiences and/or minimally intrusive contact experiences, which may include being shown pornography, exposure to exhibitionism by peers or adults, receiving sexualized comments, regularly sleeping or showering with an adult, or being touched or held in a sexualized manner.

Finally, Table 3 illustrates simple bivariate associations between clinical variables of interest. Notably, there were generally, moderate to strong, positive correlations among the types of childhood trauma. Lifetime and current anxiety disorder diagnoses were also significantly, moderately, positively correlated with each form childhood trauma. However, emotional abuse was the only form of childhood trauma significantly correlated with ED symptoms.

Mood and anxiety disorder diagnoses were generally significantly positively correlated. Similarly, ED symptoms were generally significantly positively correlated with lifetime and current mood and anxiety disorders.

Affect dysregulation as indicated by the DIB-R Affect Scale was positively correlated with current and lifetime mood and anxiety disorder diagnoses, ED symptoms, childhood emotional abuse, and drug use disorder diagnosis.

Preliminary Mediation Analyses

Two mediators were initially examined in this study, the Affect Scale from the DIB-R and the Emotion Dysregulation Superfactor from the DAPP-BQ; both function as measures of affect dysregulation. Preliminary analyses were conducted to determine which of the two mediators provided the strongest evidence of mediation. Results

Table 3. Bivariate Correlations.

Clinical Variables	1	2	3	4	5	6	7	8	9	10	11
1 Affect Scale (DIB-R)	-										
2 Lifetime alcohol use disorder diagnosis	0.15	-									
3 Lifetime drug use disorder diagnosis	0.33**	0.29**	-								
4 Lifetime mood disorder diagnosis	0.34**	0.14	0.13	-							
5 Current mood disorder diagnosis	0.31**	0.03	0.16	0.42**	-						
6 Lifetime anxiety disorder diagnosis	0.30**	0.13	0.28**	0.22*	0.10	-					
7 Current anxiety disorder diagnosis	0.32**	0.08	0.30**	0.21*	0.18*	0.85**	-				
8 Global EDE score	0.40**	0.07	0.13	0.25***	0.26**	0.21*	0.29**	-			
9 Childhood sexual abuse (CTI)	0.15	0.11	0.29**	0.22*	0.05	0.31**	0.29**	0.16	-		
10 Childhood physical abuse (CTI)	0.10	0.18*	0.26**	0.16	-0.016	0.31**	0.30**	0.15	0.58**	-	
11 Childhood Emotional Abuse (CTI)	0.26**	0.10	0.17	0.13	0.00	0.22*	0.26**	0.27**	0.41**	0.63**	-

Note. DIB-R = Diagnostic Interview for Borderlines-Revised; EDE = Eating Disorders Examination; CTI = Childhood Trauma Interview

* p < 0.05

** p < 0.01

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indicate that the Affect Scale of the DIB-R provided greater evidence of mediation across trauma types (Table 4 and Table 5), whereas the Emotion Dysregulation Superfactor of the DAPP-BQ provided only limited evidence of mediation (Table 6 and Table 7). For example, across the six models of mediation, the use of the DAPP-BQ Emotion Dysregulation Superfactor as a mediator only generated one significant indirect effect and no instances of full mediation (i.e. both an indirect effect and a direct effect), whereas the use of the DIB-R Affect Scale as a mediator contributed three significant indirect effects, and in the case of CSA, full mediation. As a result, the DIB-R was determined to function as a more robust mediator, and as such, results presented across analyses reflect the use of the DIB-R Affect Scale.

Bootstrapping Mediation Analyses

Mediation analysis using the bootstrapping approach, elaborated by Preacher & Hayes (2008), was used to test for both the direct effect of CT on the presence of comorbid SUDs in BN and the potential mediation effect of affect dysregulation on the relationship between CT and comorbid BN and SUD. Each form of CT was individually entered as an independent variable and each form of SUD (i.e. lifetime alcohol use disorder and lifetime drug use disorder) was individually tested as the dependent variable. Therefore, the following six mediation analyses were conducted: 1) childhood sexual abuse predicting drug use disorder, 2) childhood physical abuse predicting drug use disorder, 3) childhood emotional abuse predicting drug use disorder, 4) childhood sexual abuse predicting alcohol use disorder, 5) childhood physical abuse predicting alcohol use disorder, and 6) childhood emotional abuse predicting alcohol use disorder. Results of the mediation analyses (with the DIB-R Affect Scale as mediator) predicting lifetime drug

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Table 4. Results of Mediation Analyses for Lifetime Drug Use Diagnosis.

Independent Variable	Mediator	Effect of IV on mediator (SE) path a	Effect of Mediator on DV (SE) path b	Indirect Effect Estimate path ab	95% Bias-Corrected Confidence Interval	Direct Effect of IV (SE) path c'	Total Effect of IV (SE) path c
CSA	Affect Scale (DIB-R Scale)	0.1 (0.03)**	1.37 (0.46)**	0.14†	0.05, 0.29	0.26 (0.12)*	0.35 (0.11)**
CPA	Affect Scale (DIB-R Scale)	0.12 (0.030)***	1.37 (0.46)**	0.16†	0.05, 0.35	0.27 (0.14)	0.39 (0.14)**
CEA	Affect Scale (DIB-R Scale)	0.13 (0.04)**	1.47 (0.45)**	0.19†	0.05, 0.44	0.21 (0.19)	0.34 (0.18)

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$
† Significant

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Table 5. Results of Mediation Analyses for Lifetime Alcohol Use Diagnosis.

Independent Variable	Mediator	Effect of IV on mediator (SE) path a	Effect of Mediator on DV (SE) path b	Indirect Effect Estimate	95% Bias-Corrected Confidence Interval	Direct Effect of IV (SE) path c	Total Effect of IV (SE) path c
CSA	Affect Scale (DIB-R Scale)	0.1 (0.03)*	0.44 (0.31)	0.04	-0.01, 0.13	0.08 (0.11)	0.13 (0.10)
CPA	Affect Scale (DIB-R Scale)	0.12 (0.03)**	0.36 (0.31)	0.04	-0.03, 0.15	0.18 (0.12)	0.23 (0.12)
CEA	Affect Scale (DIB-R Scale)	0.13 (0.04)**	0.45 (0.31)	0.06	-0.01, 0.21	0.11 (0.15)	0.17 (0.14)

* p < 0.05
** p < 0.01

Table 6. Results of Preliminary Mediation Analyses for Lifetime Drug Use Diagnosis – DAPP-BQ Mediation.

Independent Variable	Mediator	Effect of IV on mediator (SE) path a	Effect of Mediator on DV (SE) path b	Indirect Effect Estimate path ab	95% Bias-Corrected Confidence Interval	Direct Effect of IV (SE) path c'	Total Effect of IV (SE) path c
CSA	Emotion Dysregulation (DAPP-BQ Superfactor)	0.77 (0.45)	0.02 (0.02)	0.02	-0.01, 0.10	0.34 (0.11)**	0.35 (0.11)**
CPA	Emotion Dysregulation (DAPP-BQ Superfactor)	0.58 (0.02)	0.03 (0.02)	0.02	-0.01, 0.10	0.38 (0.14)**	0.39 (0.14)**
CEA	Emotion Dysregulation (DAPP-BQ Superfactor)	1.89 (0.63)**	0.02 (0.02)	0.04	-0.04, 0.16	0.31 (0.19)	0.34 (0.18)

* p < 0.05
** p < 0.01

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Table 7. Results of Preliminary Mediation Analyses for Lifetime Alcohol Use Diagnosis – DAPP-BQ Mediation.

Independent Variable	Mediator	Effect of IV on mediator (SE) path a	Effect of Mediator on DV (SE) path b	Indirect Effect Estimate	95% Bias-Corrected Confidence Interval	Direct Effect of IV (SE) path c'	Total Effect of IV (SE) path c
CSA	Emotion Dysregulation (DAPP-BQ Scale)	0.77 (0.02)	0.04 (0.02)*	0.03	-0.001, 0.12	0.09 (0.11)	0.13 (0.10)
CPA	Emotion Dysregulation (DAPP-BQ Scale)	0.58 (0.51)	0.043 (0.02)*	0.02	-0.01, 0.11	0.21 (0.12)	0.23 (0.12)
CEA	Emotion Dysregulation (DAPP-BQ Scale)	1.89 (0.63)**	0.04 (0.02)	0.08†	0.01, 0.22	0.09 (0.15)	0.17 (0.14)

* p < 0.05
** p < 0.01
*** p < 0.001
† Significant

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use disorders in female participants with BN are summarized in Table 4 and results of the

mediation analyses predicting lifetime alcohol use disorders in female participants with

BN are summarized in Table 5. All effect estimates are represented as unstandardized

regression coefficients.

