

NONSUICIDAL SELF-INJURY IN A COLLEGE SAMPLE: RISK FACTORS,
PATHWAYS, AND DIAGNOSTIC CORRELATES

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ABSTRACT

Nonsuicidal Self-Injury in a College Sample: Risk Factors, Pathways, and Diagnostic
Correlates

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As research on nonsuicidal self-injury (NSSI) is in its beginning stages, relatively little is known about the variables that confer risk for this class of behaviors. Although recent work has implicated the role of childhood maltreatment in the development of NSSI, this body of literature is hampered by several important limitations. These limitations include either grouping together all forms of maltreatment (i.e., emotional, physical, and sexual abuse) or focusing on only one form of maltreatment. In addition, there is a paucity of research exploring the mechanisms by which maltreatment experiences relate to NSSI. Furthermore, although a great deal of attention has focused on the relation between self-harm (both suicidal and nonsuicidal) and specific psychological diagnoses, particularly borderline personality disorder (BPD), the vast majority of this research has been conducted with severe clinical samples. As a result, there is a dearth of knowledge about the risk factors, pathways, and diagnostic correlates of NSSI in non-clinical samples. Given that recent research has suggested that NSSI is increasingly common in college samples, the current study aimed to address these limitations in a diverse sample of 1,819 college students. Participants completed assessments of childhood maltreatment experiences, NSSI, as well as two potential mediators, emotion dysregulation and cognitive vulnerability, and one

potential moderator, impulsivity. In addition, a subset of participants ($n = 140$) were administered diagnostic interviews for BPD and depression. Results provided support for the role of childhood maltreatment in the development in NSSI. Controlling for other forms of maltreatment, emotional maltreatment was most predictive of NSSI. Both emotion dysregulation and negative cognitive style partially mediated the relationship between childhood maltreatment and NSSI. In contrast, impulsivity did not significantly moderate the childhood maltreatment – NSSI relation. As expected, borderline personality features significantly predicted NSSI. However, contrary to expectations, impulsivity and affective instability were not the strongest borderline criteria in the prediction of NSSI. Treatment implications of these results, strengths and limitations, as well as areas of future research are discussed.

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TABLE OF CONTENTS

	Page
ABSTRACT	ii
ACKNOWLEDGEMENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	ix
CHAPTER	
1. INTRODUCTION AND LITERATURE REVIEW	1
Overview of NSSI.....	1
Diagnostic Correlates of Nonsuicidal Self-Injury.....	4
Risk Factors Associated with NSSI	7
Mechanisms of the Relation Between Child Maltreatment and NSSI.....	9
The Current Study.....	18
2. METHODS	20
Participants	20
Measures.....	23
Procedure.....	32
3. RESULTS	35
Preliminary Analyses	35
Test of Study Hypotheses	40
4. DISCUSSION	55

Summary of Hypotheses and Results 56

Strengths and Limitations 63

Conclusion and Clinical Implications..... 67

REFERENCES CITED..... 69

LIST OF TABLES

	Page
Table 1. Sample Demographics	21
Table 2. Means and Standard Deviations for Study Variables	36
Table 3. Correlations between Study Variables.....	37
Table 4. Hypothesis #1a. Summary of Hierarchical Regression Analysis Assessing Relation Between Childhood Maltreatment Experiences and Nonsuicidal Self-Injury	41
Table 5. Hypothesis #1b. Summary of Hierarchical Regression Analysis Assessing Relation Between Emotional, Sexual, and Physical Abuse and Nonsuicidal Self- Injury.....	42
Table 6. Hypothesis #1b. Summary of Hierarchical Regression Analysis Assessing Relation between Emotional and Physical Abuse and Nonsuicidal Self-Injury.....	43
Table 7. Hypothesis #2. Summary of Hierarchical Regression Analysis Assessing Relation between Number of Forms of Maltreatment and Nonsuicidal Self-Injury ..	44
Table 8. Hypothesis #5. Summary of Hierarchical Regression Analysis Assessing the Interaction Between Childhood Maltreatment Events and Barratt Impulsiveness Scale in Predicting Nonsuicidal Self-Injury	50
Table 9. Hypothesis #5. Summary of Hierarchical Regression Analysis Assessing the Interaction between Childhood Maltreatment Events and UPPS in Predicting Nonsuicidal Self-Injury.....	51

Table 10. Hypothesis #5. Summary of Hierarchical Regression Analysis Assessing the Interaction between Childhood Maltreatment Events and BART in Predicting Nonsuicidal Self-Injury.....	52
Table 11. Hypothesis #6. Summary of Hierarchical Regression Analysis Assessing Relation between Borderline Personality Dimensional Scores and Nonsuicidal Self-Injury.....	53
Table 12. Hypothesis #7. Summary of Hierarchical Regression Analysis Assessing Relation between Specific Borderline Personality Disorder Criteria and Nonsuicidal Self-Injury	54

LIST OF FIGURES

	Page
1. Hypothesis 3. Mediation Model of the Role of Difficulties in Emotion Regulation in the Relationship between Childhood Maltreatment Experiences and Nonsuicidal Self-Injury.....	46
2. Hypothesis 4. Mediation Model of the Role of Negative Cognitive Style in the Relationship between Emotional Maltreatment Experiences and Nonsuicidal Self-Injury.....	48

CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

Nonsuicidal self-injury (NSSI) refers to the deliberate and direct destruction of one's own body tissue in the absence of suicidal intent (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). Common forms of NSSI include cutting or burning oneself, banging body parts, and picking or scraping one's skin. Instances of NSSI have been reported for centuries, but appear to have increased at an alarming rate over the past several decades (Nock, 2009a). In addition to the negative physical consequences of NSSI, self-harming behavior has been associated with a range of psychological problems, including depression, personality disorders, anxiety, and suicidality. Given the increased prevalence of NSSI, as well as the deleterious outcomes and correlates associated with the behavior, this important area of research has received increased attention in recent years. However, understanding of the risk factors for, and pathways to, NSSI is still in its nascent stages. Further research is needed in order to better clarify the nature of this puzzling behavior and inform the development of effective prevention and treatment efforts.

Overview of NSSI

Differentiating NSSI from Other Forms of Self-Injurious Behavior

Before discussing NSSI in further detail, it is important to distinguish it from other forms of self-injurious behavior. NSSI involves the *direct* destruction of one's body. As such, it is differentiated from other self-destructive behaviors in which self-harm occurs indirectly via chemical processes (e.g., liver damage related to alcohol

consumption). Further, NSSI is *deliberate* in that self-destruction is intended rather than accidental, distinguishing it from such behaviors as smoking in which harmful consequences (e.g., lung cancer) are generally unintended. In addition, the lack of intent to die differentiates NSSI from self-harming behaviors with suicidal intent, of which the prevalence, course, correlates, and response to treatment differ (Nock 2009b). NSSI is also differentiated from stereotypic self-injurious behaviors observed in individuals with developmental or cognitive disabilities, as well as severe forms of self-mutilation in individuals suffering from psychosis, such as limb amputation or auto-castration (Chapman, Gratz, & Brown, 2006). Finally, NSSI does not refer to culturally sanctioned behaviors involving the direct destruction or alteration of body tissue in an effort to enhance beauty, such as professional tattooing or body piercing (Favazza, 1998).

Prevalence and Phenomenology of NSSI

The process of establishing the prevalence of NSSI has been complicated by several factors. Importantly, there is a lack of consensus about terms and definitions among researchers and clinicians. For example, self-injury has been referred to as: deliberate self-harm (Chapman, et al., 2006; Gratz, 2001; Gratz, Conrad, & Roemer, 2002; Nock & Prinstein, 2004, 2005); self mutilation (Nock & Prinstein, 2004, 2005); parasuicide (Linehan, 1993); and deliberate self-injury (Klonsky, 2007). Some researchers do not distinguish between NSSI and self-harm inflicted with the intention of ending one's life. Other researchers fail to differentiate behaviors that inflict direct (e.g., cutting) and indirect (e.g., consuming alcohol) self-injury. Further, other authors do not provide definitions for the behavior to which they refer. Given the varying terms and

definitions used by NSSI researchers, it is difficult to present a clear epidemiological picture of the behavior (Rodham & Hawton, 2009). The current study and the related literature reviewed will focus on research that defines NSSI in accordance with the study's definition of NSSI as described above.

Historically, research in the area of NSSI has been largely limited to clinical populations. However, it has become apparent that rates of NSSI in nonclinical young adult samples are surprisingly high. For example, Whitlock, Eckenrode, and Silverman (2006) found a lifetime NSSI prevalence rate of 17% in 3,000 college students. Other smaller studies of college students have reported lifetime NSSI rates ranging from 12% to an alarming 38% (Favazza, DeRosear, & Conterio, 1989; Gratz et al., 2002; Heath, Toste, Nedecheva, & Charlebois, 2008; Muehlenkamp & Gutierrez, 2004).

It is likely that these studies actually underestimate rates of NSSI. Given that individuals often report experiencing shame associated with NSSI (Lynch & Cozza, 2009), they may be reluctant to disclose having engaged in this behavior. In addition, as NSSI typically results in injuries for which the individual can care for him or herself, nonsuicidal self-injuring individuals do not commonly seek medical treatment, which may also contribute to underreporting of these self-injurious behaviors (Muehlenkamp, 2005).

Forms of NSSI

Research suggests that the most common form of NSSI is skin-cutting (reported in between 46-97% of individuals who self-harm), followed by banging or hitting (21-44%) and burning (15-35%; Briere & Gil, 1998; Favazza & Conterio, 1989; Gratz, 2006;

Klonsky, 2007). Many self-harming individuals engage in more than one method of NSSI (Favazza & Conterio, 1989; Gratz, 2001). In addition, some researchers have found repeated episodes of NSSI to be common, with estimates for the number of lifetime instances of self-injury ranging from 3.4 to over 100 occurrences (Favazza & Conterio, 1989; Heath et al., 2008). However, other studies suggest that only a minority of individuals go on to self-injure chronically (Nock et al., 2006; Whitlock et al., 2006).

Age of Onset

Whereas onset of NSSI was previously thought to be rare prior to age 14 (e.g., Favazza, 1989), more recent research has demonstrated that a significant portion of individuals who engage in NSSI begin to do so earlier in life. For example, Ross and Heath (2002) found that approximately 59% of high school students who engaged in NSSI reported beginning this behavior at age 12, whereas 24% reported beginning at age 11 or younger. Similarly, Zanarini and colleagues (2006) reported that approximately one third of inpatients with borderline personality disorder (BPD) reported self-harming before the age of 13. Other recent studies have reported an average age of onset between 12 and 14 years of age (for review, see Rodham & Hawton, 2009).

Diagnostic Correlates of Nonsuicidal Self-Injury

BPD is a severe and persistent psychological disorder characterized by patterns of instability across affective, interpersonal, behavioral, and cognitive domains. Currently, BPD is the only psychological disorder in which NSSI is included as a diagnostic criterion (American Psychiatric Association [APA], 2000). Specifically, one of the nine diagnostic criteria for the disorder is “recurrent suicidal behavior, gestures, or threats, or

self-mutilating behavior.” (APA, 2000, p. 710). Indeed, individuals who self-injure exhibit more borderline symptoms than those who do not engage in this behavior (Andover, Pepper, Ryabchenko, Orrico, & Gibb, 2005; Klonsky, Oltmanns, & Turkheimer, 2003; Muehlenkamp et al., 2009).

Although individuals who self-injure often meet criteria for BPD, this is not always the case (Briere & Gil, 1998; Klonsky et al., 2003; Nock et al., 2006). Nock and colleagues (2006) reported that approximately 52% of adolescent inpatients with a recent history of NSSI met criteria for a personality disorder, with the majority of participants diagnosed with BPD. A significant proportion of the same sample was diagnosed with Axis I disorders, including major depressive disorder (MDD). In fact, approximately 42% of these participants met criteria for MDD according to the Diagnostic Interview Schedule for Children (DISC; Shaffer et al., 1996). Although informative, this study is limited by the lack of a control group consisting of individuals without a history of NSSI. In contrast, Jacobson and colleagues (2008) examined the diagnostic differences between four groups of adolescent outpatients: (a) no history of any deliberate self-harm; (b) NSSI in the absence of suicide attempt(s); (c) suicide attempt(s) in the absence of NSSI; and (d) both NSSI and suicide attempt(s). The only psychiatric disorder that was specifically associated with NSSI was features of BPD.

The vast majority of work in this area has focused on clinical populations (and in many cases, particularly severe clinical populations), which may inflate the association between NSSI and BPD (Klonsky et al., 2003). The few recent studies involving nonclinical samples have found that individuals who engage in NSSI are more likely to

demonstrate borderline features using self-report questionnaires (Klonsky et al., 2003), informant reports (Klonsky et al., 2003), and structured clinical interviews (Andover et al., 2005). It is important to note that Klonsky and colleagues' sample was comprised of military recruits. Thus, it is unclear whether their results generalize to other populations. To our knowledge, at present, there is a dearth of studies assessing diagnostic correlates of NSSI in community samples of young adults using structured clinical interviews.

