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Affect and State Dysregulation as Moderators of the Relationship Between Childhood Sexual Abuse and Nonsuicidal Self-injury

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Abstract

Nonsuicidal self-injury (NSSI) is a significant problem in both clinical and non-clinical populations. Affect and state dysregulation are frequently observed in survivors of childhood sexual abuse and in those who engage in NSSI. Both have been found to predict NSSI, and affect regulation has also been modeled as a mediator of NSSI. This study extends present research by modeling both affect and state dysregulation as moderators of NSSI. The findings are discussed as an extension of the tension reduction theory and within a conceptualization of posttraumatic stress disorder (PTSD) as an asymmetry of the approach-avoidance neurophysiological system.

Keywords

childhood sexual abuse, dissociation, posttraumatic stress disorder (PTSD), nonsuicidal self-injury (NSSI), attachment

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Introduction

Nonsuicidal self-injury (NSSI), the act of intentionally harming oneself without intent to die, is a serious public health concern (Briere & Gil, 1998; Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; van der Kolk, Perry, & Herman, 1991). According to Klonsky, Oltmanns, and Turkheimer (2003), approximately 4% of the population engages in NSSI.

For many years, researchers have attempted to understand why individuals engage in NSSI, and various theories and hypotheses have emerged (Batey, May, & Andrade, 2010; Dubo, Zanarini, Lewis, & Williams, 1997; Nijman et al., 1999; Suyemoto & MacDonald, 1995). Three of these—childhood maltreatment as a predictor of NSSI, attachment as a predictor of NSSI, and tension reduction theory—are germane to this article. Studies have now clearly established that childhood maltreatment (Favazza & Conterio, 1988; Suyemoto & MacDonald, 1995), especially childhood sexual abuse (CSA; Briere & Gil, 1998; Brodsky, Cloitre, & Dulit, 1995; Glassman et al., 2007; Lipschitz et al., 1999; Shenk, Noll, & Cassarly, 2010; van der Kolk et al., 1991; Yates, Carlson, & Egeland, 2008), is related to NSSI. Of those maltreated, the additive effects of multiple types of abuse were found in a review of the literature (Lang & Sharma-Patel, 2011), as would be expected based on the literature on risk factors (Baldwin, Baldwin, & Cole, 1990; Cicchetti & Lynch, 1993).

Other studies have shown that attachment is related to NSSI (Barr et al., 2008; Panksepp, Nelson, & Bekkedal, 1997). The attachment system is closely associated with endogenous opioids in the brain (van der Kolk, 1989). During reunions and episodes of maternal mirroring and responsivity, endogenous opioids that the infant experiences as soothing and nurturing are released (Sher & Stanley, 2009). Conversely, separation appears to induce a state of neurophysiological toxicity as opioids are withdrawn (van der Kolk, 1989). Survivors of trauma, including CSA, may exhibit this increased and neurophysiologically toxic distress (Sher & Stanley, 2009) upon separation from significant others or when they experience or perceive abandonment by those significant others (van der Kolk, 1989). It seems likely that survivors who experience such notable distress during attachment separations may use NSSI as a means of self-regulation.

In a similar perspective, tension reduction theory suggests that NSSI is used to self-regulate aversive emotions (Farber, 2008; Haines, Williams, Brain, & Wilson, 1995; Santa Mina, 2010). Haines and his colleagues (1995) appear to be the first to test this hypothesis. Using multiple measures of psychophysiological response, they found a significant relationship between
aversive emotions and NSSI. They concluded, “Self-mutilation produces tension reduction and promotes the feelings of relaxation that have been reported as a consequence of the behavior” (p. 481).

The present study tests the hypothesis that attachment is a predictor of NSSI while also extending the tension reduction theory of NSSI by arguing that NSSI is not only a method of affect regulation but also of state regulation. These hypotheses are tested within a sample of adults sexually abused in childhood. The following sections delineate further the theoretical model used in this study. First, an overview of the theoretical model is discussed, followed by a section discussing the relationship between CSA and NSSI. The three hypothesized mediators of the relationship between CSA and NSSI are then discussed, including, in order, insecure attachment, state dysregulation, and affect dysregulation.