Childhood Sexual Abuse

As illustrated in Table 4, CSA had a significant direct effect on drug use disorder

diagnosis in women with BN (b = 0.26, p = 0.03) as well as a significant indirect effect

mediated through affect dysregulation (bootstrapped estimate = 0.14, 95% CI = 0.05,

0.29). Thus, affect dysregulation functioned as a significant mediator of the relationship

between CSA and drug use disorder in women with BN (Figure 2). Alternatively, no

direct (b = 0.08, p = 0.44) or indirect effects (bootstrapped estimate = 0.04, 95%

CI = -0.01, 0.13) of CSA on alcohol use disorder in participants with BN were observed
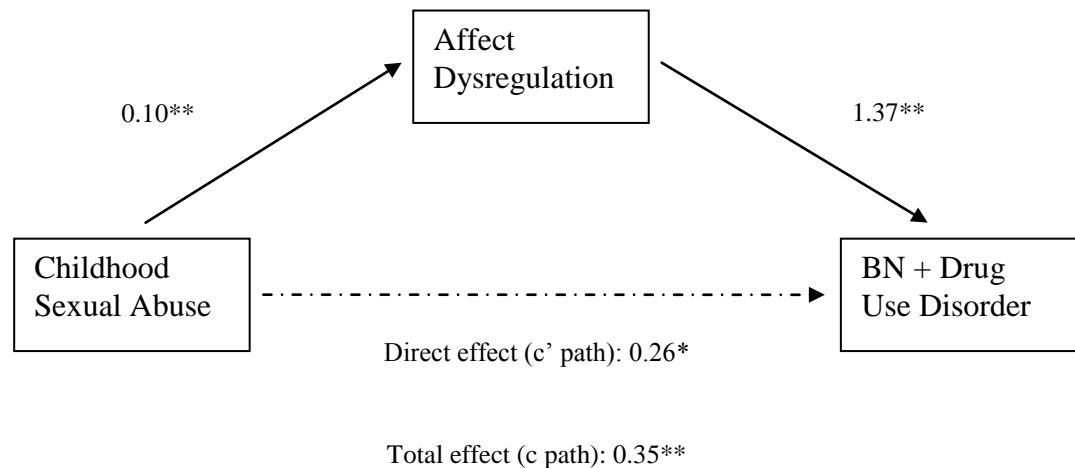
(Table 5).

Figure 2. Mediation model of the relationship between childhood sexual abuse and drug
use disorder in bulimia nervosa. All path estimates are unstandardized regression
coefficients. *p < 0.05, ** p < 0.01.

Childhood Physical Abuse

As shown in Table 4, CPA failed to have a significant direct effect on drug use disorder in women with BN (b = 0.27, p = 0.06), but did exhibit a significant indirect effect through affect dysregulation (bootstrapped estimate = 0.16, 95% CI = 0.05, 0.35; Figure 3). Thus, CPA influences the likelihood of developing drug use disorders in individuals with BN only through its impact on affect regulation. In contrast, no direct (b = 0.18, p = 0.12) or indirect effects (bootstrapped estimate = 0.04, 95% CI = -0.03, 0.15) of CPA on alcohol use disorder in participants with BN were observed (Table 5).
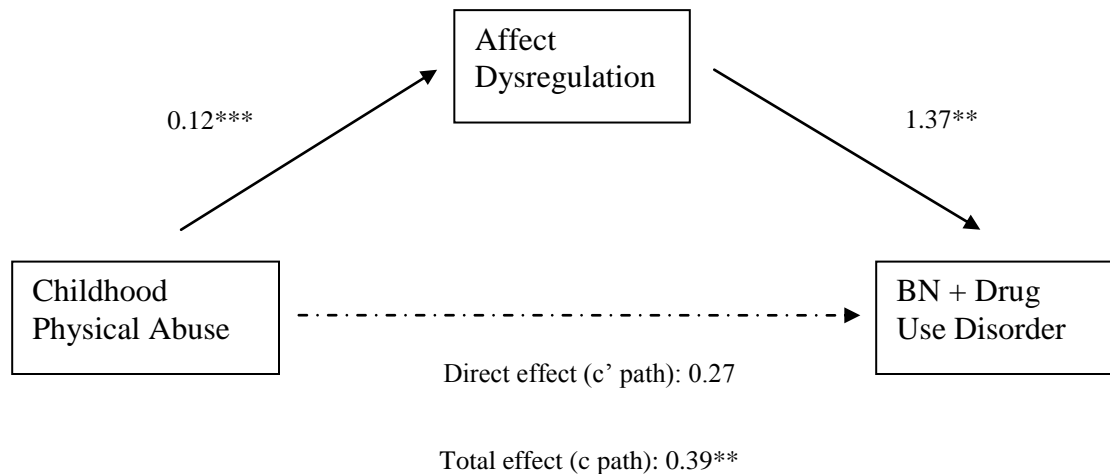
Figure 3. Mediation model of the relationship between childhood physical abuse and drug use disorder in bulimia nervosa. All path estimates are unstandardized regression coefficients. *p < 0.05, ** p < 0.01, *** p< 0.001.

Childhood Emotional Abuse

As illustrated in Table 4, CEA did not exhibit a significant direct effect on drug use disorder in participants with BN (b = 0.21, p = 0.27), but did show a significant indirect effect mediated through affect dysregulation (bootstrapped estimate = 0.19, 95% CI: 0.05, 0.44; Figure 4). Therefore, CEA influences the development of drug use

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disorders in individuals with BN only through its impact on affect regulation. Conversely, CPA failed to show significant direct (b = 0.11, p = 0.45) or indirect effects (bootstrapped estimate = 0.06, 95% CI = -0.01, 0.21) on alcohol use disorder in participants with BN (Table 5).
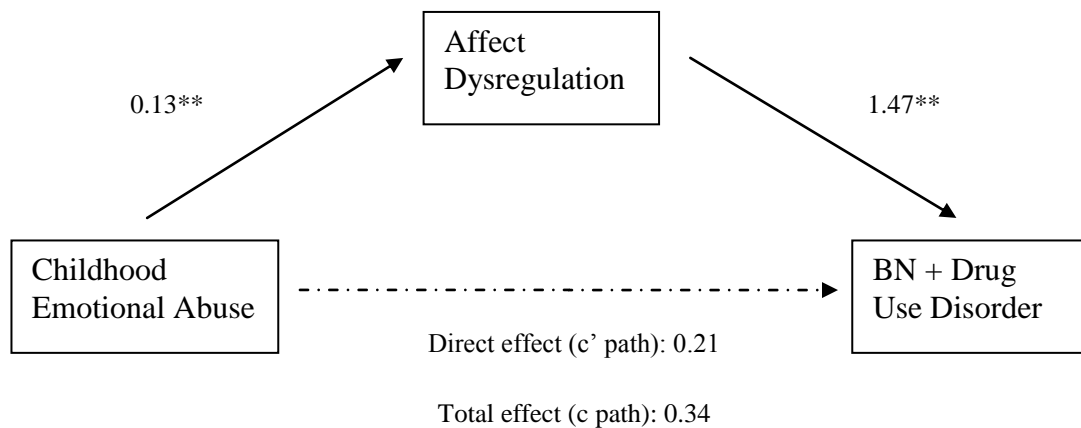
Figure 4. Mediation model of the relationship between childhood emotional abuse and drug use disorder in bulimia nervosa. All path estimates are unstandardized regression coefficients. *p < 0.05, ** p < 0.01.

Secondary Analyses

The following three additional analyses further explored the relationships between CT, affect dysregulation, and SUD diagnosis in women with BN (either alcohol or drug use disorders or their combination).

Affect Dysregulation and Substance Use Disorder

Participants who met DSM-IV criteria for a lifetime drug use disorder exhibited significantly higher scores on the Affect Scale of the DIB-R (M = 1.82, SD =0.39) when compared to those without a lifetime drug use disorder (M = 1.36, SD = 0.641; t(97.77) = -4.88, p = 0.00). In contrast, no significant differences in the Affect Scale scores on the DIB-R were observed among participants who had a lifetime alcohol use disorder

diagnosis (M = 1.57, SD = 0.53) when compared to those without the diagnosis

(M = 1.38, SD = 0.71; t(96.95) = -1.67, p = 0.10).

Affect Dysregulation and Childhood Trauma

Participants with a history of CSA were found to have significantly greater affect

dysregulation on the DIB-R (M = 1.73, SD = 0.51) than those without a history of CSA

(M = 1.39, SD = 0.633; t(83.58) = -3.20, p = 0.002). Similarly, participants who endorsed

a history consistent with CPA showed greater affect dysregulation (M = 1.68, SD = 0.54)

than those without a CPA history (M = 1.30, SD = 0.64; t(123) = -3.56, p = 0.001). No

significant differences in the DIB-R Affect Scale scores were found between participants

with a history of CEA (M = 1.57, SD = 0.57) and those without (M = 1.35, SD = 0.67;

t(123) = -1.96, p = 0.052).