Another limitation of the extant literature on the prevalence of BPD in individuals who engage in NSSI is that many studies include NSSI as one of the five criteria in the diagnosis of BPD. This may lead to overestimation of BPD in individuals who engage in NSSI. For example, Herpertz, Sass, and Favazza (1997) found that 48% of self-harming individuals met criteria for BPD when all nine criteria were included, whereas only 28% of individuals were diagnosed with BPD when excluding the fifth criterion of self-harm and suicidal thoughts, gestures, and attempts. Thus, it is important for researchers to refrain from including NSSI as a criterion that contributes to the diagnosis of BPD when examining BPD as a diagnostic correlate of NSSI.

There is also a paucity of research examining the particular aspects of BPD that are most predictive of NSSI in nonclinical samples. In a clinical sample of individuals with personality disorders, Yen and colleagues (2004) found that, excluding the self-injury criterion of BPD, affective instability, identity disturbance, and impulsivity predicted prospective self-harming behavior regardless of intent to die. Whether the same borderline features predict NSSI in nonclinical samples remains unknown. Jacobson et al. (2008) assert that knowledge regarding the specific symptoms of BPD that are most

associated with NSSI would enable researchers and clinicians to better tailor interventions.

Risk Factors Associated with NSSI

Despite advances in understanding the phenomenology and functions of NSSI, the potential pathways to this behavior remain relatively unclear. Several studies have identified a relation between history of childhood maltreatment experiences and the presence of NSSI in adolescence and adulthood (Favazza & Conterio, 1989; Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Gratz et al., 2002). Specifically, a link between child sexual abuse and NSSI has been widely hypothesized and largely observed (e.g., Bergen, Martin, Richardson, Allison, & Roeger, 2003; Briere & Gil, 1998; Glassman et al., 2007; Yates, Carlson, & Egeland, 2008). However, a recent meta-analysis of 56 studies examining the relationship between sexual abuse and NSSI (Klonsky & Moyer, 2008) suggested that, when controlling for psychiatric risk factors, such as depression, borderline personality disorder and suicidality, effect sizes were minimal or negligible. Physical abuse has been associated with NSSI in some studies (e.g., Gratz et al., 2002; Joiner, Sachs-Ericsson, Wingate, & Brown, 2007; Wiederman, Sansone, & Sansone, 1999), but not others (e.g., Glassman et al., 2007; Nock & Kessler, 2006; Zweig-Frank, Paris, & Guzder, 1994). Few studies have examined the role of childhood emotional maltreatment in the development of NSSI. However, studies that have examined this form of abuse have found evidence for the potential contribution of childhood emotional maltreatment to NSSI outcomes (Bornovalova, Gratz, Delany-

Brumsey, Paulson, & Lejuez, 2008; Glassman et al., 2007; Yates, 2009; Yates, Tracy, & Luthar, 2008).

Although a growing body of evidence suggests a relationship between childhood maltreatment and NSSI in young adulthood, three important limitations of research in this area warrant discussion. First, as noted by Glassman and associates (2007), the majority of studies related to this topic examine only one type of maltreatment experience, which limits our understanding of unique contributions of different forms of maltreatment to NSSI. The few studies that have examined the relationship between various forms of childhood maltreatment have found that specific forms of maltreatment are differentially linked to NSSI. For example, one recent study of maltreatment in a community sample suggested a unique relation between childhood physical abuse and intermittent NSSI (defined as having engaged in one to two instances of NSSI), whereas childhood sexual abuse was related to recurrent NSSI (defined as three or more instances; Yates et al., 2008). Examining the unique effect of each form of maltreatment is a necessary step in understanding the process by which childhood maltreatment leads to NSSI (Gibb et al., 2001a). Second, the majority of the studies examining childhood maltreatment and NSSI focus on sexual and physical abuse, whereas few include the study of emotional abuse. As such, further research examining the role of emotional maltreatment in the development of NSSI is needed. Finally, previous research has evidenced a relationship between the number of types of childhood maltreatment experienced and various negative psychological outcomes. Specifically, exposure to multiple forms of maltreatment is associated with greater adjustment problems in adulthood than exposure

to a single type of maltreatment (see Higgins & McCabe, 2001 for a review). However, to date, no study has examined the cumulative impact of multiple forms of maltreatment on the development and maintenance of NSSI.

Mechanisms of the Relation Between Child Maltreatment and NSSI

Childhood maltreatment appears to play a powerful role in the etiology of NSSI. However, as it is neither necessary nor sufficient for the development of self-injurious outcomes, there is a need to better understand why some survivors of childhood maltreatment self-injure, whereas others do not. In recent years, researchers have begun to examine the mechanisms by which childhood maltreatment predicts self-harm. Yet, as research in this area is in its beginning stages, further inquiry into the pathways from childhood maltreatment to NSSI is needed. The present study sought to examine emotion dysregulation and negative cognitive style as potential mediators, and impulsivity as a potential moderator, of the maltreatment-NSSI relation.

Emotion Dysregulation

The relation between emotion dysregulation and NSSI has received a great deal of attention in the theoretical literature. Linehan (1993) asserted that environmental factors interact with emotional vulnerability to increase the likelihood of emotion dysregulation, and in turn, self-harming behaviors. According to Linehan, the environment that is most likely to contribute to the development of emotion dysregulation is an invalidating environment in which the communication of emotional experiences is met by erratic, inappropriate, and negative responses. Further, sexual, physical, and emotional maltreatment are thought to contribute to an invalidating environment, thereby increasing

the likelihood of emotion dysregulation, and in turn, NSSI as well as other behaviors that function to regulate painful emotions that cannot otherwise be tolerated.

Although many studies have investigated the link between NSSI and constructs related to emotion dysregulation, such as emotional inexpressivity (e.g., Evren & Evren, 2005; Gratz, 2006), affect intensity/reactivity (Gratz, 2006) and experiential avoidance (Chapman et al., 2006; Chapman, Specht, & Cellucci, 2005), few studies have directly examined the relationship between emotional dysregulation and NSSI. Gratz and Roemer (2008) suggested that this dearth of research may be attributable, at least in part, to the lack of an agreed-upon definition of emotion dysregulation. These authors, along with several others (e.g., Mennin, Heimberg, Turk, & Fresco, 2005; Mennin, Holaway, Fresco, Moore, & Heimberg, 2007), offer a definition of emotion regulation and dysregulation that is steeped in the conceptualization of emotions from a functional perspective. Specifically, they conceptualized emotion regulation as a multidimensional construct that is comprised of: (a) awareness and understanding of emotions; (b) acceptance of emotions; (c) the ability to inhibit inappropriate or impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions; and (d) the ability to use appropriate emotion management skills flexibly to modulate emotional responses in accordance with an individual's goals and situational demands. The relative absence of any or all of these abilities would indicate difficulties in regulating emotions, or emotion dysregulation. Thus, emotion dysregulation refers to maladaptive ways of responding to emotions, regardless of their intensity, and involves the inability to control behavior when

experiencing negative emotions rather than the inability to control negative emotions themselves.

The few studies that have directly examined the relevance of emotion dysregulation to self-harm have provided preliminary support for this relation. For example, emotion dysregulation accounted for a significant amount of variance in self-injury frequency among self-harming men (Gratz & Chapman, 2007) and women (Gratz & Roemer, 2008). Emotion regulation also reliably distinguished those who self-harm from those who do not (Gratz & Chapman, 2007; Gratz & Roemer, 2008). Furthermore, Heath and colleagues (2008) found that college students with a history of NSSI reported significantly greater emotion dysregulation than comparison participants who never engaged in NSSI.

Emotion dysregulation has also been linked to childhood maltreatment experiences. Much of the literature in this area focuses on children and suggests that maltreatment impairs the development of emotion regulation skills. Children are thought to be at risk for emotion dysregulation when circumstances stress them beyond their capacity to regulate their emotions (Cole, Michel, & Teti, 1994). In particular, maltreating environments contain emotional demands that likely overwhelm a child's repertoire of emotion regulation strategies. Indeed, research has suggested that maltreated children, relative to non-maltreated children, are more likely to exhibit patterns of emotion regulation characterized by inflexibility and situationally inappropriate affect (Shields & Cicchetti, 1997, 1998; Shields, Cicchetti, & Ryan, 1994). Emotion dysregulation has been specifically linked to sexual abuse (Shipman, Zeman, Penza, &

Champion, 2000), physical abuse (Shields & Cicchetti, 1998; Shipman, Schneider, & Fitzgerald, 2007), and emotional neglect or unavailability (Shipman et al., 2000).

Despite the theoretical attention paid to the mediating role of emotion dysregulation in the relation between childhood maltreatment experiences and NSSI (e.g., Linehan, 1993), researchers have only recently begun to examine this empirically. To our knowledge, only one study examined the mediating role of emotion dysregulation in the relation between childhood maltreatment and NSSI in adulthood (Gratz & Roemer, 2008). Contrary to the authors' hypotheses, despite being correlated with both maltreatment experiences and NSSI, emotion dysregulation as measured by the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) did not mediate this relation. However, the specific subscale of the DERS tapping access to emotion regulation strategies did, indeed, mediate the maltreatment-NSSI relation. Given the theoretical emphasis placed on the model of emotion regulation deficits mediating the link between maltreatment in childhood and NSSI in adulthood as proposed by Linehan (1993), these findings warrant replication.

Cognitive Style

Although empirical support has been garnered for the mediating role of cognitive style in the relation between childhood maltreatment and suicidal ideation (Gibb et al., 2001a), to our knowledge, researchers have yet to examine these variables in relation to NSSI as the dependent variable (in place of suicidal ideation). According to the hopelessness theory of depression (Abramson, Metalsky, & Alloy, 1989), individuals who tend to attribute negative life events to stable and global causes, as well as infer

negative consequences and self-characteristics following these events are at heightened risk for developing depression. In a developmentally-focused expansion of this theory, Rose and Abramson (1992) proposed an extended model in which childhood negative events contribute to the development of a negative inferential style. In particular, emotional abuse was hypothesized to predict negative inferential style because, with emotional abuse, the abuser directly supplies the child with negative cognitions (e.g., “You’re so stupid; you’ll never amount to anything”). In the case of physical or sexual maltreatment, however, the child is left to form his or her own attributions, providing a greater opportunity to make more benign attributions. Many empirical studies have found support for this hypothesis (e.g., Gibb & Alloy, 2006; Gibb, Alloy, Abramson, & Marx, 2003; Gibb et al., 2001b).

Derived from the hopelessness theory of depression, Abramson, Alloy, and colleagues (1998, 2000) developed the hopelessness model of suicide risk to explain the link between childhood maltreatment and adult suicidality. This theory posits that childhood maltreatment contributes to a negative cognitive style, which in turn, contributes to the development of symptoms of hopelessness depression, including suicidal ideation. However, this model has not been expanded to address the relationship between childhood maltreatment and NSSI.

Recent studies have suggested that negative cognitive style may confer risk for NSSI. In a prospective study of NSSI in adolescence, Hankin and Abela (2010) followed 103 community adolescents over a 2.5-year period. Negative cognitive style at baseline significantly predicted first onset of NSSI over the course of the study even after

controlling for suicidality. Similarly, in an 18-month longitudinal study, Guerry and Prinstein (2010) found that the interaction between cognitive vulnerability and stressful life events predicted increases in NSSI prospectively.

Glassman and colleagues (2007) proposed that individuals who experience childhood abuse, particularly emotional maltreatment in the form of excessive criticism and verbal abuse, may turn to NSSI as a method of self-abuse. Indeed, these authors found that self-criticism mediated the relationship between childhood emotional abuse and NSSI in adolescence. The present study aims to determine whether negative cognitive style similarly mediates the relation between childhood maltreatment, particularly emotional maltreatment, and NSSI. As mentioned previously, individuals who experience emotional maltreatment as children may develop the tendency to attribute negative events to internal (in addition to stable and global) causes. Given the model of abusive behavior provided by their parents, as well as the tendency to blame themselves for negative events, these individuals may engage in NSSI as a way to punish themselves.