**Theoretical Model**

The theoretical model, as shown in Figure 1, suggests that those who experience CSA are at greater risk than those who do not of experiencing affect and state dysregulation, which in turn increase the survivors’ probability of engaging in NSSI. The model also suggests that those sexually abused in childhood are more likely than those who are not to be insecurely attached

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**Figure 1. Hypothetical Model of the Relationship Between CSA, Insecure Attachment and NSSI**
and that this insecure attachment places the survivors at increased risk for NSSI. Therefore, this model hypothesizes that insecure attachment, affect dysregulation, and state dysregulation act as mediators of the relationship between CSA and NSSI. In this article, affect dysregulation is defined as the incapacity to self-regulate intrusive emotionality when aroused, whereas state regulation is defined as the incapacity to maintain a strong self-identity when aroused. Affect dysregulation is operationalized as experiencing greater intrusion/arousal posttraumatic symptoms, whereas state dysregulation is operationalized as experiencing greater dissociation. Importantly, Perry (2008) notes that affect and state dysregulation are the two primary neurophysiological effects of responding to frightening and arousing situations.

The hypothesis that insecure attachment serves as a mediator of the relationship between CSA and NSSI seems clear and logical. Here it is suggested that those survivors of CSA who are most insecurely attached will be most likely to engage in NSSI. Similarly, it is suggested that those survivors of CSA who are most dissociative will be most likely to engage in NSSI. Survivors of CSA may experience greater dissociation as aversive and so may wish to escape their feelings of derealization, depersonalization, or more severe symptoms of dissociation. In this case, they may engage in NSSI to reduce their symptoms of dissociation, that is, to feel more of something. Furthermore, it is argued that the capacity to engage in avoidance may be a protective factor for those survivors of CSA experiencing higher intrusion/arousal posttraumatic symptoms, as it allows the individual to move away from the trauma, even if temporarily, and even if by less healthy means. Therefore, it is argued that NSSI is more likely to occur in the condition in which intrusive posttraumatic symptoms are higher but avoidant posttraumatic symptoms are lower. In this situation, individuals who engage in NSSI may not be able to muster the avoidant strategies that allow them to move away from the trauma. Another hypothesis is that the probability of NSSI increases when intrusion/arousal posttraumatic symptoms are lower and avoidant posttraumatic symptoms are higher. In this case, NSSI might be used to self-regulate, or to lower the feeling of numbness sometimes associated with avoidance. Thus, it is suggested that NSSI occurs more frequently when intrusion/arousal posttraumatic symptoms are out of balance with avoidant posttraumatic symptoms. When intrusion/arousal posttraumatic symptoms are higher and avoidant posttraumatic symptoms are lower, NSSI may be used to feel less of something (i.e., to feel less of the noxious symptoms of intrusion or arousal), whereas when intrusive/arousal posttraumatic symptoms are lower and avoidant posttraumatic symptoms are higher, NSSI may be used to feel more of something (i.e., to extinguish the sense of numbness).
This conceptualization is in keeping with Stein and Paulus’ (2009) hypothesis that posttraumatic stress disorder (PTSD) is a disorder caused by an imbalance between approach-avoidant neurophysiological systems. Based on literature that finds alterations in the fear-motivated (avoidant) system as well as in reward circuitry (approach system) in PTSD, they suggest that PTSD is the neurological attempt to establish a new level of homeostasis following a trauma that has altered the approach-avoidant system. The approach-avoidant system has dopamine and norepinephrine neurotransmitter systems that are involved in reward/motivation and fear-related processes, respectively. Stein and Paulus state:

If one assumes that an external trauma modulates the existing balance between approach and avoidance by up- or down-regulating the sensitivity of neural substrates that process reward or fear, one can begin to conceptualize PTSD as an altered homeostatic balance between approach and avoidance (p. 1072).