Substance Use Disorder and Childhood Trauma

Chi-square analyses revealed that participants with a CSA history were

proportionally more likely to have lifetime drug use disorders than participants without a

CSA history (χ^2 = 9.33, df = 1, p = 0.002). Similarly, participants with a CPA history

were more likely to have a lifetime drug use disorder than those who did not (χ^2 = 4.26,

df = 1, p = 0.039). No other significant associations between CT history and the

frequency of substance use disorder were observed.

CHAPTER IV

DISCUSSION

The purpose of this study was to explore the relationship between CT and SUDs
in women with BN and to determine if affect dysregulation serves as a mediator of this
relationship. Results of the mediation analyses supported a predicted direct effect of CT,
in the form of CSA, on drug use disorders in women with BN and a significant mediating
effect of affect dysregulation. Although neither CPA nor CEA had a direct effect on
lifetime drug use disorder, affect dysregulation did serve as an indirect pathway for the
relationships between CPA and lifetime drug use disorder and CEA and lifetime drug use
disorder in participants with BN. In contrast to these findings in the prediction of drug
use, relationships between CT, affective dysregulation, and alcohol use disorders were
not identified. Therefore, the major findings resulting from this study include the
following: 1) a relationship between childhood trauma and lifetime drug use disorders,
but not alcohol use disorders, in women with BN exists; 2) CSA is the only form of CT
that directly predicts drug use disorder in women with BN, whereas CPA and CEA are
related to lifetime drug use disorder only through the indirect path of affect
dysregulation; and 3) affect dysregulation functions as a significant indirect pathway
between CT and lifetime drug use disorders in women with BN. Given that the results are
partially discrepant with hypothesized findings (i.e. hypothesized a significant direct
effect of multiple forms of CT on both lifetime alcohol and drug use disorder and a

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significant mediating effect of affect dysregulation for each form of SUD), multiple

potential explanations are discussed below.

Development of Substance Use Disorders Following Childhood Trauma in Individuals With Bulimia Nervosa

The relationship between a history of CT and the development of both alcohol use

disorders (e.g., Copeland, Magnusson, Goransson, & Heilig, 2011; Schwandt, Heilig,

Hommer, George, & Vijay, 2013) and drug use disorders (e.g., Darke & Torok, 2013;

Nelson et al., 2006) has been well-documented in the literature. Thus, it is curious that in

the current study, significant relationships between CT and SUDs among individuals with

BN were found only within the category of drug use disorders. Perhaps an examination of

the impact of severity of CT experiences on the development of particular substance use

behaviors (e.g. more vs. less deviant or severe behaviors), as well as a broader

consideration of patterns of substance use following CT, may provide insight into these

surprising findings.

Severity of Childhood Trauma Experiences

In addition to being less prevalent than alcohol use disorders (e.g., Simpson &

Miller, 2002), drug use has been considered by many to be a more severe, or deviant,

manifestation of substance use behaviors (e.g., Sartor et al., 2013). In their study of early

substance use in adolescent girls following CSA, Sartor and colleagues (2013) reasoned

that "some alcohol use is nearly universal, but the use of cannabis…at any age is

somewhat deviant" (p. 998). Bensley, Spieker, Van Eenwyk, and Schoder (1999)

described a similar finding in their examination of the associations between abuse history

and alcohol and drug use in public school students. They determined that among older

high school students (in contrast to younger students), neither light/moderate nor heavy drinking was associated with abuse history and they argued that at this age, alcohol use is common even among youth without a CT history. These investigators referenced this as the "saturation effect," which specifies that as a particular behavior (i.e. alcohol use) becomes increasingly prevalent, the strength of association with risk factors decreases (Bensley et al., 1999). Sartor and colleagues (2013) also identified differences in ease of access to alcohol versus drugs as a potential explanation for differences in prevalence and degree of risk associated with CT history in each category of substance use. Given that alcohol is typically easier to access and alcohol use is often considered culturally normative behavior (especially during later adolescence), there are likely more opportunities to engage in alcohol use and to experience subsequent negative consequences, thus allowing for greater relative ease in meeting diagnostic criteria for lifetime alcohol abuse or dependence. Additionally, issues of legality are likely to influence perceptions of deviance and may contribute to the view that drug use and drug use disorders are less socially-acceptable, more dangerous, and/or more severe.

Severity of the CT experience itself may represent an important predictor of patterns of specific substance use behavior, such that more severe CT experiences contribute to the development of more severe or deviant outcomes. For example, Copeland and colleagues (2011) found that in their sample of women seeking treatment for alcohol dependence, a significant relationship between alcohol dependence and sexual abuse emerged only among those who experienced the most severe form of sexual abuse (i.e. involving anal and vaginal penetration). They further determined that women with a history of this most severe form of sexual abuse experienced more severe levels of

alcohol abuse and greater psychiatric comorbidity (Copeland et al., 2011). Similarly, in a large self-report study of childhood abuse and alcohol and drug use among adolescents in Washington State public schools, Bensley and colleagues (1999) found strong associations between both combined abuse and molestation and heavy use of alcohol, as well as more severe levels of drug abuse. These relationships were most pronounced among younger students (i.e. 8th graders vs. 12th graders, see saturation effect noted above) engaging in heavy drinking versus light/moderate drinking and among adolescents participating in heavier drug use versus light/moderate drug use. Overall, they determined that increasingly severe trauma experiences (i.e. combined abuse or molestation vs. non-sexual forms of trauma) were more likely to be associated with problematic substance use, and further generalized that more serious outcome behaviors may stem from more serious antecedents (Bensley et al., 1999).

In their study of CT exposure and alcohol dependence, Schwandt et al. (2013) found both higher rates and more severe forms of CT among alcohol dependent subjects when compared to controls. Additionally, they identified CT as a predictor of alcohol dependence severity, specifically noting CEA as having both direct and indirect effects on this outcome through the role of impulsivity as a significant mediator of this association. Kendler and colleagues (2000) also highlighted the role of CT severity in the development of psychiatric disorder more broadly. The authors specifically identified a "dose-response" relationship between CSA and psychiatric disorder, such that the likelihood of developing psychiatric disorder increased with the degree of severity of the trauma. In fact, they identified CSA in its most severe form of sexual intercourse as the greatest risk factor for developing BN and substance dependence (Kendler et al., 2000).

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In another investigation of specific features of CSA and the development of psychiatric disorders, Bulik, Prescott, and Kendler (2001) identified CSA severity as an important factor. They asserted that there was greater risk of developing psychopathology if the following indicators of severe CSA were present: intercourse was attempted or completed, the perpetrator and victim were related, the perpetrator used force or threat, and/or the victim was not believed or supported or was punished after disclosing the abuse.

Finally, in their examination of sexual assault history as a risk factor for substance use problems, Ullman, Relyea, Peter-Hagene, and Vasquez (2013) linked CSA severity with greater use of substances to cope. They surmised that this relationship, which was mediated by PTSD, provides further support for a self-medication model of substance use. Furthermore, these investigators found that both PTSD and use of substances to cope fully mediated the relationship between traumatic events and problem alcohol use and partially mediated the relationship between traumatic events and problem drug use (Ullman et al., 2013). Collectively, these studies support the idea that CT severity is a significant factor in the prediction of psychopathology. If one assumes that drug use is a less common (Simpson & Miller, 2002) and perhaps more severe form of psychopathology than alcohol use (Sartor et al., 2013), present findings support the notion that severity of CT may drive a greater association to increasingly severe forms of psychiatric disturbance.

Patterns of Substance Use Following Childhood Trauma

Several researchers have further investigated this link between a history of CT and the subsequent manifestation of substance use behaviors and have identified specific

patterns of use that appear to influence the development of SUDs. In general, one of the more widely cited risk factors for the development of alcohol and drug abuse is an early age at onset of substance use; earlier initiation of substance use has been linked to greater rates of substance dependence, progression to use of other substances, and more severe outcomes (Darke & Torok, 2013; Lynskey et al., 2003). Relevant to the current study, numerous investigations have shown that a history of CT functions as a predictor of early onset substance use, thus influencing the development of SUDs; this finding has been demonstrated for both alcohol and drug use among young adolescents who experienced various forms of trauma (Bensley et al., 1999; Harrison, Fulkerson, & Beebe, 1997; Nelson et al., 2006; Sartor et al., 2013). Early initiation of substance use may be a particularly important pattern to address with regard to risk among adolescents with a CT history, as substance use behavior does not become normative until mid-adolescence (Simpson & Miller, 2002). Thus, substance use prior to that may be driven by other motives, potentially including efforts to regulate negative affect associated with the trauma. In addition to early initiation of substance use, progression to use of more serious substances, as well as regular versus intermittent use, and abuse of multiple substances, each represent important patterns of use that have been associated with a history of CT (Bensley et al., 1999, Harrison et al., 1997; Nelson et al., 2006).