Impulsivity

Individuals who engage in NSSI most commonly report that they spend little time planning the behavior in advance, suggesting that NSSI is often conducted impulsively (Favazza & Conterio, 1989; Muehlenkamp, 2005). In fact, researchers have proposed that the diagnosis of Impulse-Control Disorder Not Otherwise Specified may be an appropriate classification for many individuals engaging in this behavior (Nock & Favazza, 2009). Studies of self-injurers have found that between 70% and 80% of

participants reported that once they consider engaging in NSSI, they cannot refrain from doing so (Bennum, 1983; Favazza & Conterio, 1989). In a study of individuals with personality disorders (schizotypal, borderline, avoidant, and obsessive-compulsive personality disorders), Yen and colleagues (2004) found that the BPD symptom of impulsivity prospectively predicted suicide behavior (defined as any act of self-harm regardless of intent to die) but not suicide attempts (defined as suicide-related acts with at least some intent to die that, at minimum, resulted in mild medical threat). Although the authors did not explicitly state their definition of impulsivity, given that they used the Diagnostic Interview for Personality Disorders (DIPD; Zanarini, Frankenburg, Sickel, & Yong, 1996), an interview based on the DSM diagnostic criteria for personality disorders, it is likely that they operationalized the construct as a pattern of engaging in at least two impulsive, potentially self-damaging behaviors (excluding NSSI and suicidal behavior).

Despite the evidence that NSSI may be linked to impulsivity, other studies have not found support for this relationship. For example, one study found that impulsivity correlated with the degree of NSSI among those who self-injured, but failed to distinguish self-injurers from control participants (Simeon et al., 1992). Another investigation found that those who engage in NSSI differ from those who do not engage in NSSI with regard to some aspects of impulsivity (e.g., future planning), but not others (Herpertz et al., 1997).

One important limitation of the research on the role of impulsivity in NSSI is that impulsivity is a multifaceted construct that is defined differently across studies (Anestis, Selby, & Joiner, 2007; McCloskey et al., 2009; Whiteside & Lynam, 2001). Further,

different measures of impulsivity tap different dimensions of the construct. Recently, Whiteside and Lynam (2001) proposed a new conceptualization of impulsivity based on the assertion that the construct is an umbrella for various personality factors related to “impulsive-like behavior” (p. 685). These authors administered the NEO-Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992) and several commonly used impulsivity measures to over 437 undergraduates. Through exploratory factor analyses, they identified four personality facets of impulsivity: urgency; (lack of) premeditation; (lack of) perseverance; and sensation seeking. The authors created the Urgency, Premeditation, Perseverance, and Sensation Seeking Impulsiveness Behavior Scale (UPPS; Whiteside & Lynam, 2001) to assess these four dimensions. Urgency refers to the tendency to engage in impulsive behaviors when experiencing negative affect without considering long-term outcomes. Of note, this subscale differentiates the UPPS from other measures of impulsivity in that it takes into account the role of affect in impulsive behaviors, which makes it particularly relevant to NSSI (Anestis et al., 2007). Lack of premeditation refers to a difficulty in thinking and reflecting on the consequences of an act before engaging in that act, in addition to valuing immediately available rewards over delayed rewards. Lack of perseverance refers to the inability to remain focused on a task that may be boring or difficult. Finally, sensation seeking involves openness to trying new, potentially dangerous activities, as well as the tendency to pursue and enjoy exciting activities. The UPPS, particularly the urgency scale, has been shown to predict self-harming behaviors, such as bulimic symptoms and drinking to cope (Anestis et al. 2007).

However, to date, studies have yet to administer the UPPS to individuals who engage in NSSI.

Additionally, until recently, research in this area relied on self-report measures of impulsiveness. Self-report measures are vulnerable to presentation biases and assume that individuals can accurately understand and report their mental processes underlying behavior (Nisbett & Wilson, 1977). In contrast, behavioral tasks allow for an observable measure of the behavior of interest, albeit in a controlled context, and are less face valid than self-report measures (McCloskey et al., 2009). As such, they can be valuable tools for gauging impulsive behavior. To our knowledge, only two studies have employed behavioral tasks as measures of impulsivity in relation to NSSI (Janis & Nock, 2009; Glenn & Klonsky, 2010). Janis and Nock (2009) reported that neither the Connors' Continuous Performance Test as a measure of behavioral inhibition nor the Iowa Gambling Task as a proxy for risky decision-making was significantly associated with NSSI. Consistent with these findings, self-injuring individuals performed similarly to those who denied NSSI on a stop-signal task used as a behavioral measure of inhibitory control (Glenn & Klonsky, 2010). However, given that this area of research is new, the role of impulsivity- particularly as assessed by behavioral methods- in the relation between childhood maltreatment experiences and NSSI has yet to be fully explored. The present study aims to determine whether impulsivity, as measured by both self-report and a behavioral measure not yet examined in relation to NSSI, moderates the association between childhood maltreatment and NSSI.

The Current Study

The current study aimed to contribute to the understanding of the risk factors and diagnostic correlates of NSSI in a large sample of late adolescent and young adult undergraduates. In so doing, this study sought to examine one particular putative risk factor for NSSI, childhood maltreatment. Specifically, the current study examined the unique relationship between different forms of childhood maltreatment and NSSI in a diverse college sample. Further, this study examined various mechanisms that may explain these relationships. Finally, this study aimed to contribute to a better understanding of the diagnostic correlates of NSSI, with a focus on the relationship between BPD and NSSI. To this end, participants completed several measures, including the Functional Assessment of Self-Mutilation (FASM; Lloyd, Kelley, & Hope, 1997) via Sona Systems, Temple University's online data collection system. The FASM was used to assess presence and history of NSSI. In addition, participants completed several self-report measures aimed at assessing the variables of interest: childhood maltreatment, emotion dysregulation, negative cognitive style, impulsivity, and BPD. Participants who endorsed a history of NSSI and comparison participants who denied ever engaging in NSSI were invited to the laboratory for the second phase of the study. During this visit, participants were administered structured clinical interviews for BPD and depression, as well as a behavioral task of impulsivity.

The current study was designed to test seven main hypotheses. First, based on previous findings (e.g., Glassman et al., 2007; Gratz et al., 2002; Yates, 2004), we expected overall childhood maltreatment to be associated with NSSI, controlling for the

other forms of maltreatment. We also hypothesized that each form of maltreatment would *uniquely* predict NSSI. Second, we expected exposure to multiple forms of maltreatment to be associated with greater frequency of NSSI. Third, we hypothesized that emotion dysregulation would mediate the relationship between all forms of childhood maltreatment and NSSI. In other words, we expected maltreatment experiences to be associated with emotion dysregulation, which in turn, would predict NSSI. Fourth, we hypothesized that negative cognitive style would mediate the relation between emotional maltreatment and NSSI. Fifth, we hypothesized that impulsivity would moderate the relation between childhood maltreatment experiences and NSSI, such that the association between childhood maltreatment and NSSI would be greater for individuals who are also high in impulsivity. Sixth, controlling for history of depression and current depressive symptoms, we expected that NSSI would be associated with borderline personality features. Seventh, it was expected that, excluding the criterion pertaining to self-harm, impulsivity and affective instability would have the strongest association with NSSI of the diagnostic criteria for BPD.

CHAPTER 2

METHODS

Participants

Participants were recruited from the Temple University undergraduate research pool. Assessing NSSI in an undergraduate sample is both appropriate and necessary. As mentioned previously, although recent research has suggested that NSSI is increasingly common in college samples, the majority of studies focused on self-harm have been conducted in individuals with a history of psychiatric treatment. Given that many individuals who engage in NSSI never seek mental health services (Conterio & Lader, 1998), further examination of this behavior in late adolescents and young adults who are not seeking treatment is indicated. Additionally, many researchers have concluded that NSSI is more common among women than men (e.g., Boudewyn & Liem, 1995; Muehlenkamp, 2005; Ross & Heath, 2002), and accordingly, much of the research in this area has been conducted with all female samples. However, other studies failed to find a gender difference (Gratz, 2001; Heath et al., 2008; Martin & Waite, 1994). As such, both men and women were included in this study.

Phase 1. A total of 1,863 undergraduates participated in Phase 1 of the study. Forty participants from Phase 1 were excluded from the following analyses due to apparent random responding. In addition, despite signing the online informed consent for Phase 1, which indicated that participants must be ≥ 18 years old, four participants reported being 17. Their data were removed from all analyses. Thus, the following

analyses are based on a final sample of 1,819. Demographic characteristics are presented in Table 1.

Table 1

Sample Demographics

	Phase 1 (<i>N</i> = 1,819)	Phase 2 (<i>N</i> = 140)
Mean Age in Years (SD)	20.42 (3.23)	19.91 (2.04)
Gender (<i>n</i> female, % female)	1,088 (59.9%)	94 (67.1%)
Ethnicity (<i>n</i> , %)		
White	1,086 (59.7%)	89 (63.6%)
African American	306 (16.8%)	20 (14.3%)
Asian American		
East Asian	172 (9.5%)	16 (11.4%)
South Asian	53 (2.9%)	5 (3.6%)
Pacific Islander	13 (.7%)	1 (.7%)
Hispanic/Latino	73 (4.0%)	3 (2.1%)
Other	70 (3.9%)	2 (1.4%)
Did Not Respond	46 (2.5%)	4 (2.9%)
Year in School (<i>n</i> , %)		
Freshman	426 (23.4%)	40 (28.6%)
Sophomore	566 (31.1%)	52 (37.1%)
Junior	567 (31.2%)	38 (27.1%)
Senior	235 (12.9%)	10 (7.1%)
Did not Respond	25 (1.4%)	0 (0%)
Household Income (<i>n</i> , %)		
\$0- \$9,999	44 (2.4%)	1 (.7%)
\$10, 000- \$19,999	88 (4.8%)	5 (3.6%)

Note. SD = Standard deviation

Table 1 (Continued)

	Phase 1 (<i>N</i> = 1,819)	Phase 2 (<i>N</i> = 140)
Household Income		
(Continued)		
\$20,000- \$29,999	103 (5.7%)	10 (7.1%)
\$30,000- \$39,999	106 (5.8%)	10 (7.1%)
\$40,000- \$49,999	100 (5.5%)	4 (2.9 %)
\$50,000- \$59,999	116 (6.4%)	10 (7.1 %)
\$60,000- \$69,999	138 (7.6%)	12 (8.6%)
\$70,000- \$80,00	146 (8.0%)	12 (8.6%)
Over \$80,000	479 (26.3%)	39 (27.9%)
Did not Respond	499 (27.4%)	37 (26.4%)
Highest Parental Education (<i>n</i> , %)		
Less than 7 years of school	18 (1.0%)	1 (.71%)
Junior high school graduate	12 (.7%)	1 (.71%)
Partial High School training	26 (1.4%)	1 (.71%)
High school graduate (GED)	325 (17.9%)	22 (15.7%)
Partial college training	330 (18.1%)	24 (17.1%)
College Graduate	720 (39.6%)	69 (49.3%)
Graduate School Training	201 (11.1%)	6 (4.3%)
Other	11 (.6%)	3 (2.1%)
Don't Know	46 (2.5%)	4 (2.9%)
Did not Respond	130 (7.1%)	9 (6.4%)

Note. SD = Standard deviation

Phase 2. A conservative power analysis using the smaller range of effect sizes found in related previous studies revealed that the Phase 2 sample size needed to obtain power of 0.80 was 127 participants. Of the participants who completed Phase 1, 140 participated in Phase 2; 70 of these participants reported a history of NSSI, whereas 70 denied ever engaging in NSSI. Demographic characteristics of the Phase 2 sample are also presented in Table 1. No statistically significant differences were found between Phase 1 and Phase 2 samples on the basis of ethnicity ($\chi^2(8) = 5.47, p = ns$), gender ($\chi^2(1) = 3.29, p = ns$), SES ($t(1318) = -.858, p = ns$), and age ($t(1742) = 1.91, p = ns$).

Measures

Contact information. A brief *Contact Information Questionnaire* was used to obtain the telephone numbers, email addresses, and mailing addresses of participants in Phase 1. This information was used for recruiting participants for the diagnostic interviewing portion of the study (Phase 2). This questionnaire was the only connection between participants' names and ID numbers. The contact information file was kept separated from all other data and stored in a password-protected file on a HIPAA-compliant computer in Dr. Alloy's secure laboratory.

Demographic information. A *Demographic Information Form* was used to assess the gender, age, ethnicity, native language, and socioeconomic status of the sample. This information was used to determine the generalizability of the sample.

Nonsuicidal self-injury. The *Functional Assessment of Self-Mutilation* (FASM; Lloyd et al., 1997) is a commonly used self-report measure designed to assess the methods, frequency, and functions of NSSI. The measure consists of two parts. The first

part is a checklist of NSSI in which participants were asked whether they have engaged in each of 11 different NSSI behaviors, plus a fill-in “other” category, in the past year. For each item endorsed, participants provided the frequency of occurrence and whether or not they obtained medical treatment. Upon completing the checklist, participants were asked about: the length of time they contemplated NSSI prior to engaging in the behavior(s); age of onset; whether (and how many times) they engaged in NSSI more than one year prior to completing the questionnaire; if they were under the influence of drugs or alcohol at the time; the degree of physical pain experienced; and whether any of these behaviors was a suicide attempt. The second part of the FASM presents 22 potential motivations for engaging in NSSI (e.g., “to stop bad feelings;” “to punish yourself”) in a checklist format. Respondents rated each motivation on a four-point Likert scale, ranging from “never” to “often.” Confirmatory factor analyses of the FASM have demonstrated a four-factor model of the functions of NSSI comprised of automatic-negative reinforcement, automatic-positive reinforcement, social-negative reinforcement, and social-positive reinforcement. Subsequent research has supported the internal consistency (α 's ranged from .62 to .85) and construct validity of these four functions (Nock & Prinstein, 2004, 2005). In the present study, a continuous variable of NSSI frequency was calculated by adding together the number of times participants reported engaging in any form of NSSI.