Such a model allows for approach and avoidance systems to be down- or up-regulated individually or in tandem. In this conceptualization, individuals may be more likely to engage in NSSI when the posttraumatic approach-avoidance system is out of balance than when it is in balance. Indeed, NSSI may be an extreme attempt to bring the neurophysiological posttraumatic approach-avoidant system into greater balance.

A conceptualization of NSSI as an attempt to balance the posttraumatic approach-avoidant system is in keeping with other researchers’ suggestions. Briere and colleagues (2010) proposed that NSSI, dissociation, and suicidality, among other behaviors and affective states, are the survivor’s attempt to cope with triggered posttraumatic emotional states, especially when these emotional states overwhelm the survivor’s affect-regulating capacities. When this occurs, the survivor might seek to move away from the trauma to promote the person’s sense of integrity. Chapman, Gratz, and Brown (2006) termed this process experiential avoidance, whereas Briere and colleagues termed it dysfunctional avoidance. In keeping with this perspective, Nock and Mendes (2008) found that when subjected to a stressful task, those who had previously engaged in NSSI experienced increased physiological reactivity to the task along with a decreased ability to tolerate that distress. Similarly, individuals experiencing complex trauma may not have the capacity to regulate strong affective states and thus may engage in more extraordinary methods of self-soothing and containment (Pearlman & Courtois, 2005).

The theoretical model presented here is grounded in the work of both psychological (Briere, Hodges, & Godbout, 2010; Chapman et al., 2006) and
neurophysiological (Nock & Mendes, 2008; Stein & Paulus, 2009) research. Thus, a contribution of this theory of NSSI is that it bridges the psychological/neurophysiological divide. The following sections delineate the different components of this model more fully. The first section discusses the relationship between CSA and NSSI, followed by sections on attachment, state dysregulation, and affect dysregulation.

**CSA and NSSI**

NSSI is related to several types of trauma in childhood, including a traumatic experience (Zlotnick et al., 1997), perceived life threat (Weaver, Chard, Mechanic, & Etzel, 2004), prior trauma (Marchetto, 2006), a childhood history of abuse (Favazza & Conterio, 1988; Lang & Sharma-Patel, 2011), childhood neglect and trauma (Lang & Sharma-Patel, 2011; van der Kolk et al., 1991), CSA (Briere & Gil, 1998; Brodsky et al., 1995; Glassman et al., 2007; Lang & Sharma-Patel, 2011; Lipschitz et al., 1999; Shenk et al., 2010; van der Kolk et al., 1991; Yates et al., 2008), CSA by a caretaker (Dubo et al., 1997), age of incest, and injury experienced during incest (Weaver et al., 2004). The relationship between CSA and NSSI is found across multiple types of samples, including adolescents (Glassman et al., 2007), adolescents experiencing abuse or neglect (Shenk et al., 2010), psychiatric emergency room patients (Briere & Zaidi, 1989), and in adults with a personality disorder or bipolar II disorder (van der Kolk et al., 1991). In each case, those experiencing CSA engaged in greater NSSI. Thus, the relationship between CSA and NSSI appears clear. Indeed, a systematic review found that of the 21 studies which had published data on the relationship between CSA and NSSI, only one did not show a relationship (Fliege, Lee, Grimm, & Klapp, 2009).

**Attachment**

Insecure attachment is hypothesized to be a precursor to NSSI when insecurely attached individuals experience a real or perceived abandonment of the attachment figure, be it the parent, partner, therapist, or other attachment figure. van der Kolk (1991) indirectly tested the relationship between attachment and NSSI by using parental separation and neglect as proxies for attachment. Finding a relationship, he concluded that childhood trauma contributed heavily to the initiation of self-injury, whereas secure attachment helped to maintain that relationship (p. 1669). Furthermore, Dubo and colleagues (1997) found that caretaker emotional withdrawal, failure to protect
by the caretaker, and inconsistent treatment by the caretakers, as proxies of insecure attachment, were related to NSSI.