For example, in a co-twin design study of early substance use among adolescent females, Sartor and colleagues (2013) found that a history of CSA significantly predicted early initiation of alcohol, cigarette, and cannabis use even after controlling for the influence of genetic and shared environmental influences. Specifically, CSA was associated with a more than four-fold increase in risk for alcohol use prior to age 10 and a

3.5-fold increase in initiation of cannabis use between the ages of five and thirteen. Interestingly, however, the investigators identified differences in patterns of use of alcohol versus cannabis and cigarettes in terms of their association with CSA, noting a more gradual decrease in CSA-related risk with increasing age for early use of cigarettes and cannabis and an overall higher CSA-associated risk for alcohol use among the youngest age groups studied. Thus, CSA-related risk of early onset cigarette and cannabis use appears to remain as adolescents continue to age, whereas significant findings for CSA-related risk of early onset alcohol use diminish as older age groups are considered. This may be related to the more normative use of alcohol among older adolescents and the "saturation effect" described previously (Bensley et al., 1999; Sartor et al., 2013). Additionally, findings from the Sartor et al. (2013) study suggest that early initiation of cigarette and cannabis use is more likely to be influenced by both CSA experiences and familial risk factors (i.e. genetic and environmental influences) than alcohol use. In another co-twin-design study of CSA and subsequent drug abuse/dependence, Nelson et al. (2006) determined that CSA functions as a risk for earlier initiation of substance use across multiple drug classes; additionally, these investigators found that CSA-related risk of substance use and risks associated with early-onset use of cannabis or regular smoking combine in an additive fashion to produce even greater likelihood of developing illicit drug abuse/dependence. In a study exploring the role of CPA on patterns of drug use among injection drug users, Darke and Torok (2013) reported that severe CPA emerged as a significant correlate of younger age at first alcohol intoxication and first illicit drug use when compared to individuals who experienced mild/moderate CPA or no abuse history. They further reported that a history of CPA was associated with greater lifetime

and recent polydrug use, although in this instance, severity of trauma did not differentially influence patterns of multiple substance use (Darke & Torok, 2013).

Also with regard to use of multiple substances, Harrison and colleagues (1997) found that a history of both physical and sexual forms of CT were associated with greater rates of multiple substance use. This finding was most pronounced for individuals with a history of CSA and for those with a history of combined CPA and CSA. This was a notable finding given evidence that when considering trajectory of use, adolescents often progress to other drugs once they are already regular/frequent users of alcohol, thus suggesting a history of more significant or regular use in general as a precipitant of multiple-substance use (Harrison et al., 1997). Perhaps progression of substance use is related to the motives underlying the initial behavior, such that substance use is initiated to help an individual cope with or escape from thoughts, emotions, or other triggers associated with the CT. As the individual begins using substances more regularly, additional substances may be experimented with to assist in more effectively regulating affect or to provide an escape, thus leading to more serious drug use. Harrison and colleagues (1997) further explored adolescents' reasons for substance use and found that adolescents with a history of CT generally endorsed more reasons for substance use than adolescents with no abuse history. Specifically, CT victims in their study were more likely to report the following reasons for substance use when compared to subjects without a CT history: use by family members, because of painful emotions, because use was illegal, to escape from problems, because parents weren't there, and due to peer pressure. Overall, results of their study suggest that adolescents with a CT history report substance use at an earlier age, endorse use of a wider variety of substances, and are more

likely to use for the purpose of self-medication. Associated with these findings, Harrison et al. (1997) hypothesized an affect regulation function of substance use following CT experiences, such that adolescents use alcohol and drugs to cope with their trauma by escaping the associated intense emotions, increasing their level of comfort around others, or withdrawing from interpersonal relationships. Though potentially effective in offering escape or comfort in the moment, they further assert that this method of regulating affect may inhibit the development of healthy relationships and other, more effective coping skills (Harrison et al., 1997).

Lastly, Widom, White, Czaja, and Marmostein (2007) explored the long-term effects of CT on the development of substance use behaviors in middle adulthood. They found that a history of CT impacts the outcome of excessive drinking among women in middle adulthood specifically through the indirect pathway of alcohol abuse or dependence during young adulthood even after controlling for parental alcohol and drug problems. This finding suggests that potentially lasting substance use problems are likely to develop during young adulthood in the brief time after the CT occurred, and that the experience of CT may actually impede the more normative development out of problematic substance use patterns. These findings therefore make an important case for the application of clinical interventions targeted at earlier age groups and following known cases of CT to prevent continued substance abuse (Widom et al., 2007). Such findings also raise important questions about factors that prompt the use of substances following CT, potentially implicating an affect regulation function as discussed previously (e.g. Harrison et al., 1997), and which appears particularly relevant to the findings cited in the present study.

Summary

Findings of the current study suggest that there is a relationship between CT experiences and the development of drug use disorders, but not alcohol use disorders, in this sample of individuals with BN. The idea that increasingly severe CT experiences contribute to more severe outcomes, with drug use often considered a more severe or deviant form of substance abuse (Sartor et al., 2013), offers one such explanation, for which there is some support in the existing literature (e.g. Bulik et al., 2001; Kendler et al., 2000; Schwandt, et al., 2013; Ullman et al., 2013). Further exploration of specific patterns of substance use and their association with CT in the overall development of SUDs offers an additional perspective on these findings. Briefly, CT has been linked with earlier onset and more regular use of substances, as well as use of multiple substances (e.g. Bensley et al., 1999; Harrison et al., 1997; Nelson et al., 2006). Thus, current study findings may be explained, at least in part, by more severe CT experiences prompting increasingly severe or significant use of substances, likely initiated at younger ages, used more frequently, and potentially triggering the progression to even more deviant forms of substance use. Findings from the current study, as well as those reported in the literature, suggest that the development of such substance use may have been driven by a need to cope with or escape from the painful emotions and internal conflict associated with the CT experience (e.g., Widom et al., 2007). Future studies should continue to focus on the development of substance use behaviors following CT, particularly with a focus on the use of substances to regulate negative affect, as opportunities to intervene clinically may interrupt the trajectory of such problematic outcomes.

<center>**Unique Impact of Childhood Sexual Abuse on the**
Development of Psychopathology</center>

Type of Childhood Trauma

A review of the literature on the relative impact of different forms of CT on the

development of later psychopathology yields widely discrepant findings. Some studies

suggest that CSA has the most significant influence on the development of various forms

of psychopathology (Duncan et al., 2008; Molnar, Buka, & Kessler, 2001; Simpson &

Miller, 2002), while other studies have identified CEA as the most significant form of CT

in this regard (Kent & Waller, 2000; Schwandt et al., 2013; Wonderlich et al., 2007).

Research in this area has often sought to isolate the relative contributions of different

types of CT and to differentiate the factors uniquely associated with each. For example,

Rorty, Yager, and Rossotto (1995) suggest a potential link between the direct assault on

the physical self-associated with CPA (and CSA), but not CEA, and the exacerbated

focus on body size and shape in eating disorders. Related to this, some investigators have

even linked specific outcomes to particular forms of CT. For instance, in their study on

inpatient substance users with a history various forms of CT, Banducci, Hoffman, Lejuez,

and Koenen (2014) reported that type of CT was uniquely associated with the subsequent

development of particular negative effects. As such, participants with a history of CSA

were more likely to endorse negative sexual experiences or behaviors (i.e. prostitution,

exchanging sex for drugs, diminished sexual arousal when sober, greater rates of

unprotected sex), while those with a history of CPA reported higher numbers of arrests

for assault and weapons charges, and individuals with a CEA history were found to have

comparatively higher emotion dysregulation scores when the type of trauma was

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considered (Banducci et al., 2014). Thus, according to this study, type of CT experienced may influence the development of specific negative outcomes; such findings may represent an important avenue for additional research across patient populations and multiple forms of consequent psychopathology. Alternatively, other investigators have emphasized broader perspectives in their conclusions on the influence of CT type. For example, in their study of CEA and its impact on the development of EDs, Kent, Waller, and Dagnan (1999) found that CEA is the most reliable predictor of general ED attitudes and behavior; however, they also asserted that CEA may exist as a common factor underlying all forms of CT. Given its broad presence across traumatic experiences, it may function overall as a significant risk factor for the development of more general symptomatology (Kent & Waller, 2000).

Despite the lack of consensus on relative impact of CT type, in virtually all studies examining CT and the development of psychiatric symptoms and/or illness, including both BN and SUDs, CSA appears to increase rates of psychopathology (e.g., Molnar et al., 2001). Childhood sexual abuse is the most studied of the childhood traumas (Rorty, Yager, & Rossotto, 1995; Simpson & Miller, 2002) and has been highlighted by some as a unique etiological factor implicated in the development of SUDs (Duncan et al., 2008; Simpson & Miller, 2002), as well as other forms of psychopathology, over and above the influence of family environment or parental substance abuse. The results of the current study appear to echo this trend, such that CSA was the only form of CT found to have a significant direct relationship with drug use disorders among individuals with BN, whereas CEA and CPA exerted only indirect influences on the drug use disorders via the pathway of affect dysregulation. This finding therefore prompts a consideration of

alternative (direct) pathways by which a history of CSA may influence a tendency toward drug use (and by extension, greater psychopathology) among individuals with BN. Potential explanations for these findings include theories related to identity development/self-concept and associated core beliefs, interpersonal/relational theories, and affective explanations, which are summarized below.