The FASM has demonstrated acceptable psychometric properties with normative (Lloyd et al., 1997), psychiatric (Guertin, Lloyd-Richardson, Spirito, Donaldson, & Boergers, 2001), incarcerated (Penn, Esposito, Schaffer, Fritz, & Spirito, 2003), and

adolescent (Nock & Prinstein, 2004, 2005) samples. Specifically, the FASM has been found to have adequate levels of internal consistency for minor and moderate/severe forms of NSSI ($\alpha = .65-.66$; Guertin et al., 2001). Similarly, internal consistency in the present study was adequate ($\alpha = .65$). The measure has also demonstrated significant associations with measures of suicidal ideation, past suicide attempts, hopelessness, and depressive symptoms (Guertin et al., 2001; Nock & Prinstein, 2005).

Childhood maltreatment. The *Lifetime Experiences Questionnaire* (LEQ; Gibb et al., 2001b) is a 64-item self-report measure that assesses history of childhood (i.e., prior to the age of 15) emotional, physical, and sexual maltreatment committed by both peers and adults. Consistent with Hart and colleagues' conceptualization of emotional maltreatment (1987), forms of emotional maltreatment assessed by the LEQ include being degraded, humiliated, terrorized, rejected, or isolated. Forms of physical maltreatment assessed include being the victim of deliberate pain, being hit, or choked. Forms of sexual maltreatment assessed include behaviors in which contact is made (e.g., unwanted intercourse), as well as behaviors in which contact is not made (e.g., exposure to pornography).

For each LEQ item, participants indicated whether or not they ever experienced that event. If they had experienced a particular event, they then indicated the age of onset and offset of the event described, the frequency of the event on a 6-point scale, and the relationship of the perpetrator. Continuous levels of each form of maltreatment were determined by summing the number of different experiences in each category of maltreatment. The maltreatment subscales have been found to correlate highly with levels

of emotional, physical, and sexual maltreatment as assessed by structured clinical interviews (r 's = .78, .79, and .87, respectively; Gibb et al., 2001b), and have demonstrated predictive validity for episodes of depression (see Gibb et al., 2001b). The LEQ has also demonstrated adequate internal consistency for the childhood emotional (α = .85), physical (α = .67), and sexual (α = .80) maltreatment subscales (Gibb et al., 2001b). In the current study, internal consistency was high for the childhood emotional (α = .93), physical (α = .87), and sexual (α = .96) maltreatment subscales. A categorical variable (ranging from 0-3) was also created to assess the number of forms of maltreatment experienced, where 0 = no history of maltreatment, 1 = exposure to a singular form of maltreatment (e.g., emotional maltreatment), 2 = exposure to two forms of maltreatment (e.g., emotional and sexual abuse), and 3 = exposure to three forms of maltreatment (emotional, physical, and sexual abuse).

Depression. The *Schedule for Affective Disorders and Schizophrenia-Lifetime* (SADS-L; Endicott & Spitzer, 1978) is a semi-structured diagnostic interview that assesses current and lifetime history of Axis I disorders. In the current study, only the depression section was administered to assess lifetime and current depressive episodes. The SADS-L version used in this study was adapted for several projects in Dr. Alloy's laboratory (e.g., Alloy et al., 2000) and is described in detail by Alloy et al. (2008) and Nusslock and colleagues (2007). The inter-rater reliability for this version has been found to be excellent ($\kappa > .90$).

Levels of depressive symptoms were assessed using the *Beck Depression Inventory-II* (BDI-II; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report

questionnaire used to assess the severity of psychological and somatic symptoms of depression. For each item, participants selected one of four statements that best describes how they had been feeling in the past week (e.g., “0 = I do not feel sad,” “1 = I feel sad much of the time,” “2 = I am sad all of the time,” and “3 = I am so sad or unhappy that I can’t stand it”). An overall score ranging from 0 to 63 was obtained by summing the individual scores for each of the 21 items, with higher scores suggesting greater depressive symptomatology. The BDI-II has been used extensively with undergraduate populations (e.g., Whisman, Perez, & Ramel, 2000) and has demonstrated strong convergent validity with other scales of depression (r 's > .50), as well as high internal consistency (α 's > .90; Steer & Beck, 2000). In the present study, the BDI-II demonstrated similarly high internal consistency ($\alpha = .94$).

Emotion dysregulation. The *Difficulties in Emotion Regulation Scale* (DERS; Gratz & Roemer, 2004) is a 36-item self-report measure designed to assess overall emotion dysregulation, as well as six specific dimensions of the construct: (a) nonacceptance of emotional responses (e.g., “When I’m upset, I feel guilty for feeling that way.”); (b) difficulties in engaging in goal-directed behavior (e.g., “When I’m upset I have difficulty focusing on other things.”); (c) impulse control difficulties (e.g., “When I’m upset, I lose control over my behavior.”); (d) lack of emotional awareness (e.g., “I pay attention to how I’m feeling.” [reverse scored item]); (e) limited access to emotion regulation strategies (e.g., “When I’m upset, I believe that I will remain that way for a long time.”); and (f) lack of emotional clarity (e.g., “I have difficulty making sense out of my feelings.”). Responses were made on a 5-point scale ranging from “almost never” to

“almost always.” In the current study, DERS scores were summed to yield an overall index of emotion dysregulation, with higher scores indicating greater levels of emotion dysregulation. The DERS has demonstrated good test-retest reliability and adequate construct and predictive validity (Gratz & Roemer, 2004). Internal consistency has been found to be good to excellent for the overall measure ($\alpha = .81-.93$), as well as the individual subscales (α 's $> .80$). In the present study, internal consistency of the DERS was high ($\alpha = .95$). The DERS has also demonstrated good test-retest reliability over 4-8 weeks ($r = .88$; Gratz & Roemer, 2004).

Cognitive style. The *Cognitive Style Questionnaire* (CSQ; Alloy et al., 2000), a revised version of the Attributional Style Questionnaire (Peterson et al., 1982), is a self-report measure designed to assess cognitive style. Specifically, this measure is used to assess individuals' tendency to make internal, stable, and global attributions, and to infer negative consequences and characteristics about themselves following the occurrence of a negative life event. Participants were presented with 12 negative hypothetical events (e.g., “You really want to be in an intimate, romantic relationship but aren't.”) and asked to identify what they believed to be the major cause of each event. They then answered a series of questions regarding the likely cause of each event along three dimensions: (1) internality (e.g., “Is it something about you or something about other people or circumstances that causes you to not be in an intimate, romantic relationship?”); (2) stability (e.g., “Do you think the reason for you not being in an intimate, romantic relationship will also cause you to not be in an intimate, romantic relationship in the future?”); and (3) globality (e.g., “Do you think the reason why you are not in a

relationship will also cause problems in other parts of your life?”). Participants also answered questions regarding the likely consequences of each event (e.g., “How likely is it that your not being in an intimate, romantic relationship will lead to other negative things happening to you?”) and what the occurrence of the event implies about their self-concept (e.g., “Do you think there is something wrong with you because you are not in an intimate, romantic relationship?”). A composite score was calculated for inferences (mean ratings for the stability, globality, consequences, and self-implication dimensions) in response to the hypothetical negative events, with higher scores reflecting more negative inferential styles. The CSQ composite for negative events has demonstrated good internal consistency ($\alpha = .88$; Alloy et al., 2000) and test-retest reliability over one year ($r = .80$; Alloy et al., 2000). In the current study, internal consistency was notably high ($\alpha = .97$).

Borderline personality disorder. Borderline pathology was measured using the borderline subscale of the *International Personality Disorder Examination-4th Edition* (*PDE-IV*; Loranger, 1988), a structured interview designed to assess Axis II disorders. The PDE is a unique measure of personality dysfunction in that it provides both categorical and dimensional scores. Many theorists have expressed skepticism regarding the merits of categorical (as opposed to dimensional) measurements of personality pathology (e.g., Klein, Wonderlich, & Shea, 1993; Rothschild, Cleland, Haslam, & Zimmerman, 2003; Widiger, 1992; Zimmerman & Coryell, 1990). Specifically, it has been suggested that the boundaries that designate the presence or absence of personality disorders may be arbitrary and may result in a loss of important clinical information

regarding individuals who experience pain and impairment related to elevated personality disorder features (e.g., Klein, 1993; Klein et al., 1993; Widiger, 1992). As such, the PDE was used to determine participants' borderline features as well as whether or not they met criteria for a diagnosis. Items were given a rating of "0" when the behavior was absent or not clinically significant, "1" when it was present but of uncertain clinical significance, and "2" when it was present and clinically significant. The items assessing borderline features were then summed to provide a dimensional score for the disorder. Consistent with the DSM-IV, if participants received a score of 2 on 5 or more borderline criteria, they were given a BPD diagnosis accordingly.

The PDE as a whole has been shown to have strong inter-rater reliability cross-sectionally ($\kappa = .79$) and prospectively ($\kappa = .84$; Pilkonis, Heape, Ruddy, & Serrao, 1991), and for both diagnosis and dimensional scores (Loranger, 1988). The validity and stability of the BPD diagnosis was found to be adequate ($\alpha = .69$; Sanislow, Grilo, & McGlashan, 2000). Internal consistency was adequate in the present study ($\alpha = .82$).

Impulsivity. The *UPPS Impulsive Behavior Scale* (UPPS; Whiteside & Lynam, 2001) was used to assess impulsivity at Phase 2. It is a 45-item questionnaire comprised of four subscales: (a) urgency (e.g., "When I am upset, I often act without thinking"); (b) sensation seeking (e.g., "I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional"); (c) (lack of) premeditation (e.g., "I usually make up my mind through careful reasoning"); and (d) (lack of) perseverance (e.g., "Once I start a project, I almost always finish it"). Items are scored on a Likert scale ranging from 0 = "Strongly Disagree" to 4 = "Strongly Agree." Coefficient alphas have

been found to be between .89-.91, .81-.87, .83-.87, and .89-.91 for urgency, premeditation, perseverance, and sensation seeking, respectively. In the present study, internal consistency ranged from fair to high on the total score ($\alpha = .87$) and subscales (urgency $\alpha = .89$, premeditation $\alpha = .68$, perseverance $\alpha = .86$, and sensation seeking $\alpha = .81$) of the UPPS.

The *Barratt Impulsiveness Scale, Version 11* (BIS-11; Patton et al., 1995), a widely used self-report measure of trait-dependent impulsivity, was administered to all participants at Phase 1. The scale is comprised of 30 items scored on a 4-point Likert scale (“1 = rarely/never;” “2 = occasionally;” “3 = often;” “4 = almost always/always”). Additionally, the BIS-11 is divided into three second-order factors measuring attentional, motor, and nonplanning impulsiveness. In the present study, individual items were summed to yield an overall impulsivity score, with higher scores indicative of greater impulsivity. Internal consistency for the BIS-11 has been found to be good in both general psychiatric ($\alpha = .83$) and undergraduate ($\alpha = .82$) samples (Patton et al., 1995). Internal consistency of the BIS-11 in the current study was acceptable ($\alpha = .71$).

The *Balloon Analogue Risk Task* (BART; Lejuez et al., 2002) is a computerized behavioral measure of impulsivity. In this task, participants were presented with thirty balloons on the computer screen, one at a time. The participant decided how much air to “pump” into a given balloon. For each successful pump of air, more pretend money was accrued. However, at some point, the addition of more air caused the balloon to burst, leading to the loss of all money accrued during that trial. Thus, the individual was required to decide to continue to pursue more money and risk the balloon popping, or to

stop and collect the money already accrued for that trial. Each balloon has a different popping point, ranging from the 1st to the 128th pump. The main measure is the average number of pumps across balloons, excluding balloons that popped (the number of pumps is necessarily constrained on trials when the balloon explodes). The BART has been used successfully in both adolescent and young adult samples, and has been found to correlate with self-report measures of impulsivity (Lejuez et al., 2002). The BART has demonstrated acceptable test-retest reliability ($r = .68-.82$; Lejuez et al., 2003; White, Lejuez, & de Wit, 2008).

Procedure

Participants who elected to participate in the study logged on to the Sona Systems website and selected the study. An electronic consent form was presented to participants following the presentation of general study information and prior to the presentation of any study questionnaires. The consent form outlined the purpose of the study, the voluntary nature of participation, the potentially distressing subject matter, as well as the confidentiality procedures regarding data collection. In addition, the consent form informed participants that they could skip any questions they did not wish to answer and withdraw from the study at any time without penalty. Participants were also told that the study would take approximately 75 minutes and they would receive 1.5 research credits to compensate them for their time.