More recently, researchers have evaluated the direct relationship between attachment and NSSI, finding a relationship between NSSI and greater attachment anxiety (Gormley & McNiel, 2010; Stepp et al., 2008), insecure attachment to a parental figure in childhood (Gratz, 2003), and anxiety over abandonment and anxiety within an adult romantic attachment (Levesque, Lafontaine, Bureau, Cloutier, & Dandurand, 2009). Insecure attachment in infancy also predicts self-injurious outcomes in young adulthood (Yates, as cited in Yates, 2009). Furthermore, Kimball and Diddams (2007) found a relationship between attachment and NSSI after accounting for self-regulation, which acted as a mediator between attachment and NSSI.

The attachment system is closely related to the endogenous opioid system, with requited attachment stress being associated with the release of endogenous opioids (Sher & Stanley, 2009). Conversely, unrequited attachment needs, including real or perceived abandonment, may be experienced as neurophysiologically toxic as a result of the withdrawal of the endogenous opioids (van der Kolk, 1989). In partial support, Gormley and McNeil (2010) found that the relationship between NSSI and adult attachment anxiety (i.e., fear of abandonment) or attachment avoidance (i.e., fear of intimacy) was mediated by depressive symptoms. Recognizing that fears of abandonment and unrequited attachment needs could be experienced as dystonic, they concluded, “distress that occurs in the context of strong needs for someone else to provide relief, without an expectation that relief will be forthcoming, may activate fears of abandonment, which may then intensify depressive symptoms” (p. 279). Thus, it may not be the presence of any one type of insecure attachment that is the issue, but the presence of any insecure attachment. Based on the studies presented, this study hypothesizes that lesser security in attachment will predict greater probability of NSSI in individuals sexually abused in childhood.

State Dysregulation

A number of studies have now shown a relationship, direct or indirect, between dissociation and NSSI (Batey et al., 2010; Brodsky et al., 1995; Tolmunen et al., 2008; van der Kolk et al., 1991; Yates et al., 2008; Zlotnick et al., 1997; Zweig-Frank, Paris, & Guzder, 1994). Furthermore, Briere and Gil (1998) found that of adults who self-injured, 40% were diagnosed with an unspecified dissociative disorder.
This relationship between dissociation and NSSI has been conceptualized in various ways. In one interpretation, NSSI is viewed as a possible means for people to dissociate, or distract themselves from emotional distress (Briere & Gil, 1998). In this conceptualization, emotional distress leads to NSSI, which then leads to dissociation (Batey et al., 2010). A different hypothesis is that dissociation acts as a mediator between CSA and NSSI. Because dissociation is related both to CSA (van der Kolk et al., 1996) and to NSSI (Batey et al., 2010; Brodsky et al., 1995; Tolmunen et al., 2008), it may mediate the relationship between CSA and NSSI, with greater dissociation leading to greater use of NSSI as an attempt to regulate one’s state, or self-identity. The latter conceptualization is the one used in this study. It is hypothesized that higher dissociation will predict a greater probability of NSSI.

**Affect Dysregulation**

As discussed previously, NSSI may be used to self-regulate (Farber, 2008; Santa Mina, 2010) both psychologically and physiologically (Brain, Haines, & Williams, 2011), especially for those with significant histories of childhood trauma (Shenk et al., 2010). Nock (2009) suggests that NSSI is a functional mechanism, that is, it facilitates an escape from intolerable arousal. His theory resonates with that presented in this article, which suggests that NSSI is a functional mechanism used to regulate affect and state. Finding a strong direct relationship between psychological distress and NSSI, Williams and Hasking (2010) suggested that NSSI may be used to tolerate intense emotions. Other research has supported covariations between NSSI and PTSD arousal (Weaver et al., 2004), reexperiencing symptoms (Weierich & Nock, 2008), posttraumatic stress symptoms, and PTSD avoidance and numbing symptoms (Haines et al., 1995; Weierich & Nock, 2008; Williams & Hasking, 2010).