Identity Development and Core Beliefs

One line of inquiry that has received particular attention in the literature has been the impact of CSA on the development of identity and self-concept, as well as the formation of core beliefs. Finkelhor and Browne (1985) conceptualized CSA as a uniquely potent form of psychological damage due to the interaction of four core "traumagenic dynamics:" traumatic sexualization, betrayal, powerlessness, and stigmatization. In this model, which is summarized below, they propose that such traumagenic dynamics function to alter one's cognitive and emotional capacities, disturb one's self-concept and broader worldview, and serve to dysregulate affect (p. 531). Finkelhor and Browne (1985) define traumatic sexualization as the process whereby a child's sexuality develops in a dysfunctional manner in the context of sexual abuse and as a result of a variety of inappropriate associations between sexual experiences and rewards such as attention, affection, or privileges, or when fear becomes implicitly associated with sex. Traumatic sexualization is thought to contribute to conflict and confusion related to sexuality and to subsequent disturbances in the process of sexual identity development. It may also manifest in compulsive or aggressive sexual behaviors, cognitive preoccupation with sexual themes or increased awareness of sexual issues, sexual dysfunction or an aversion to sexual experiences, and negative beliefs about one's

body (potentially leading to the development of eating disorders) and sexuality. Additionally, Finkelhor and Browne (1985) associate it with inappropriate perceptions of the role of sex in interpersonal relationships and beliefs about obtaining and receiving affection, as well as negative emotional experiences related to sexual contact that often generalize beyond the abusive relationship and into future intimate relations. The authors depict the dynamic of betrayal as the process of learning that the person a child depends on caused them harm through manipulation or coercion. Further damage relevant to this dynamic may be caused when children who disclose the abuse are not believed, are blamed, or are outcast rather than validated and helped. Results of betrayal are thought to include grief and depression related to the loss of a trusted figure. Betrayal may also lead to extreme efforts to regain trust and security in interpersonal relationships, potentially leading to dependent behaviors or a lack of boundaries in relationships; alternatively, one may become hostile, angry, and largely mistrustful, seeking to withdraw from intimate relationships. The dynamic of powerlessness is represented by continual and uncontrollable boundary and bodily violations, which are compounded by the negative effects of coercion and manipulation. Feelings of powerlessness are frequently reinforced when the child's efforts to stop the abuse are inevitably stymied and the child feels trapped. Powerlessness often manifests as fear and anxiety, potentially in the form of post-traumatic stress disorder or other anxiety disorders. Finklehor and Browne (1985) also assert that it diminishes a person's sense of personal efficacy and capacity for coping, potentially contributing to escape behaviors (which may include substance abuse and binge eating), as well as difficulties with self-protection, and thus a greater potential for re-victimization. In contrast, such feelings of powerlessness may lead to

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overcompensation in the form of seeking to control or dominate others, potentially playing out in aggression, bullying, and/or reenactment of one's trauma experience. Finally, Finkelhor and Browne (1985) identify stigmatization as the negative associations that a child links to the sexual abuse and then integrates into his or her self-concept; such negative self-conceptions often include shame and guilt and evolve into diminished self-esteem. These notions are typically reinforced directly by the abuser, but are also emphasized by attitudes espoused by family members and society, particularly when blame is misattributed to the child. Such stigmatization frequently leads to isolation given internalized beliefs that one is different or damaged and likely to be rejected. It may also lead to acting on such internalized self-beliefs such that one becomes involved in stigmatized behaviors including substance abuse, prostitution, self-injury, suicide, or criminal activity. Through this model, Finkelhor and Browne (1985) have examined how each of these dynamics may develop and manifest as a result of the CSA, and how the dynamics may subsequently contribute to negative outcomes such as deficits in regulating affect and behavior, identity confusion, diminished self-worth, and a limited capacity for coping. Given their detailed conceptualization of the potentially dysfunctional developmental trajectory associated with CSA, this model provides clear links to the potential for the development of both EDs and SUDs.

Using a developmental psychopathology framework, Cole and Putnam (1992) similarly explored the implications of CSA in the form of father-daughter incest on the development of identity and self-concept. They conceptualized the sexual abuse in terms of the following three major elements: 1) the physical and psychological trauma and bodily violation associated with the act itself, 2) the ongoing fear and guilt that exists

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between episodes of abuse, and 3) the loss of a trusted relationship with a significant attachment figure. Broadly, Cole and Putnam suggest that incest impedes the development of self and social functioning and that psychiatric disorders associated with CSA, including both SUDs and EDs, mirror these particular deficits. Cole and Putnam further specified the impact of CSA in terms of two major categories. The first category of influence involves intrapsychic impairments, in terms of both sense of self and identity integrity and ability to effectively regulate affect and control impulses. The second category involves impairments in the relation of self to others, including the development of secure and trusting relationships and the ability to experience emotional and sexual intimacy with others. Particularly relevant to the current study, Cole and Putnam identified core deficits in these categories in both EDs and SUDs, as psychiatric illnesses likely to result from a history of incest, or CSA more generally. With regard to EDs, they described distorted body image as a deficit in self-integrity; binge eating and purging, fear of weight gain, self-injury, and depression as symptoms associated with self-regulation deficits; and avoidance of sexual intimacy as a symptom in the interpersonal category. With regard to SUDs, Cole and Putnam described the development of an alcohol or drug use identity as a deficit in the self-integrity category; aggressive or antisocial behaviors, mood lability, and use of substances to regulate affect as symptoms consistent with deficits in self-regulation; and social isolation and suspiciousness as interpersonal deficits. They more generally related a history of incest/CSA to the development of low self-esteem, anxiety, and depression. Additionally, Cole and Putnam encouraged a consideration of developmental stage at time of abuse, given their view that specific developmental tasks are interrupted as a result of the abuse and the subsequent

difficulties in self-regulation, self-concept formation, and interpersonal functioning. As part of their model, they expand on deficits in the areas of ego development, attachment, personal competence/efficacy, self-control and regulation, capacity for coping, and cognitive development, each of which is likely to impact the potential development of psychiatric symptoms (Cole & Putnam, 1992).

Similar to the influence of CSA on the process of identity development is the potential for CSA to shape the formation of early core beliefs or cognitive schemas. Young and Lindemann (1992) proposed the notion of early maladaptive schemas in their work with individuals with personality disorders to better account for the more deeply rooted, inherent themes that guide one's approach to the world and that go beyond the mere automatic thoughts associated with the often briefer-course cognitive behavioral theories elaborated by Beck, Rush, Shaw, and Emery (1979). They defined early maladaptive schemas as "broad, pervasive themes regarding oneself and one's relationships with others, which are developed during childhood" and revised or expanded on throughout life (p. 12). Young and Lindemann (1992) posited that early maladaptive schemas function as templates for processing later life experiences and are generally characterized by the following qualities: 1) they develop from early dysfunctional patterns or experiences, 2) are capable of contributing to self-destruction and affect dysregulation, 3) are capable of interfering with one's ability to meet key needs for self and social functioning, and 4) are deeply ingrained beliefs which are vital to one's sense of self. Young and Lindemann (1992) identified 16 early maladaptive schemas within the following six domains: instability and disconnection, impaired autonomy, undesirability, restricted self-expression, restricted gratification, and impaired

limits. The application of the early maladaptive schemas and core beliefs appears especially relevant to a consideration of the impact of CSA on psychological functioning, particularly as many of these early maladaptive schemas develop in the context of early abusive experiences or dysfunctional interpersonal or developmental patterns. As such, several investigators have examined the role of core beliefs in the development and maintenance of psychiatric illness following CSA. This has been particularly notable in the area of EDs and less so in SUDs, but may represent an important future direction for research.