Consistent with other studies on Sona Systems, participants were informed that, by electing to continue to participate in this survey, they indicated that they read and understood the contents of the consent form and agreed to participate in the study.

Participants were also told that they might be invited to participate in Phase 2, the diagnostic interviewing phase of the study. Once participants indicated their consent, they then completed the following measures: FASM, LEQ, DERS, CSQ, BDI-II, and BIS-11. These measures have been widely used in research studies at Temple University and/or other research institutions. Upon completion of the measures, all participants were given a referral to the Temple University Psychological Services Center as well as the number for a toll-free 24-hour hotline of National Hopeline Network at 1-800-SUICIDE (1-800-784-2433). Participants were also given debriefing information and contact information for the primary researchers of the study.

A subset of the individuals who completed Phase 1 were invited to participate in Phase 2 of the study. As the focus of this study was NSSI, all individuals who endorsed engaging in NSSI more than once were invited to participate in Phase 2 until the target of 70 self-harming participants was obtained. In order to determine the unique relationship between childhood maltreatment experiences and NSSI, it was also necessary to have a comparison group of participants without a history of self-harm. Given that the majority of individuals who completed Phase 1 did not endorse a history of NSSI, a random subset of individuals who denied self-harming behaviors were invited to participate in the study until the target goal of 70 participants without a history of NSSI was obtained. A random numbers table was used to select this subset. Participants were invited to participate in Phase 2 via email or phone call and they scheduled appointments via Sona Systems. No participant was contacted by any method more than three times if they did not express interest in participating in Phase 2.

Phase 2 was conducted in the laboratory. Participants met with the author who is trained in the administration of all relevant measures, including suicide assessment. Upon arriving at the laboratory, participants were given a thorough description of the study and were asked to read and sign the consent form if they elected to participate. Because of the sensitive nature of self-harming behaviors, the limits of confidentiality were emphasized during the consent procedure. Specifically, it was made clear to the participant that, if we learned during the course of the study that he or she was at imminent risk of serious harm, we would inform others (e.g., the participant's clinician or the police) as we believed necessary and appropriate in order to ensure the participant's safety.

Following consent, participants were administered the borderline section of the PDE, the depression section of the SADS-L, the BART, and the UPPS. Participants could choose to receive either \$10 or 1.5 course credits for completion of this portion of the study. At the end of the visit, participants were given a list of referrals.

If participants endorsed NSSI in the past month or indicated suicidal intent, a thorough suicide assessment was conducted. The Suicide Interview was drawn from similar assessments developed by leaders in the field of self-harming behaviors and was previously adapted for use in the Alloy Lab study, Project TEAM. If it was determined that a participant was in imminent danger, the interviewer followed the study's suicide protocol, which was modeled after the suicide protocol used in several of Dr. Alloy's IRB-approved studies.

CHAPTER 3

RESULTS

Preliminary Analyses

Means and standard deviations were calculated for each study variable (see Table 2) and zero-order correlations were calculated to examine relationships between the variables of interest (see Table 3). Internal consistency of all the measures was examined by calculating Cronbach's α coefficients.

Of the total Phase 1 sample, 37% reported a history of NSSI, with 16.2% reporting more than 10 incidents of NSSI and 6% reporting more than 50 incidents. The majority of individuals with a history of NSSI reported harming themselves more than one time (92%) and using multiple forms of NSSI (64.5%). The most frequently reported NSSI behaviors were: picking at a wound (25%), biting oneself (12%), skin picking to the point of drawing blood (10%), hitting (9%), burning (8%), and cutting (7%). The mean reported age of onset of NSSI was 13.

Of the 140 Phase 2 participants, 16 met criteria for borderline personality disorder as assessed by the PDE with all but 1 reporting having engaged in NSSI. Twelve additional participants, 11 of whom endorsed engaging in NSSI, were subthreshold for the disorder (i.e., met 4 out of 9 criteria, rather than the 5 needed for diagnosis).

Table 2

Means and Standard Deviations for Study Variables

Variable	Mean	Standard Deviation
Phase 1	<i>N</i> = 1,819	
Lifetime Experiences Questionnaire (LEQ)		
Total Maltreatment	26.85	32.50
Emotional Maltreatment	20.57	21.87
Sexual Maltreatment	2.51	9.89
Physical Maltreatment	4.46	7.76
Functional Assessment of Self-Mutilation (FASM), Total NSSI	17.03	76.03
Beck Depression Inventory (BDI-II)	10.47	10.40
Cognitive Style Questionnaire (CSQ)	162.52	51.40
Difficulties in Emotion Regulation Scale (DERS)	73.67	23.78
Barratt Impulsivity Scale (BIS-11)	68.53	9.80
Phase 2	<i>N</i> = 140	
UPPS	118	22
Personality Disorders Examination (PDE), Dimensional score for Borderline Personality Disorder	5.94	5.51

Table 3

Correlations between Study Variables

	1	2	3	4	5	6	7	8	9
1. NSSI	-								
2. LEQ	.256**	-							
3. CEA	.309**	.926**	-						
4. CSA	.051*	.621**	.410**	-					
5. CPA	.196**	.888**	.701**	.542**	-				
6. Abuse Forms	.271**	.616**	.607**	.435**	.629**	-			
7. DERS	.352**	.340**	.376**	.184**	.262**	.274**	-		
8. BIS	.166**	.193*	.203**	.084**	.161**	.139**	.398**	-	
9. UPPS ^a	.226*	.189**	.214*	.075	.137	.112	.445**	.566**	-
10. BART ^a	.09	-.004	.022	-.157	.002	-.050	-.045	-.046	.166
11. SA	.232**	.227**	.208**	.227**	.207**	.177**	.227**	.086**	.128
12. BDI-II	.281**	.387**	.383**	.254**	.329**	.301**	.643**	.307**	.353**
13. PDE ^a	.647**	.401**	.443**	.131	.290**	.299**	.526**	.155	.400**
14. CSQ	.254**	.220**	.279**	.081**	.177**	.216**	.488**	.233**	.259**

Note. ^a These measures were collected at Phase 2. Thus, $n = 140$ rather than 1,819. NSSI = Nonsuicidal Self-Injury; LEQ = Lifetime Experiences Questionnaire; CEA = Childhood Emotional Abuse; CSA = Childhood Sexual Abuse; CPA = Childhood Physical Abuse; Abuse Forms = Number of types of childhood abuse; DERS = Difficulties in Emotion Regulation Scale; BIS = Barratt Impulsiveness Scale; UPPS = Urgency, Premeditation, Perseverance, Sensation Seeking Scale; BART = Balloon Analogue Risk Taking Task; SA = History of Suicide Attempts; BDI-II = Beck Depression Inventory; PDE = Personality Disorders Examination; CSQ = Cognitive Style Questionnaire. ** $p < .01$, * $p < .05$.

Table 3. (continued)

	10	11	12	13
10. BART ^a	-			
11. SA	-.053	-		
12. BDI-II	.233**	.006	-	
13. PDE ^a	.230**	.549**	.1.04	-
14. CSQ	.123**	.467**	.478**	.034

Note. *** $p < .001$; ** $p < .01$, * $p < .05$; ^a These measures were collected at Phase 2. Thus, $N = 140$ rather than 1,819; Balloon Analogue Risk Taking Task; SA = History of Suicide Attempts; BDI-II = Beck Depression Inventory; PDE = Personality Disorders Examination; CSQ = Cognitive Style Questionnaire

Diagnostics for Assumptions of Linear Multiple Regression

Diagnostic analyses were conducted in order to test the assumptions necessary to perform linear multiple regression analyses using guidelines outlined by Field (2009). Many variables (overall maltreatment experiences, emotional maltreatment, physical abuse, sexual abuse, and NSSI) did not meet the assumption of normality necessary for regression analyses due to significant levels of skewness and/or kurtosis. As such, logarithmic transformations were performed, after which all variables, with the exception of childhood sexual abuse, approximated normal distributions. All subsequent results pertaining to these variables were derived using logarithmically transformed data with the exceptions of means and standard deviations reported in Table 2. Given the low base rate of childhood sexual abuse, this variable was highly positively skewed. Attempts to transform it to approach normality using log, square root, reciprocal and reverse score transformation were not successful. Thus, hypotheses involving childhood sexual abuse

were tested and reported both including and excluding this variable. Analyses including this variable must be interpreted with caution. Finally, although many predictor variables were significantly correlated (see Table 3), all tolerance and variance inflation factor (VIF) values were within normal limits with no indication of multicollinearity.

Relation between Demographics and Study Variables

The relations between gender, age, SES, and ethnicity and study variables were examined. Gender was significantly related to several variables. Specifically, female gender was associated with greater frequency of NSSI ($r = .10, p < .001$), negative cognitive style ($r = .06, p = .02$), history of suicide attempts ($r = .08, p = .001$), depression ($r = .09, p < .001$), and emotion dysregulation ($r = .06, p = .01$), whereas male gender was significantly associated with history of more frequent physical abuse ($r = -.10, p < .001$). Age was significantly correlated with both frequency of maltreatment experiences ($r = .09, p < .001$) as well as the number of types of maltreatment experienced (i.e., physical, sexual, and emotional maltreatment; $r = .08, p = .002$), with older age associated with greater frequency and number of types of maltreatment. Age was also significantly correlated with impulsivity as measured by the BIS-11 ($r = -.08, p = .001$) and UPPS ($r = -.33, p < .001$) such that younger age was associated with greater impulsivity. Finally, household income was significantly positively correlated with greater impulsivity as per the BIS-11 ($r = .10, p < .001$). In contrast, income was negatively associated with greater frequency of overall maltreatment experiences ($r = -.12, p < .001$), as well as emotional ($r = -.07, p = .02$), physical ($r = -.15, p < .001$), and sexual ($r = -.11, p < .001$) maltreatment individually such that greater income was

associated with fewer maltreatment events.

A dichotomous variable was created to indicate whether participants identified themselves as Caucasian or non-Caucasian. This variable was correlated with frequency and number of types of overall maltreatment experiences ($r = .09, p < .001$ and $r = .06, p = .01$, respectively) as well as physical ($r = .13, p < .001$) and sexual ($r = .10, p < .001$) abuse. This means that greater number of overall, sexual, and emotional maltreatment, as well as number of types of maltreatment experiences, were associated with being non-Caucasian. In contrast, NSSI ($r = -.12, p < .001$), cognitive style ($r = -.12, p < .001$), impulsivity as measured by the BIS-11 ($r = -.12, p < .001$), and emotion dysregulation ($r = -.05, p = .03$) were significantly associated with being Caucasian. Although there are conceptual problems with controlling for ethnicity (see Steinberg & Fletcher, 1998), in order to better clarify the associations between the main study variables, ethnicity, gender, and age were included as covariates in subsequent analyses.

Tests of Study Hypotheses

Hypothesis 1a

It was hypothesized that, consistent with previous research, history of childhood maltreatment would be associated with NSSI. To test this hypothesis, a hierarchical linear regression analysis was conducted controlling for gender, age, and ethnicity. In addition, to ensure that the results could not be accounted for by overlap between NSSI and suicidality, history of past suicide attempts was also included as a covariate. Finally, given that depressive symptomatology has been associated with risk for NSSI (e.g., Hankin & Abela, 2010; Klonsky et al., 2003), we also controlled for depressive

symptoms as assessed by the BDI-II. As hypothesized, childhood maltreatment experiences (i.e., the total number of childhood maltreatment events endorsed on the LEQ) significantly predicted number of NSSI incidents over and above history of suicide attempts and other covariates (see Table 4). History of suicide attempts, depressive symptoms, gender, and ethnicity were also significant predictors of NSSI in the model.

Table 4

Hypothesis #1a. Summary of Hierarchical Regression Analysis Assessing Relation Between Childhood Maltreatment Experiences and Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.14	.14	49.9***
History of Suicide Attempts	.49	.06	.18***			
Depressive Symptoms	.32	.03	.23***			
Gender	.066	.032	.048*			
Age	-.008	.005	-.039			
Ethnicity	-.202	.032	-.147***			
Step 2				.17	.03	64.64**
History of Suicide Attempts	.40	.06	.15***			
Depressive Symptoms	.22	.03	.16***			
Gender	.08	.03	.06**			
Age	-.01	.01	-.05*			
Ethnicity	-.22	.03	-.16***			
Maltreatment Experiences	1.02	.13	.20***			

* $p < .05$, ** $p < .01$, *** $p < .001$

Hypothesis 1b

In order to examine the unique relation of each form of maltreatment to NSSI, reported levels of childhood emotional, physical, and sexual maltreatment were entered into a regression equation simultaneously with frequency of NSSI as the criterion variable, controlling for gender, age, ethnicity, history of suicide attempts, and current depressive

symptoms. When all three forms of maltreatment were included as predictors, emotional maltreatment and sexual abuse significantly predicted frequency of NSSI over and above history of suicidality and other covariates (see Table 5). However, interestingly, sexual maltreatment was negatively associated with higher frequency of NSSI. As mentioned previously, given that sexual abuse was significantly positively skewed even after attempting to transform it, this variable does not satisfy the assumptions for conducting linear regression analyses. As such, results must be interpreted with caution. When removing sexual maltreatment experiences from the analysis, emotional abuse remained a significant predictor of NSSI, whereas physical abuse continued to fail to predict NSSI (see Table 6).