In addition, Williams and Hasking (2010) hypothesized that NSSI might be related to deficits in emotional regulation. Like Nock (2009), they suggested that NSSI is a form of coping with intense emotion, especially for those with fewer skills in adaptive coping. In support of this hypothesis, avoidance strategies (Andover, Pepper, & Gibb, 2007) and emotional numbing (Glover, Lader, Walker-O’Keefe, & Goodnick, 1997) were used significantly more often by those engaging in NSSI than those not engaging in NSSI.

Only two known studies have assessed the relationship between arousal or intrusive posttraumatic symptoms and NSSI. Weaver and colleagues (2004) found that PTSD arousal symptoms mediated the relationship between the age of onset of CSA and NSSI. Briere and Gil (1998) found that intrusive and
avoidant posttraumatic symptoms were lower in the group of adults who did not engage in NSSI than the group of adults who did engage in NSSI. Whereas avoidant and intrusive posttraumatic symptoms were fairly equal in level of severity in the group of adults who did not engage in NSSI, intrusive posttraumatic symptoms were somewhat more severe than avoidant posttraumatic symptoms in those who did engage in NSSI. This latter finding suggests that there may be an interaction effect between avoidant and intrusive posttraumatic symptoms when predicting NSSI. Such an interaction could be explained if the ability to protect the self by using posttraumatic avoidant mechanisms breaks down as posttraumatic intrusive symptoms continue to rise.

Two known studies have assessed the relationship between NSSI and avoidant posttraumatic symptoms. Weierich and Nock (2008) found that, among adolescents, both PTSD avoidance/numbing and reexperiencing symptoms mediated the relationship between CSA and NSSI frequency. Williams and Hasking (2010) found that emotion-focused and avoidant-focused coping were significantly related to NSSI when controlling for diagnosis of mental illness and psychological distress. As in Briere and Gil’s (1998) study, these studies suggest that avoidance may play a role in NSSI. Therefore, it is hypothesized that when intrusion/arousal posttraumatic symptoms are higher and avoidant posttraumatic symptoms are lower, survivors of CSA will be more likely to engage in NSSI.

Finally, because greater dissociation is related to greater NSSI, and because some persons appear to experience a change in neuropsychological states when engaging in NSSI (Briere & Gil, 1998), it may be that the hypothesized interaction between avoidant and intrusive posttraumatic symptoms is modified based upon the level of dissociation. More specifically, NSSI may be most likely to occur when dissociation is low and (a) avoidant posttraumatic symptoms are low and intrusive posttraumatic symptoms are high, or (b) avoidant posttraumatic symptoms are high and intrusive posttraumatic symptoms are low (i.e., when they are out of balance). Thus, in keeping with Stein and Paulus (2009), this study argues that the probability of NSSI increases when avoidant and intrusive posttraumatic symptoms are out of balance. These hypotheses account for two frequently reported reasons for NSSI—that it is used to feel less of something or more of something.

To recap, the model shown in Figure 1 results in the following hypotheses—that NSSI is more likely to occur in survivors of CSA when