Consistent with this theory, Waller and colleagues (2001) examined the role of specific core beliefs (as defined by Young and Lindemann, 1992) as mediators of the relationship between CSA and bulimic symptomatology among women with DSM-IV diagnosed BN. They determined that abandonment (belief that others will not offer protection or support), emotional inhibition (emotional expression believed to be aversive), and mistrust/abuse (belief that others will abuse one) core beliefs functioned as primary mediators of binge eating, while defectiveness/shame (perceived deficits that lead one to be unlovable) core beliefs acted as partial mediators of the CSA-purging relationship. These investigators encouraged further exploration of the role of core beliefs as mediators of the association between CSA and other "escape behaviors" (i.e. SUDs), as well as between other forms of CT and ED symptomatology (Waller et al., 2001). Jenkins, Meyer, and Blissett (2013) also studied the role of core beliefs as mediators of the relationship between various forms of CT and ED symptoms in university students. They found that mistrust/abuse core beliefs mediated the relationship between CEA and Drive for Thinness subscale of the EDI-2 (Garner, 1991), while abandonment core beliefs

served as a partial mediator of the relationship between CSA and the Bulimia subscale of the EDI-2 (Garner, 1991). In their study of CT, dissociation, and core beliefs among women with BN, Hartt and Waller (2002) similarly found that different forms of CT were associated with different core beliefs. They reported significant correlations between CSA and core beliefs about mistrust/abuse, emotional deprivation (belief that one's emotional needs will go unmet), emotional inhibition, and subjugation (belief that others' desires are valued as more important than their own). Childhood emotional abuse was correlated with defectiveness/shame, mistrust/abuse, vulnerability to harm (belief that one cannot control the threat of harm), and emotional inhibition. Finally, CPA was correlated with emotional deprivation core beliefs. Interestingly, Hartt and Waller (2002) offer that subjugation beliefs may be related to the experience of being controlled during the traumatic experience, and as such, ignoring and/or overriding the child's needs. They also surmise that individuals who experienced CSA and CEA were more likely to learn that it is less acceptable to be upset or emotional about particularly secretive (as in the case of CSA) or insidious (as in the case of CEA) abuse than it is about physical forms of abuse. Contrasts among the core beliefs associated with various forms of trauma may prove valuable in generating insight into our understanding of how such early experiences contribute to one's self-conception and the potential for development of later psychopathology (Hart & Waller, 2002; Young & Lindemann, 1992).

In summary, impairments in the process of identity development and formation of self-concept, as well as the development of particular maladaptive schemas as a result of CSA, may provide beneficial alternative explanations that further elucidate the relationship between CSA and psychiatric symptomatology, including that associated

with both EDs and SUDs. These hypotheses are worthy of further research as they pertain to various dysregulated forms of behavior and psychiatric illness.

Interpersonal/Relational Factors

The uniquely significant direct relationship between CSA and drug use disorders among individuals with BN found in the present study may also be further explained by interpersonal and relational theories. These purported explanations fall broadly into the following categories: disrupted attachment, dysfunctional parenting and family environment, and social relationships. A substantial body of literature supports the notion that the process of attachment is often disrupted in the context of CSA (e.g., van der Kolk & Fisler, 1994; van der Kolk, Perry, & Herman, 1991; Dimitrova et al., 2010). Briefly, the developmental process of attachment is both biologically and psychologically related to the capacity for self-regulation of affect and behavior. It facilitates the ability to develop a sense of self, to control impulses and modulate emotional responses, and to engage in secure and intimate relationships with others (van der Kolk & Fisler, 1994). In the context of CT, establishing secure attachments allows for the amelioration of the negative effects of traumatic experiences. However, disruptions in the attachment process or disorganized forms of attachment in combination with (or as a result of) CT often contribute to difficulties regulating the associated physiological arousal and frequently manifest as a sequelae of dysregulated behavioral consequences, which may include aggressive and self-destructive acts, EDs, and SUDs (van der Kolk & Fisler, 1994). According to van der Kolk et al. (1991), this is particularly relevant in more severe or pervasive forms of trauma (notably including CSA and persistent neglect) in which the CT leads to the development of various self-destructive behaviors (i.e. suicide attempts,

non-suicidal self-injury, some ED behaviors) and the lack of a secure attachment serves to maintain them, as efforts to self-regulate, albeit dysfunctional in nature. These investigators attribute this to the comparatively limited options for relying on secure interpersonal resources to assist them in regulating their affect (van der Kolk et al., 1991). Related to this theory, Bensley and colleagues (1999) found significant reductions in attachment to both mother and father among adolescents with a history of combined abuse and molestation in their study of adolescent substance use behaviors and self-reported abuse history.

Consistent with attachment theories and the development of self-regulation capacities, Ehring and Quack (2010) reviewed the important role of primary caregivers in facilitating adaptive emotion regulation skills through the process of modeling their own ability to regulate affect, as well as more explicit efforts to identify, label, and help the child understand his or her own emotional states. Thus, given the importance of interpersonal interaction in developing emotion regulation skills, findings of their study suggest that survivors of early-onset chronic interpersonal trauma exhibited greater difficulties in emotion regulation than non-traumatized controls, as well as survivors of late-onset trauma, early-onset non-interpersonal trauma, and non-chronic early-onset interpersonal trauma (Ehring & Quack, 2010). Thus, early CT experiences that are chronic (vs. isolated) in nature and were perpetrated in a relational context appear to pose the greatest risk in terms of emotion regulation deficits. In such cases, the presence of an early and secure attachment figure would likely serve to mitigate the negative effects of the trauma experience and assist the child in regulating his or her affect and arousal, due to both attachment processes and modeling.

Unfortunately, caregivers have been found to model both effective and ineffective behaviors; as such, parents who abuse substances in the presence of their children send the message of acceptability of potentially heavy substance use and reinforce the use of substances to cope or regulate affect (Widom et al., 2007). This may contribute to earlier and greater use of substances by children and adolescents, particularly in a case of CT in which the child may be seeking a means of regulating their affect and has been shown that substance use can function in this way. Parental substance abuse may also limit opportunities for positive interpersonal interactions, emotional closeness, and effective communication (Widom et al., 2007). Additionally, parental substance abuse itself exists as a risk factor for perpetrating CT, including physical abuse and neglect. Risk also extends to CSA in which the perpetrator is frequently a relative or stranger (Simpson & Miller, 2002; Widom et al., 2007). In such cases, parents may not be able to effectively supervise their children's interactions with others (including extra familial perpetrators), leaving their children open to risk for harm. Parental substance abuse may also lead to an increased risk of committing boundary violations and perpetrating child abuse among the parents (Simpson & Miller, 2002) Additionally, in the context of substance abuse, parents struggle to monitor their child's exposure to, and interaction with, potentially dangerous influences, including substance abusing peers (Widom et al., 2007); this may further increase the child's potential for experimenting with substance use and developing substance abuse problems.

An adverse family environment has also been found to result in CT and contribute to dysfunctional or destructive outcomes. Various studies have associated the presence of the following family environment factors with negative outcomes, including BN and

substance abuse: tension, lack of supervision, physical coercion, intimidation, witnessing parental violence, perceived hostility, lack of warmth and support, parental indifference, disbelief/invalidation following the child's disclosure of abuse; parental over control, and perceived rejection (Bick, Zajac, Ralson, & Smith, 2014; Kent & Waller, 2000; Simpson & Miller, 2002; Widom et al., 2007).

Finally, the influence of social relationships deserves consideration as an important relational factor in the development of dysregulated behavioral outcomes and/or psychiatric illness resulting from experiences of CT, most notably CSA. In their study of substance use coping and PTSD among sexual assault survivors, Ullman and colleagues (2013) hypothesized that interpersonal forms of trauma are more likely to contribute to feelings of betrayal and mistrust, thereby reducing the likelihood of turning to social supports for coping, and increasing the potential for use of substances to cope. Dimitrova and colleagues (2010) explored the impact of close relationships with attachment figures in mediating the effects of CSA among a community sample of women. Findings suggest that CSA contributes to problems in adult attachment, with diminished comfort in the areas of closeness and intimacy and greater anxiety and concerns about abandonment. The authors further attribute these difficulties to the likely perception that others are not accessible or reliable as secure resources for support. They also associated CSA with poorer psychological outcomes, with more severe forms of CSA contributing to increasingly significant difficulties in psychological functioning and ability to develop closeness in adult attachments. Via mediation analysis, Dimitrova and colleagues (2010) specifically concluded that the closeness domain of attachment functions as a protective factor in reducing impact of severity of CSA on psychological

functioning. Such findings emphasize the importance of maintaining close relationships (thereby fulfilling attachments needs) following traumatic experiences as a means of developing resilience to the impact of the trauma.

Adams and Burowski (2007) reported a similarly positive impact of close relationships on psychological outcomes. These investigators specifically assessed whether the relationships between child and mother and child and peers moderated the association between CSA and the development of anxiety disorders. Findings revealed significant associations between relationship quality and anxiety disorder diagnoses; specifically, children with many friends and a higher degree of relationship quality with their mother exhibited the weakest association with anxiety disorder diagnoses while the opposite was true for children with few friends and poor maternal relationship quality. The authors proposed that such relationships may function as secure attachments, potentially reducing the need for children to rely on the use of maladaptive coping strategies or to experience shame and self-blame as a result of the CSA and they encourage further investigation of these hypothesized mechanisms (Adams & Burowski, 2007). Research on the impact of social and parental (attachment) relationships in the development of other psychiatric disorders, such as SUDs and EDs, would likely also prove fruitful and may lead to useful implications for treatment.

Given that previous research has implicated maternal support following CSA (and CSA disclosure) as a predictor of adjustment, Bick and colleagues (2014) specifically examined the degree of convergence between parent and child reports of maternal support following CSA disclosure by the child and the resulting impact on psychosocial functioning (including substance abuse outcomes). Two domains of support were

considered: maternal belief of the disclosure and discussion of the incident of abuse.