Table 5

Hypothesis #1b. Summary of Hierarchical Regression Analysis Assessing Relation Between Emotional, Sexual, and Physical Abuse and Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.14	.14	50.78***
History of Suicide Attempts	.49	.07	.18***			
Depressive Symptoms	.32	.03	.24***			
Gender	.07	.03	.05*			
Age	-.01	.01	-.04			
Ethnicity	-.20	.03	-.15***			
Step 2				.20	.06	36.03***
History of Suicide Attempts	.44	.07	.17***			
Depressive Symptoms	.22	.03	.16***			
Gender	.06	.03	.06**			
Age	-.01	.01	-.05*			
Ethnicity	-.20	.03	-.15***			
Emotional Abuse	.92	.12	.24***			
Physical Abuse	.23	.16	.05			
Sexual Abuse	-.83	.20	-.11***			

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 6

Hypothesis #1b. Summary of Hierarchical Regression Analysis Assessing Relation between Emotional and Physical Abuse and Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.14	.14	50.59***
History of Suicide Attempts	.49	.07	.18***			
Depressive Symptoms	.32	.03	.24***			
Gender	.07	.03	.05*			
Age	-.01	.01	-.04			
Ethnicity	-.20	.03	-.15***			
Step 2				.19	.05	45.70***
History of Suicide Attempts	.41	.06	.15***			
Depressive Symptoms	.21	.03	.15***			
Gender	.07	.03	.05*			
Age	-.01	.01	-.05*			
Ethnicity	-.21	.03	-.15***			
Emotional Abuse	.88	.12	.23***			
Physical Abuse	.037	.15	.01			

* $p < .05$, ** $p < .01$, *** $p < .001$

Hypothesis #2

We hypothesized that the number of forms of maltreatment experienced would be associated with frequency of NSSI, such that exposure to a greater number of forms of maltreatment would predict greater frequency of NSSI than exposure to one form of maltreatment. Frequency of maltreatment experiences was included as a covariate in addition to demographic variables, depressive symptoms, and history of suicide attempts to control for the possibility that any observed relation between number of forms of abuse and NSSI is a function of having experienced a greater number of abuse events. Indeed, as expected, the number of forms of maltreatment experienced predicted the frequency of NSSI (see Table 7). That is, greater number of types of maltreatment was associated with

greater frequency of NSSI, even when controlling for total number of maltreatment events and other covariates.

Table 7

Hypothesis #2. Summary of Hierarchical Regression Analysis Assessing Relation between Number of Forms of Maltreatment and Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.14	.14	49.91***
History of Suicide Attempts	.49	.07	.18***			
Depressive Symptoms	.32	.03	.23***			
Gender	.07	.03	.05*			
Age	-.01	.01	-.04			
Ethnicity	-.20	.03	-.15***			
Step 2				.17	.03	64.64***
History of Suicide Attempts	.41	.06	.15***			
Depressive Symptoms	.22	.03	.16***			
Gender	.08	.03	.06**			
Age	-.01	.01	-.05*			
Ethnicity	.22	.03	-.16***			
Total Maltreatment	1.02	.13	.20***			
Step 3				.18	.01	21.91***
History of Suicide Attempts	.40	.06	.15***			
Depressive Symptoms	.21	.03	.16***			
Gender	.08	.03	.06*			
Age	-.01	.01	-.06*			
Ethnicity	-.23	.03	-.17***			
Total Maltreatment	.59	.16	.12***			
Forms of Maltreatment	.10	.02	.14***			

* $p < .05$, ** $p < .01$, *** $p < .001$

Hypothesis #3

Baron and Kenny's (1986) four-step test of mediation was used to assess whether emotion dysregulation, measured by the total DERS score, mediated the relation between frequency of childhood maltreatment events and NSSI. Step 1 indicated that childhood maltreatment was positively correlated with NSSI (this was also examined as part of Hypothesis 1 above). Step 2 revealed that childhood maltreatment was significantly correlated with emotion dysregulation. Step 3 indicated that emotion dysregulation predicted NSSI when controlling for maltreatment (i.e., emotion dysregulation and childhood maltreatment were entered in a single step to predict NSSI). Finally, when emotion dysregulation was entered into the equation, the association between childhood maltreatment and NSSI remained significant but was attenuated, suggesting potential partial mediation. A follow-up Sobel test confirmed that the presence of emotion dysregulation was associated with a significant reduction of the effects of childhood maltreatment experiences on the occurrence of NSSI (*Sobel Statistic* = 5.52, $p < .001$). This confirms that emotion dysregulation partially mediated the relation between childhood maltreatment and NSSI. A path diagram with regression coefficients is represented in Figure 1.

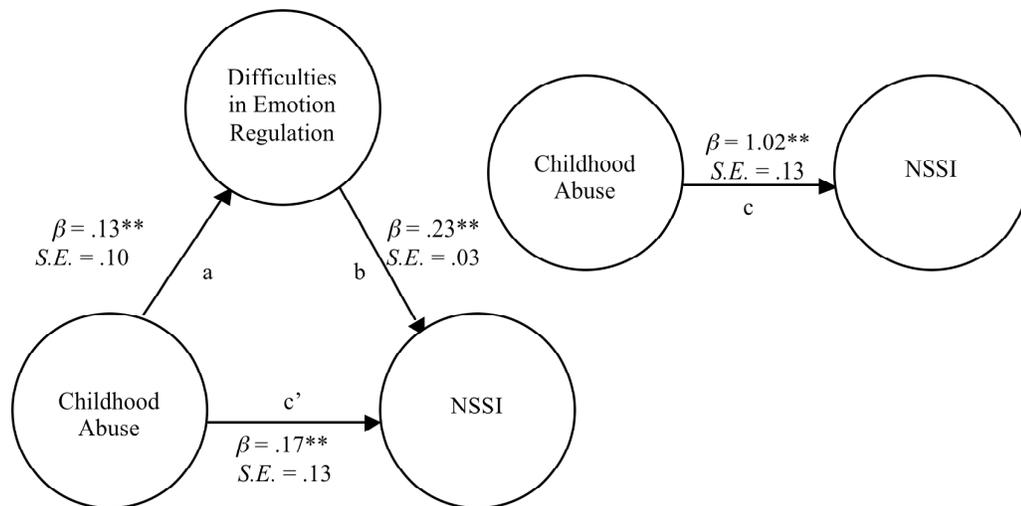


Figure 1. Hypothesis 3. Mediation Model of the Role of Difficulties in Emotion Regulation in the Relationship between Childhood Maltreatment Experiences and Nonsuicidal Self-Injury

Note. S.E. = Standard Error; NSSI = Nonsuicidal Self-Injury. $**p < .001$.

Hypothesis #4

Hypothesis 4a. We hypothesized that, controlling for other forms of maltreatment, emotional maltreatment would be associated with negative cognitive style. In order to determine if emotional maltreatment uniquely predicted negative cognitive style, a hierarchical regression analysis was conducted in which physical and sexual abuse were entered simultaneously in Step 1 and emotional abuse was entered in Step 2 to predict negative cognitive style. Consistent with our hypothesis, emotional maltreatment

significantly predicted NSSI even when controlling for the effects of other forms of abuse and other covariates.¹

Hypothesis 4b. Baron and Kenny's (1986) four step test of mediation was used to assess whether negative cognitive style, measured by the total CSQ score, mediated the relation between frequency of childhood emotional maltreatment events and NSSI. Step 1 indicated that emotional maltreatment significantly predicted NSSI, also determined in Hypothesis 4a above. Step 2 confirmed that emotional maltreatment significantly predicted negative cognitive style. In Step 3, emotional maltreatment and cognitive style were entered in a single step and significantly predicted NSSI. In Step 4, emotional maltreatment was entered into the model first, followed by CSQ, to predict NSSI. The strength of the emotional maltreatment - NSSI relation was attenuated, suggesting potential partial mediation. The Sobel Test (*Sobel Statistic* = 6.17, $p < .001$) confirmed the significance of negative cognitive style as a partial mediator of the relationship between emotional abuse and NSSI. A path diagram with regression coefficients is represented in Figure 2.

¹ Given that the sexual abuse variable did not meet assumptions of normality required for regression analyses, analyses were repeated with this variable removed. Results were unchanged, as emotional maltreatment continued to significantly predict negative cognitive style above and beyond the effects of physical abuse and other covariates.

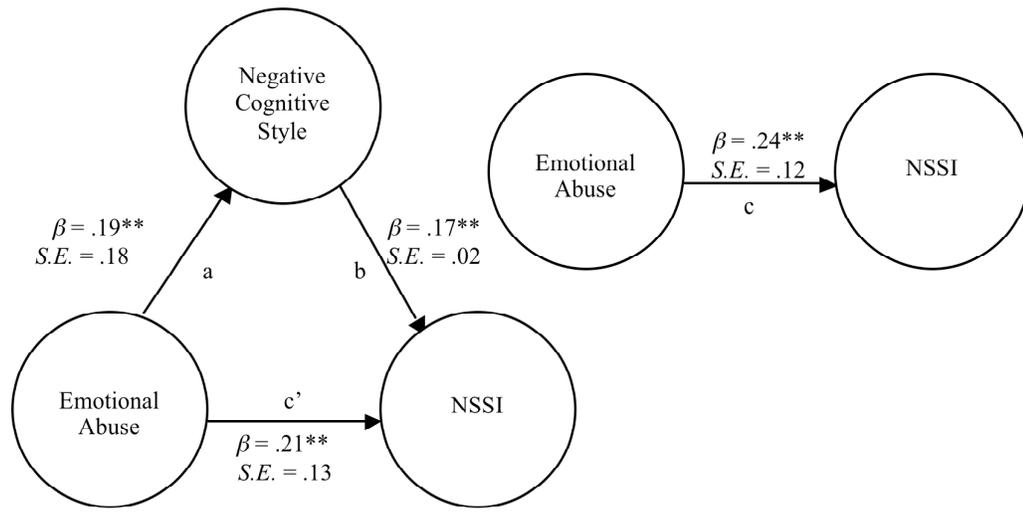


Figure 2. Hypothesis 4. Mediation Model of the Role of Negative Cognitive Style in the Relationship between Emotional Maltreatment Experiences and Nonsuicidal Self-

Note. S.E. = Standard Error; NSSI = Nonsuicidal Self-Injury. $**p < .001$.

Hypothesis #5

We hypothesized that impulsivity would moderate the relation between childhood maltreatment and NSSI. A series of hierarchical regression analyses were conducted to test the interaction between childhood maltreatment experiences (i.e., frequency of childhood maltreatment events as per LEQ) and impulsivity in predicting NSSI. First, childhood maltreatment experiences and the BIS-11 were entered into the regression equation simultaneously to assess for main effects. Next, the two-way interaction between the BIS-11 and childhood maltreatment experiences was entered. Although the BIS-11 significantly predicted NSSI, the interaction effect was non-significant (see Table

8). When the same analyses were conducted using the Total UPPS as a measure of impulsivity, neither main effects nor the interaction effect were significant (see Table 9). When the individual UPPS scales were examined independently, only the urgency scale significantly predicted NSSI ($\beta = .26, p = .01$). However, when controlling for depression, suicidality, and demographic variables, urgency was no longer a significant predictor ($\beta = .12, p = .22$). Moreover, the interaction between urgency and childhood maltreatment experiences did not significantly predict NSSI ($\beta = .49, p = .15$). Finally, the same analyses were conducted a third time using the BART behavioral task as a measure of impulsivity. The average number of pumps per balloon, excluding explosions, was not significantly correlated with NSSI (see Table 10). Similarly, the interaction between the BART and childhood maltreatment experiences was not significant in predicting NSSI. Taken together, these results suggest that impulsivity did not moderate the relation between childhood maltreatment experiences and NSSI.

Hypothesis #6

We expected that, controlling for history of depression and current depressive symptoms, features of BPD (not including the BPD criterion of self-harm) would significantly predict NSSI. In order to test this hypothesis, a hierarchical linear regression analysis was performed, indicating that borderline features did, indeed, predict NSSI above and beyond the effects of history of depressive episodes and other covariates (see Table 11). Note that history of depression also initially predicted NSSI. However, once BPD features was added to the equation, history of depression was no longer a significant predictor of NSSI.