Degree of convergence in parent and child reports on these domains was assessed among

120 mother-child dyads. Especially relevant to the current study was their finding of

lower risk of tobacco and drug use (including alcohol abuse, abuse of prescription

medications, abuse of illicit drugs) among children in association with convergent reports

on belief of disclosure (i.e. mother and child both reported that disclosure of CSA was

fully believed). Alternatively, the greatest risk for anxiety, post-traumatic stress, and

dissociation symptoms resulted in the instance of negative convergence of discussion of

the CSA incident, indicating greater risk for poorer psychological outcome in instances

where mother and child agree that details of the CSA incident were not discussed (Bick et

al, 2014). Overall, these findings suggest that certain elements of the parental

relationship, and approaches to dealing with trauma, can and do impact psychological and

behavioral outcomes following CSA.

While social and parental relationships can serve as protective factors with regard

to psychosocial functioning, some interpersonal patterns can also contribute to less

favorable outcomes. Mezzich and colleagues (1997) highlighted the role of unhealthy

social connections, CT experiences, and antisocial behavior in promoting dysregulated

behavioral trajectories in their investigation of the relationship between substance use and

risky sexual behavior among female adolescents. Based on findings from their study,

these investigators proposed two pathways by which behavioral dysregulation, negative

affectivity, and a history of victimization interact to lead to substance abuse and risky

sexual behavior. The first pathway involves a child who exhibits both behavioral

dysregulation and negative affectivity and who lives in a chaotic and violent family and is

likely exposed to CT. These factors combine to predispose the child to conflictual parent-daughter relationship, internalizing symptoms, and disengagement from the family at an early age, culminating in the development of antisocial acts and subsequent substance abuse and risky sexual behavior. The second pathway involves an interaction between early sexual maturation (as indicated by early age at menarche), antisocial features, and affiliation with an older antisocial boyfriend who introduces the child to substance abuse and risky sexual behavior (Mezzich et al., 1997, p. 164). In this study, both pathways highlight the role of negative social or familial interactions and potential for CT on the development of substance abuse and other forms of self-destructive behavior. Finally, in their discussion of both prevention efforts and treatment implications relevant to drug-related outcomes among adolescent survivors of CSA, Nelson and colleagues (2006) emphasized the potential for psychotherapeutic interventions to reinforce and facilitate the development of healthy, same-aged peer relationships, thus reducing the tendency toward age-inappropriate behaviors such as substance use and decreasing the speed of progression to more adult roles and/or more serious forms of substance abuse.

In summary, the studies reviewed here appear to support the idea that relational factors such as disrupted attachment, discordant family environments, ineffective modeling, parental substance abuse, and lack of healthy social or parental relationships do play a role in translating early CT experiences into later psychosocial dysfunction, often including EDs and substance use. Such relational factors may help explain the unique impact CSA experiences have on the development of drug use disorders in individuals with BN, over and above the influence of CEA and CPA.

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Regulation of Affect

The role of affect and affect regulation has received considerable attention in the present study, not only due to the evaluation of affect dysregulation as a potential mediator of the relationship between CT and SUDs among individuals with BN, but also due to the integral role of affect in a range of psychological processes, including self-development and cognition, interpersonal relationships, and general models of coping with adversity. Many elements of affect dysregulation and their role in the development and manifestation of psychopathology have been delineated above. Additional conceptualizations and implications of affect dysregulation will be reviewed here, particularly as they relate to CSA and as they may offer greater insight into the unique relationship with the development of drug use disorders and BN. Specifically, the following theories and constructs will briefly be reviewed: biological predisposition to psychiatric illness, bodily shame, dissociation, PTSD, and deficits in overall self-regulation capacities (including both affective and behavioral processes).

Neurobiological studies of female survivors of CT (including CSA) indicate that such forms of significant early life stress are associated with perpetual sensitization of the pituitary-adrenal and autonomic stress response, thus generating increased risk of development of psychiatric illness in adulthood (Heim et al., 2000). This finding contrasted the stress reactivity observed among subjects with depression, but without a history of CT, suggesting a different pathophysiological basis for the development of depression among those with a trauma history. Thus, early life adversity may contribute to a biological vulnerability for the development of stress-related psychiatric illness (Heim et al., 2000), such as a SUD, which may reflect the need to regulate the associated

increases in arousal and affect. Andersen and colleagues (2008) similarly studied the

neurobiological consequences of repeated CSA. These investigators used volumetric MRI

to determine differential effects of early trauma across various brain regions, which they

then correlated with age of abuse to determine if there are periods during which these

specific areas are uniquely vulnerable to traumatic stress. Results of their study suggest

an influence of sensitive periods on the potential for volumetric changes in different brain

regions. Specifically, volumetric changes in the hippocampus were more strongly

associated with abuse occurring from ages 3-5 and 11-13; such a significant early

sensitivity to trauma in this region may be related to relatively early maturation of the

hippocampus and the excretion of corticotrophin-releasing hormone in response to stress

from a particular population of cells in the immature (but not adult) hippocampus.

Additionally, corpus callosum volumetric changes were most likely to be observed with

abuse from ages 9-10 while volumetric changes in the frontal cortex gray matter were

primarily associated with trauma occurring during ages 14-16. Amygdalar volume

changes were observed, but were not specifically correlated with an age range of abuse,

potentially due to early development of the amygdala in females. Overall, these findings

assert that specific brain regions have particular age-related windows of vulnerability to

the effects of trauma (Andersen et al., 2008). Thus, different emotional and behavioral

deficits may be observed in relation to age or developmental stage at time of trauma, with

changes in different brains regions likely to manifest different psychological and

behavioral outcomes. Perhaps future studies will extend their investigations to the

differential effects of particular forms of trauma (i.e. CSA vs. CEA vs. CPA) and to the

examination of various forms of psychiatric illness or behavioral outcome and their association with brain-related changes.

In addition to biological changes resulting from trauma, changes in specific psychological processes have also been identified. For example, Andrews (1997) elaborated on the construct of bodily shame in relation to trauma and the development of BN. Bodily shame is thought to reflect a fairly stable affective style that develops in response to early CT and involves self-conscious concerns about one's body, potentially contributing to self-perceptions of disgust as well as self-destructive behaviors such as EDs (Andrews, 1997). It has been found to mediate the relationship between CT (CSA and CPA) and depression within a community sample of women (Andrews, 1995); similarly, bodily shame was found to be related to BN, occurring concurrently with the ED symptoms (Andrews, 1997). Due to inherent limitations of a small sample size, the author encouraged further investigation of bodily shame as a mediator of the CT-BN relationship. Andrews (1997) further hypothesized that, given an abuse history, bodily shame may impact eating habits and exacerbate concerns related to appearance and need for approval.

The psychological process of dissociation has also been examined in relation to CT experiences. Dissociation has been identified as a primary coping mechanism used to manage the heightened arousal and extreme fear associated with the trauma experience in the moment (van der Kolk & Fisler, 1994). This psychological process functions to reduce arousal and effectively inhibit one's conscious awareness of the present experience. While this process is likely to serve a self-protective function during the initial trauma, it may also become activated by comparatively minor stressors or by

recollections of the trauma, and thus frequently becomes generalized to situations outside the initial context of the trauma experience (van der Kolk & Fisler, 1994). Such outcomes may ultimately result in ongoing disengagement from present awareness and withdrawal from interpersonal interaction (van der Kolk & Fisler, 1994), despite the fact that such interactions may have protective effects (see above); thus, a once effective mechanism can impede more productive means of functioning. Substance abuse has been proposed to serve in a similar capacity, allowing an individual to escape or numb their awareness to thoughts and emotions associated with previously traumatic experiences (Bensley et al., 1999). Additionally, a dimensional association between severity of CSA and dissociation has also been observed among women with BN (Hartt & Waller, 2002). Collectively, these findings may suggest a mechanism of escape, or an affect regulating function of dissociation, as an explanation of substance use among individuals with BN following severe CT (i.e. CSA); as such, future studies may seek to explore the impact of dissociation as a mediator of the CT-SUD relationship.

Posttraumatic Stress Disorder has frequently been investigated as a response to CT experiences and as factor implicated in the development of further psychopathology. For example, as previously reviewed, Holzer and colleagues (2008) identified the arousal and avoidance components of PTSD as significant mediators of the relationship between sexual trauma (occurring at any age) and BN. Given an understanding of the nature of PTSD and findings such as those cited by Holzer and colleagues (2008), affect dysregulation appears to be clearly implicated in this disturbance, as does the proposed role of ED behaviors in regulating the corresponding arousal and affect. A similar function has been proposed for substance use behaviors (Rosenkranz, Muller, &

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Henderson, 2014; Ullman et al., 2013). For instance, in their study of substance use among adult women with a history of sexual trauma (during childhood and/or adulthood), Ullman and colleagues (2013) determined that PTSD and substance use coping fully mediated the relationship between trauma and problem drinking and partially mediated the relationship between trauma and problem drug use. Importantly, among the forms of trauma assessed, only CSA and interpersonal forms of trauma predicted substance use coping after controlling for the mediating role of PTSD (Ullman et al., 2013). Thus, use of substances may provide a means of managing the effects of early abuse experiences, potentially through their affect numbing qualities.