Table 8

Hypothesis #5. Summary of Hierarchical Regression Analysis Assessing the Interaction Between Childhood Maltreatment Experiences and Barratt Impulsiveness Scale in Predicting Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.14	.14	49.91***
History of Suicide Attempts	.49	.07	.18***			
Depressive Symptoms	.32	.03	.23***			
Gender	.07	.03	.05*			
Age	-.01	.01	-.04			
Ethnicity	-.20	.03	-.15***			
Step 2				.14	.003	6.01*
History of Suicide Attempts	.48	.07	.18***			
Depressive Symptoms	.29	.03	.22***			
Gender	.08	.03	.05*			
Age	-.01	.01	-.03			
Ethnicity	-.19	.03	-.14***			
Barratt Impulsivity Scale	.13	.05	.06*			
Step 3				.17	.03	61.19***
History of Suicide Attempts	.40	.06	.15***			
Depressive Symptoms	.21	.04	.15***			
Gender	.09	.03	.06**			
Age	-.01	.01	-.05*			
Ethnicity	-.22	.03	-.16***			
Barratt Impulsivity Scale	.06	.05	.04			
Maltreatment Experiences	.10	.13	.20***			
Step 4				.17	<.001	.39
History of Suicide Attempts	.41	.06	.15***			
Depressive Symptoms	.21	.04	.15***			
Gender	.09	.03	.06**			
Age	-.01	.01	-.05*			
Ethnicity	-.22	.03	-.16***			
Barratt Impulsivity Scale	.11	.07	.06			
Maltreatment Experiences	1.51	.83	.30			
Maltreatment X Barratt	-.22	.35	-.12			

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 9

Hypothesis #5. Summary of Hierarchical Regression Analysis Assessing the Interaction between Childhood Maltreatment Events and UPPS in Predicting Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.15	.15	3.87**
History of Suicide Attempts	.31	.23	.13			
Depressive Symptoms	.46	.13	.32**			
Gender	.11	.15	.32			
Age	.02	.03	.05			
Ethnicity	-.16	.15	-.10			
Step 2				.16	.01	.98
History of Suicide Attempts	.28	.23	.12			
Depressive Symptoms	.42	.14	.29**			
Gender	.11	.15	.07			
Age	.03	.04	.08			
Ethnicity	-.16	.15	-.09			
UPPS	.16	.16	.10			
Step 3				.24	.08	11.86**
History of Suicide Attempts	.16	.22	.06			
Depressive Symptoms	.30	.14	.20*			
Gender	.17	.14	.10			
Age	.01	.03	.03			
Ethnicity	-.22	.14	-.13			
UPPS	.10	.15	.06			
Maltreatment Experiences	2.00	.57	.32**			
Step 4				.25	.01	1.35
History of Suicide Attempts	.19	.22	.08			
Depressive Symptoms	.30	.14	.21*			
Gender	.17	.14	.10			
Age	.004	.04	.01			
Ethnicity	-.20	.14	-.12			
UPPS	.31	.24	.19			
Maltreatment Experiences	5.50	3.10	.89			
Maltreatment X UPPS	-1.31	1.13	-.62			

Note. UPPS = Urgency, Premeditation, Perseverance, and Sensation Seeking Impulsiveness Behavior Scale. * $p < .05$, ** $p < .01$, *** $p < .001$. The UPPS was collected at Phase 2. Thus, $n = 140$ rather than 1,819

Table 10

Hypothesis #5. Summary of Hierarchical Regression Analysis Assessing the Interaction between Childhood Maltreatment Events and BART in Predicting Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.15	.16	3.74
History of Suicide Attempts	.23	.22	.09			
Depressive Symptoms	.48	.13	.34***			
Gender	.09	.15	.06			
Age	.02	.04	.05			
Ethnicity	-.01	.15	-.06			
Step 2				.17	.02	2.87
History of Suicide Attempts	.20	.22	.08			
Depressive Symptoms	.50	.13	.36***			
Gender	.13	.15	.08			
Age	.03	.04	.08			
Ethnicity	-.07	.15	-.04			
BART	.01	.01	.15			
Step 3				.24	.07	10.89
History of Suicide Attempts	.09	.21	.04			
Depressive Symptoms	.37	.13	.26**			
Gender	.22	.14	.13			
Age	.02	.03	.06			
Ethnicity	-.13	.14	-.08			
BART	.01	.01	.16			
Maltreatment Experiences	1.8	.55	.31			
Step 4				.24	.00	.018
History of Suicide Attempts	.09	.04	.04			
Depressive Symptoms	.36	.26	.26**			
Gender	.22	.13	.13			
Age	.02	.06	.06			
Ethnicity	-.13	-.08	-.08			
BART	.01	.15	.15			
Maltreatment Experiences	1.67	.28	.28			
Maltreatment X BART	.005	.93	.03			

Note. BART = Balloon Analogue Risk Taking Task; * $p < .05$, ** $p < .01$, *** $p < .001$. BART data were collected at Phase 2. Thus, $n = 140$ rather than 1,819

Table 11

Hypothesis #6. Summary of Hierarchical Regression Analysis Assessing Relation between Borderline Personality Dimensional Scores and Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.26	.26	7.83***
History of Depression	.39	.08	.41***			
Depressive Symptoms	.24	.14	.16			
Gender	.15	.15	.09			
Age	-.003	.03	-.09			
Ethnicity	-.13	.15	-.07			
Step 2				.42	.16	29.20***
History of Depression	.06	.09	.06			
Depressive Symptoms	-.06	.13	-.04			
Gender	.15	.13	.09			
Age	.003	.03	.01			
Ethnicity	-.23	.13	-.13			
BPD Dimensional Score	.09	.02	.61***			

* $p < .05$, ** $p < .01$, *** $p < .001$. BPD was assessed at Phase 2. Thus, $n = 140$ rather than 1,819.

Hypothesis #7

It was expected that, of the diagnostic criteria for BPD (excluding the criterion pertaining to self-harm), impulsivity and affective instability would have the strongest association with NSSI. In order to test this hypothesis, the following BPD criteria were entered into a regression equation to predict NSSI controlling for depressive symptoms: affective instability; emptiness; identity disturbance; dissociation/paranoid ideation; abandonment; impulsivity; unstable relationships; and experiences of anger. Of these criteria, only emptiness, dissociation, and impulsivity significantly predicted NSSI (see Table 12).

Table 12

Hypothesis #7. Summary of Hierarchical Regression Analysis Assessing the Relation between Specific Borderline Personality Disorder Criteria and Nonsuicidal Self-Injury

Step and predictor variables	<i>B</i>	<i>SEB</i>	β	R^2	ΔR^2	ΔF
Step 1				.16	.16	23.45***
Depressive Symptoms	.59	.12	.40***			
Step 2				.41	.25	5.99***
Depressive Symptoms	.08	.14	.06			
Identity Disturbance	-.12	.22	-.05			
Impulsivity	.34	.16	.18*			
Unstable Relationships	-.26	.19	-.13			
Emptiness	.79	.19	.39**			
Abandonment	.24	.17	.11			
Affective Instability	.15	.16	.08			
Anger	-.01	.17	-.01			
Dissociative Experiences	.59	.18	.17**			

* $p < .05$, ** $p < .01$, *** $p < .001$. BPD was assessed at Phase 2. Thus, $n = 140$ rather than 1,819.

CHAPTER 4

DISCUSSION

NSSI has come to be recognized as a widespread and pervasive public health problem, occurring at surprisingly high rates in both clinical and nonclinical samples. As such, increasing attention has been paid to gaining a more complete understanding of the phenomenology of this class of behaviors. However, as research in this area is still in its nascent stages of development, there is a paucity of knowledge regarding the risk factors and diagnostic correlates of NSSI. Moreover, much of the extant literature has provided merely descriptive data and has been hampered by methodological limitations.

Although some research has suggested that childhood maltreatment experiences confer risk for NSSI, little is known about the unique contribution of each form of maltreatment to the development of self-harming behaviors. Still less is known about the potential mechanisms at play in the relationship between childhood abuse and NSSI. In addition, although much research has focused on the association between BPD and NSSI in clinical populations, little work has examined this relationship in nonclinical samples. Given this, further research is needed in order to elucidate the association between specific borderline criteria and NSSI in nonclinical samples. This study aimed to build upon the extant research by examining potential risk factors, pathways, and diagnostic correlates of NSSI. This section will briefly highlight the study's results, review the strengths, limitations, and clinical implications of the study, as well as provide suggestions for areas of future research.

Summary of Hypotheses and Results

Replicating findings from a previous urban university-based sample (Gratz et al., 2002), the present study found that 37% of participants reported a history of NSSI, the majority of whom reported harming themselves more than once and via multiple forms of self-injury. The most common form of NSSI was picking a wound, followed by biting oneself, and picking one's skin to the point of drawing blood. Although more severe forms of NSSI were less commonly endorsed, cutting and burning oneself were still relatively frequently reported in 7% and 8% of the sample, respectively. Thus, it is apparent that NSSI, in both more mild and severe forms, was common in the present sample.² Consistent with previous studies, the mean reported age of onset of NSSI was 13.

Childhood Abuse as a Risk Factor for Nonsuicidal Self-Injury

As expected, childhood maltreatment emerged as a significant predictor of NSSI even after taking into account the influence of history of suicide attempts, depressive symptoms, and demographic variables. These results are consistent with both the theoretical (Linehan, 1993) and empirical (e.g., Boudewyn & Liem, 1995; Gratz et al., 2002) literature, and suggest the importance of further investigating the mechanisms by which maltreatment leads to NSSI. It was also hypothesized that childhood sexual, physical, and emotional abuse would each uniquely predict NSSI. In this study, emotional maltreatment was, indeed, a significant predictor of NSSI, whereas physical

² Additional analyses focused on cutting and excluding other forms of NSSI indicated that childhood maltreatment experiences significantly predicted self-reported cutting.

abuse was not. Previous research examining the role of physical abuse in the development of NSSI has yielded equivocal results with some studies finding evidence for the physical abuse - NSSI association and others not. This study now adds to the body of literature suggesting that emotional maltreatment, in contrast to physical abuse, may uniquely confer risk for NSSI.

Given that this study's childhood sexual abuse variable was highly positively skewed even after attempting multiple transformations, data pertaining to the unique contribution of sexual abuse to the development of NSSI should be interpreted with caution. Surprisingly, when including emotional and physical abuse as predictors in the model, sexual abuse was significantly negatively associated with NSSI.³ Although Klonsky and Moyer's (2008) meta-analysis called into question the etiological link between childhood sexual abuse and NSSI, to our knowledge, no studies have suggested that sexual abuse may serve as a buffer against the development of NSSI. Despite the fact that none of the variables of interest evidenced multicollinearity based on VIF, it is possible that the negative B weight of childhood sexual abuse when all three forms of abuse were included in the regression analysis is attributable to a suppressor effect (for more details regarding suppressor effects, see Cohen & Cohen, 1983; Tzelgov & Henik, 1991). This possibility is more likely given that the sexual abuse was positively associated with NSSI when it was the sole childhood abuse predictor.

³ Sexual abuse evidenced a significant, positive association with NSSI when examined as the sole predictor ($F = 4.196, p = .04$).

Although previous research has provided evidence for an association between exposure to multiple types of abuse and a wide range of negative adjustment problems in adulthood (see Higgins & McCabe, 2000, 2001 for review), to our knowledge, this study was the first to address the cumulative effect of multiple forms of abuse on the occurrence of NSSI. Results suggested that the number of forms of maltreatment is associated with greater frequency of NSSI beyond what is accounted for by the total number of abuse incidents. This finding may have important clinical implications. Higgins and McCabe (2000) suggest that children who have suffered multiple forms of maltreatment would likely benefit from early intervention to minimize the negative sequelae of experiencing multiple forms of maltreatment. Further research is needed in order to determine the mechanisms that may explain this relationship between number of forms of abuse and NSSI.

Mediators and Moderator of the Childhood Maltreatment-NSSI relation

Consistent with our hypothesis, emotion dysregulation partially mediated the relationship between childhood maltreatment experiences and NSSI. This finding is also consistent with the theoretical literature; most notably, Linehan's (1993) biosocial theory asserts that an invalidating environment in childhood can arrest the development of effective emotion regulation skills, which can lead to the development of NSSI as a strategy to regulate one's emotions in the absence of more adaptive emotion regulation techniques. Of note, although this finding is consistent with the theoretical literature, it differs from Gratz and Roemer's (2004) findings in which the total DERS score did not mediate or partially mediate the relation between childhood maltreatment and NSSI.

Empirical support for the mediating role of emotion dysregulation in the relationship between childhood maltreatment and NSSI has important clinical implications. Specifically, given that children who experience childhood maltreatment appear to be at greater risk for developing difficulties with emotion regulation, early implementation of evidence-based treatments that focus on teaching emotion regulation skills (e.g., dialectical behavior therapy; Linehan, 1993) may prove to be an important strategy for preventing NSSI in children at risk.

Also consistent with our hypothesis, negative cognitive style significantly partially mediated the relationship between childhood emotional maltreatment experiences and NSSI. Importantly, this effect remained significant above and beyond that accounted for by depressive symptoms, suicide attempts, and demographic covariates. In other words, these findings suggest that individuals who have experienced childhood emotional maltreatment may be at greater risk of developing a cognitive style in which they interpret negative life events as due to internal, global, and stable causes, which confers risk not only for depression, a robust finding in the extant literature, but also for maladaptive coping behaviors when faced with overwhelming negative affect.

In contrast, none of the three measures of impulsivity moderated the relationship between childhood maltreatment and NSSI. One potential explanation for these null results is that individuals who engage in NSSI may only be impulsive in certain contexts. Specifically, given the role of emotion regulation in NSSI behaviors, it is possible that individuals who self-injure may only behave impulsively when emotionally distressed (i.e., impulsivity may be state rather than trait related). In order to test this hypothesis,

future research would benefit from administering behavioral measures of impulsivity either during or after a laboratory manipulation to induce emotional distress. Relatedly, it is not surprising that the urgency scale of the UPPS, which assesses the tendency to engage in rash behaviors in the face of negative emotional states, was the only scale to significantly predict NSSI (although it was no longer significant after controlling for depression and history of suicide attempts).

Another potential explanation for null results with regard to the moderating role of impulsivity in the relation between childhood maltreatment and NSSI is that, given the reinforcing nature of NSSI (e.g., through emotion regulation or social reinforcement), individuals who self-injure may not want to resist the urge to self-injure. Thus, although they may have the ability to refrain from acting impulsively, they may choose to self-injure because the reward resulting from engaging in the behavior is sufficiently reinforcing.

Unfortunately, the UPPS was inadvertently not included in the Phase 1 online battery of questionnaires and was thus administered during Phase 2 instead. Given that Phase 2 consisted of a substantially smaller sample than Phase 1, the power to detect significant effects was lower for the UPPS than the BIS-11. The BART was also administered to a smaller number of participants due to the fact that the behavioral task had to be completed in the laboratory. Nonetheless, power analyses suggest that the sample size should have been sufficient to detect significant effects.

Insofar as emotion dysregulation and negative cognitive style only partially mediated the association between childhood maltreatment experiences and NSSI, and

impulsivity failed to moderate this relation, it is important to consider other potential mediators and moderators. Given that the BPD criteria of dissociation and emptiness both significantly predicted NSSI in this study, it is possible that one or both of these constructs may mediate the relation between maltreatment and NSSI. A burgeoning body of research has implicated dissociation in the etiology of NSSI (Gratz et al., 2002). Similarly, numerous studies have supported a relationship between childhood maltreatment and dissociation in both clinical (See Zanarini & Jager-Hyman, 2009 for a review) and non-clinical (e.g. Briere & Runtz, 1988; Yates et al., 2008) samples. Specifically, childhood maltreatment experiences have been hypothesized to disrupt cognitive and developmental processing, at times resulting in dissociative experiences (e.g., Putnam, 1997). It is possible that individuals who have experienced childhood maltreatment and subsequent tendencies to dissociate may in turn engage in self-harm as a “grounding” technique in response to dissociative states. Despite the support garnered for individual links of this model, researchers have yet to examine the ability of dissociation to account for the relationship between childhood maltreatment experiences and dissociation. Further, to our knowledge, no study has examined the potential mediating role of emptiness in the association between childhood maltreatment and NSSI.

Another potential variable that may play an important role in the relationship between childhood maltreatment experiences and NSSI is the construct of emotion awareness, which refers to the ability to recognize, label, describe, and differentiate one’s emotional experiences. Recent research (e.g., Paivio & McCulloch, 2004; Polk & Liss,

2007) has suggested that the inability to verbally express negative affect may interact with abuse experiences to predict NSSI. This suggests that NSSI may function as a mechanism to express negative emotional experiences for individuals who have difficulty expressing emotions verbally. Future research would benefit from empirically evaluating emotion awareness as a potential moderator of the relationship between childhood maltreatment and NSSI.

Borderline Personality Disorder and NSSI

As expected, when excluding the criterion of self-harm, dimensional scores of BPD significantly predicted NSSI. The exclusion of the self-harm criterion ensures that the relationship between BPD and NSSI is not artificially inflated. Although relatively few participants met criteria for BPD (11% of the overall group; 23% of those who self-injured), the significant relationship between dimensional scores of BPD and NSSI suggests the importance of intervening with effective treatments even when individuals do not meet full criteria for BPD.

As hypothesized, impulsivity as assessed by the PDE did significantly predict NSSI. However, inconsistent with our hypotheses, affective instability did not significantly predict self-injury. Affective instability refers to a marked emotional reactivity that tends to last for only a few hours. This result is especially surprising given that emotion dysregulation significantly predicted NSSI. In contrast, both emptiness and dissociation were significantly associated with NSSI. As mentioned previously, the relationship between dissociation and NSSI has been supported in prior research (Gratz et al., 2002; Zlotnick et al., 1996). Although, to our knowledge, little research has

specifically examined the role of emptiness in relation to NSSI, an emerging body of literature investigating the putative functions of NSSI asserts that one of the functions of NSSI may be automatic positive reinforcement. This suggests that some individuals may engage in self-harming behaviors in order to generate feeling or sensation (i.e., to feel “something” rather than nothing or emptiness).

Strengths and Limitations

The present study had several strengths. First, the large sample size allowed for detection of both larger and more subtle effects. In addition to being large, the sample was also relatively diverse. Third, although college samples are often used for convenience, it is both appropriate and necessary to study NSSI in this population. Prior research focused on NSSI in clinical samples is important and informative; however, there are notable differences between clinical and college samples that might preclude generalization between these populations. As recent data (including those from this study) indicate, NSSI is increasingly common in college samples, and it is therefore important to investigate NSSI in this population. Fourth, our statistical control for history of suicide attempts, depressive symptoms, demographic variables, and in some cases, history of depression and number of maltreatment events, provided particularly conservative tests of our hypotheses. For example, by including relevant covariates, we confirmed that the observed association between childhood maltreatment and NSSI could not be better accounted for as simply an artifact of depression or history of suicidality. Fifth, the use of structured interviews in assessing BPD allowed for rigorous and accurate diagnosis of the disorder both categorically and dimensionally.

Another strength of this study is that it focused on the frequency of NSSI rather than using a dichotomous variable indicating the presence or absence of NSSI.

Individuals who have harmed themselves once or twice likely differ significantly from those who engage in repetitive NSSI. Examining of frequency of NSSI provides more detailed information about this phenomenon and increases the likelihood of identifying clinically significant risk factors (Gratz et al., 2002).

Despite the strengths of the current study, it is also characterized by several limitations, which may point to possible directions for future research. An important limitation is the reliance on retrospective self-reports of childhood abuse experiences and NSSI. Despite the use of well-validated measures, it is possible that recall or response biases may have occurred, particularly in the reporting of early abuse experiences given that they took place several years prior to participation in the study. Although interview measures are generally considered to be the gold standard, it is likely that interviews investigating childhood maltreatment experiences would be similarly vulnerable to these biases. Furthermore, prior research has indicated that the LEQ is highly correlated with interview measures of childhood maltreatment experiences (Gibb et al., 2001b). Finally, the LEQ was designed to assess occurrence of specific instances of childhood maltreatment as opposed to global recall of maltreatment in attempt to minimize recall biases (Gibb et al., 2001b).

With regard to the FASM, one potential limitation is that, although the measure clearly states that participants should only endorse self-injury that was inflicted with intent to harm oneself, it is possible that some participants overlooked these instructions

and endorsed injuries that occurred in the absence of intent to cause pain (e.g., by accident). This might be especially true for more commonly endorsed self-harming behaviors, such as preventing a wound to heal or biting oneself. As such, future studies would benefit from the inclusion of an interview-based assessment of NSSI (e.g., Self-Injurious Thoughts and Behaviors Interview; Nock, Holmberg, Photos, & Michel, 2007) to allow for follow-up probing to clarify intent to inflict pain or harm. However, it is important to note that, given the experience of shame often correlated with NSSI (Lynch & Cozza, 2009), participants may actually be more likely to honestly endorse NSSI on self-report questionnaires rather than clinical interviews because of the feeling of anonymity.

In addition to the use of self-report questionnaires to assess experiences of childhood maltreatment and NSSI, this study also relied on self-report measures of emotional and cognitive experiences, such as emotional dysregulation, cognitive style, and impulsivity, with the exception of a behavioral impulsivity task. It is likely that some participants lack awareness of their emotional and cognitive responses, limiting the extent to which they could accurately report and explain cognitive and emotional processes underlying their behavior (Janis & Nock, 2009). Thus, assessing emotional and cognitive processes through multiple methods, such as interviews and behavioral tasks, may have provided clearer and more accurate data.

Although the use of structured interviews for BPD and depression is a strength of this study, NSSI has been associated with a wider variety of psychopathology, including symptoms of anxiety (Andover et al., 2005; Klonsky et al., 2003), posttraumatic stress

disorder (Weierich & Nock, 2008), avoidant personality disorders (Nock et al., 2006), substance use disorders (Nock et al., 2006), and eating disorders (e.g., Anderson, Carter, McIntosh, Joyce, & Bulik, 2002; Favaro & Santonastaso, 2002). Future research should further explore other diagnostic correlates of NSSI in nonclinical samples. In addition, all of the clinical interviews were administered by the same interviewer and inter-rater reliability was not obtained. Although the interviewer was trained in the administration of these assessments, lack of reliability must be acknowledged as a significant limitation of this study.

Another limitation of this study is its cross-sectional design. Although some subjects participated in two phases of the study, their data were not treated prospectively. Thus, temporal relationships between potential risk factors and NSSI are unclear and causal conclusions cannot be drawn. For example, emotional dysregulation may increase the likelihood of NSSI, or engagement in NSSI may dispose individuals to view themselves as having difficulty regulating their emotions. Longitudinal designs are needed to truly determine distal and proximal factors contributing to the etiology and maintenance of self-injurious behaviors.

An additional limitation of this study is that a potential selection bias may have been introduced into the sample during recruitment. In the interest of informed consent and to ensure that participants were aware of the sensitive nature of some of the questions addressed in this study, participants were informed that the study was an investigation of NSSI. As such, it is possible that individuals with a history of NSSI may have been more likely to participate in this study. Unfortunately, it is impossible to determine whether

individuals who decided not to participate in this study significantly differed from those who participated. Of note, those who participated in Phase 1 did not significantly differ from those who participated in Phase 2 with regard to demographic factors.

A final, albeit important, limitation is that although this study yielded several significant, interesting, and potentially important findings related to potential risk factors and moderators of NSSI, the majority of the variance in frequency of NSSI was not accounted for by the models examined. This suggests that, although childhood maltreatment experiences may be one risk factor for NSSI, it provides only a partial explanation of the pathways to the development of self-injurious behaviors. Thus, it is important that future research continues to examine additional potential factors that may confer risk for NSSI.

Conclusion and Clinical Implications

Results from the present study have important clinical implications. First, findings are consistent with past research suggesting that childhood abuse confers risk for NSSI. In particular, childhood emotional maltreatment appears to uniquely predict NSSI. Past research has tended to overlook this form of maltreatment and has instead focused on physical and sexual abuse, partly stemming from the belief that these forms of maltreatment lead to the most deleterious outcomes. However, the present results lend support to the notion that even more subtle forms of maltreatment can have a significant damaging impact on emotional well-being. In addition, this study's findings suggest that both negative cognitive style and emotion dysregulation may play important roles in the relationship between childhood maltreatment and NSSI. Taken together, these results

suggest that it may be beneficial to target at-risk children who experienced abuse and implement treatment strategies designed to improve emotion regulation skills and/or challenge negative attributional styles in an effort to prevent the development of NSSI. For example, cognitive interventions focused on altering negative cognitive style would likely attenuate the impulse to self-punish through NSSI. Similarly, treatments focused on improving emotion regulation skills would enable individuals who experienced an invalidating environment and have difficulty navigating emotionally demanding situations to learn more adaptive coping skills in place of self-injuring. Focus on implementing distress tolerance skills seems especially important for individuals with a propensity for NSSI given that results from this study suggest that individuals who engage in NSSI may engage in impulsive behaviors only when distressed.

In addition, this study yielded interesting findings with regard to the relationship between borderline personality disorder and NSSI. Specifically, BPD dimensional scores were associated with NSSI. These findings suggest that individuals who evidence some borderline features but do not necessarily meet criteria for the diagnosis may be at risk of engaging in NSSI. Moreover, of the eight BPD criteria other than self-harming behaviors, only impulsivity, dissociation, and emotion regulation were significantly associated with NSSI. Addressing impulsivity, dissociation, and/or emptiness in therapy may prove to be an effective approach to preventing or reducing self-injuring behaviors.

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