Expanding on the conceptualization of PTSD, the construct of Complex PTSD appears to emphasize more global deficits in functioning, particularly in terms of self-regulation (Rosenkranz et al., 2014). As such, Complex PTSD is thought to involve disturbances in affect and behavioral regulation, self-perception, and interpersonal relationships. Rosenkranz and colleagues (2014) investigated the impact of Complex PTSD as a mediator of the relationship between various forms of CT and SUD severity among 216 youth enrolled in substance use treatment. They found that the Complex PTSD partially mediated the relationship between CT and substance use severity and that each domain of the construct (Affect Dysregulation, Self-Criticism, Abandonment Concerns, Hopelessness, Dissociation, and Somatic Complaints) was implicated in this association. These findings provide further support for the notion that SUDs are related to CT and that substance use behaviors may reflect impairments in self-regulation as a result of early trauma experiences (Rosenkranz et al., 2014).

Finally, given the review of affect dysregulation in the context of a CT history, it appears increasingly likely that such childhood adversity contributes to disruptions in general self-regulation capabilities, such that the functions of identifying, processing, expressing, coping, and effectively modulating associated behavior are inherently limited. Numerous recent investigations have focused explicitly on further delineating the specific elements associated with the broader construct of affective and behavioral dysregulation, including affective lability (Groleau et al., 2012) lack of emotional clarity (Weiss, Tull, Lavender, & Gratz, 2013), negative urgency (Dir Karyadi, & Cyders, 2013), alexithymia (Hund & Espelage, 2005), multi-impulsivity (Corstorphine et al., 2007), difficulties engaging in goal-directed behavior (Ehring & Quack, 2010), Complex PTSD (Rosenkranz et al., 2014), disinhition (Weiss et al., 2013), and compulsivity (Dworkin, Javdani, Verona, & Campbell, 2014), and their relation to both CT history and destructive or impaired behavioral outcomes such as EDs and SUDs. In summary, the results of the current study clearly support the role of affect dysregulation as a mediator of this relationship, not only for CSA, but also for CEA and CPA, and support the emphasis on this particular line of inquiry in future research.

Limitations

It is important to note the inherent methodological limitations that limit the scope and applicability of the findings from this study. First, this research involved a cross-sectional design, which was largely based on retrospective recall of childhood trauma experiences. Such a design does not allow for causal links to be determined and includes limitations with regard to accuracy and memory for historical events. Nevertheless, the CTI (Fink et al., 1993) was used to assess these experiences; this measure is known to

provide a rigorous interview assessment of the frequency and severity of CT, which is generally considered to be reliable and valid and to correlate well with more objective measures that assess history of CT (i.e. Fergusson, Horwood, & Woodward, 2000). Second, the cross-sectional nature of the study design did not allow for accurate determination of the temporal sequencing of CT experiences, which would, in theory, precede the development of both SUDs and EDs. However, this may reasonably be assumed given the age restrictions associated with a designation of *childhood* trauma. Third, the scope of this investigation was limited to the study of female participants with BN. Thus, the generalizability of findings to males, as well as to individuals without a history of ED is limited. Fourth, the measure of SUD used in this study was the presence or absence of lifetime diagnosis of SUD (alcohol or drug abuse/dependence), thus producing a dichotomous dependent variable as an outcome measure. Future studies may benefit from further specification of the substance use, including whether or not it is lifetime versus current use or abuse or dependence (this is particularly relevant for alcohol abuse, as it appears relatively easy to meet alcohol abuse criteria given cultural norms surrounding alcohol use). Additionally, elaboration on the frequency of use and specific type of substance abused may prove beneficial given that different substances may be abused in an eating disorder sample that is likely more focused on weight-related factors associated with substance use (i.e. may choose to abuse amphetamines versus marijuana or alcohol).

Future Directions

Despite the limitations noted above, the current study had several strengths and highlighted multiple avenues for further investigation on this topic. Briefly, strengths of

the present study include the use of a structured diagnostic interview (i.e. SCID-I/P; First et al., 1995) based on DSM-IV criteria to assess for lifetime SUD diagnosis and BN diagnosis, as well as the use of an highly reliable and valid interview measure of CT (i.e. CTI, Fink et al., 1993). Methodological strengths also include the use of bootstrapping mediation analyses described by Preacher and Hayes (2008). Additionally, this study is one of only a few to examine the relationship between a history of CT and comorbid BN and SUD, particularly with a focus on elucidating the mechanisms that may underlie (i.e. affect dysregulation) this association. Relatively few studies have addressed these relationships together, despite the fact that links between the individual associations of CT and BN and CT and SUDs are well-established in the literature and are noted to frequently contribute to a challenging clinical picture and poor prognosis (e.g., Kendler et al., 2000; Thompson & Wonderlich, 2004; Steiger, 2010; Wilsnack et al., 1996). Given that the findings suggest that relationships between CT and drug use disorders do exist among individuals with BN, at least partially as a result of dysregulated affect, much work remains to be done in this area to facilitate our understanding of the impact of CT experiences on the development of specific and complex forms of psychopathology, most notably that of BN and SUDs.

Methodological limitations may be addressed via the use of a prospective, longitudinal research design; this would limit the biases associated with retrospective recall, ensure the temporal sequencing of the development of psychopathology following CT, and would also allow for causal mechanisms to be identified and more fully elucidated. Future methodological improvements may include the inclusion of covariates into the model; previous studies have identified PTSD and other psychiatric disorders, as

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well as family/environmental factors to be important covariates to control for

(e.g., Ehring & Quack, 2010; Holzer et al., 2008; Ullman et al., 2013). Finally, a more

specific measure of substance use disorder may prove beneficial, particularly in the form

of a continuous variable. For instance, determining specific patterns of use, including

current versus past use, abuse versus dependence, age at onset of substance use, type of

substances used, and reasons for use have all been identified as important factors

(e.g., Harrison et al., 1997; Nelson et al., 2006; Sartor et al., 2013). Similarly, the impact

of specific types of trauma may be examined more explicitly, as the literature continues

to be mixed with regard to differential effects corresponding to each type of trauma.

Associated with the type of CT experience, various qualities of the trauma have been

found to have particular impact, including the duration of the abuse, relationship with the

abuser, age at onset of the trauma, disclosure of the abuse, and whether the abuse

occurred as an isolated event or part of a prolonged/persistent pattern (e.g. Bulik et

al., 2001). Such factors, among others, should be further investigated as potential

moderators of a relationship between CT and subsequent psychopathology. Related to

this is the importance of considering stage of development at the time of CT onset in

terms of impact of the trauma on an individual's developing identity and ability to cope,

and consequently, the potential manifestation of psychiatric symptoms (Cole &

Putnam, 1992; Kent & Waller, 2000). Similarly, the function of affect regulation should

continue to be explored as a mediator of the relationship between CT and the

development of later psychopathology, particularly given significant findings of affect

dysregulation as a significant mediator and/or indirect pathway of the relationship

between CT and SUD in individuals with BN found in the current study. Specific

elements of affect dysregulation may be explored in accordance with trauma and the development of psychopathology following CT; for instance, the role of alexithymia versus difficulties tolerating negative affect, may further illuminate the specific role of affect dysregulation and provide targets for intervention (Weiss et al., 2013). Finally, continued development of models that depict how CT may affect psychological functioning and result in impaired abilities to regulate affect will likely prove beneficial; such models may include cognitive, interpersonal, biological, affective, and intrapsychic explanations, each of which may generate important avenues for psychotherapeutic intervention. In general, it will be important to use findings of such research to impact how and when we identify potential psychiatric problems following CT and how we may best target them therapeutically to enhance coping and promote psychological health.

CHAPTER V

CONCLUSION

The purpose of the present study was to further explore the nature of the relationship between childhood trauma (sexual, physical, and emotional abuse) and the development of comorbid SUDs in individuals with BN, specifically highlighting the potential mediating role of affect dysregulation. Findings suggest that a relationship between CT and lifetime drug use disorders, but not alcohol use disorders, exist in this sample of women with BN. Childhood sexual abuse appeared to have both direct and indirect effects on the development of SUDs in women with BN in this study, while CPA and CEA were found to impact the development of SUDs only through the role of affect dysregulation. The severity of the CT experience and specific impact of affect dysregulation were discussed as potential explanations for the given findings. Future research should continue to explore the impact of CT on the subsequent development of psychopathology more broadly, and comorbid EDs and SUDs more specifically, as such comorbidities often contribute to further impairment and poorer prognosis (Gregorowski et al., 2013).

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