1. insecure attachment is higher (and secure attachment is lower);
2. dissociation is higher;
3. dissociation is lower and intrusion/arousal posttraumatic symptoms are out of balance with avoidant posttraumatic symptoms.
This article extends the knowledge base by being the first to assess dissociation and avoidant posttraumatic symptoms as moderators of NSSI. No known paper has conceptualized or assessed whether avoidant posttraumatic symptoms act as a moderator of the relationship between intrusive posttraumatic symptoms and NSSI. Furthermore, dissociation has only ever been assessed as a predictor of NSSI, whereas this study tests a complex relationship among intrusive and avoidant posttraumatic symptoms and dissociation on NSSI. The present study also extends the tension reduction theory of NSSI by arguing that NSSI is not only a method of affect regulation but also of state regulation. Furthermore, it tests the theory that NSSI is more likely when the posttraumatic approach-avoidant system is out of balance (Stein & Paulus, 2009). Whereas studies have evaluated either state dysregulation (Batey et al., 2010; Brodsky et al., 1995; Tolmunen et al., 2008; van der Kolk et al., 1991) or affect dysregulation (Nock & Mendes, 2008) as precursors to NSSI, no known study has assessed both within the same study. Therefore, this study furthers the literature both conceptually and statistically.

Method

Participants

This was a cross-sectional study of adult survivors of CSA in treatment or entering treatment over a 9-month period in a treatment facility. Of 83 respondents, 78 had sufficiently complete questionnaires to be included in the study. The mean age of the sample was 34.2 (SD = 8.7, range = 18 to 57), and the mean education was 12.6 (SD = 2.8), with a range of 6 to 24 years of education. Fifty-six percent of respondents were Caucasian, 15% were Hispanic, and 24% were African American. CSA among the sample was relatively severe, as only slightly less than a third of respondents experienced a single incident of abuse. Twenty-five percent experienced two incidents of abuse, and 43% experienced three or more incidents of abuse. (Note that in the measure, the terms, incident and perpetrator, were somewhat conflated. An incident of abuse was defined as a coherent experience of sexual abuse that occurred either one time or over time and that was committed by one or more perpetrators. The second [and third] incidents of abuse had to involve different experiences of abuse by different perpetrators than in the first [and second] experience. For example, one incident of abuse could be a father’s lengthy sexual abuse of his daughter or a onetime gang rape. The second incident of abuse might be abuse by a neighbor over a period of a year.)
**Procedure**

At the new clients’ first visit to the agency, office staff explained the study. Clients agreeing to participate read and then signed the informed consent, after which they completed the packet of measures. Existing clients completed the battery of tests at their next appointment. This study was approved by the Institutional Review Board at the first author’s university.

**Measures**

*Self-injurious behaviors questionnaire (SBQ).* This measure was developed previously by Hodges for use at the agency and was modified slightly for use as an instrument in this study. It gathers an extensive history of NSSI and its severity in the respondent and in the respondent’s family. It is a self-report measure that captures a wide variety of information about the respondent’s history of NSSI, including their history of NSSI in the past 30 days, during the past year, and ever; history of treatment for the NSSI, including medication, hospitalization, inpatient psychiatric, medical, outpatient therapy; history of relationship loss because of the NSSI, including a friend, spouse/partner, family member, therapist/psychiatrist, or date; and the familial history of NSSI or attempted/completed suicide, including the respondent’s mother or father, partner, aunt or uncle, brother or sister, cousin, grandparent, sibling, or child. Finally, it asks about whether, when the person self-injures, they use alcohol or drugs, do so in front of anyone, have a ritual or pattern, or dissociate during an episode.

Ten different types of NSSI were captured and subjected to a factor analysis. In the initial analysis of this measure (Bolen & Hodges, 2002), two factors emerged, one capturing two less serious types of NSSI (wound interference and skin picking) and another capturing the more serious types of NSSI (cutting, burning, scratching or biting oneself, hitting oneself with fists, head banging, bone breaking, and hair pulling). After considerable analysis with both factors in this earlier report, it was determined that different variables predicted lesser and more serious NSSI. As such, for this analysis a decision was made to investigate more serious NSSI only. This analysis was interested in predicting the presence of a history of NSSI. Therefore, a variable was constructed that captured any type of more serious lifetime NSSI.

Cronbach’s alpha for the more serious NSSI scale was .72. In the factor analysis (Bolen & Hodges, 2002), the Kaiser–Meyer–Olkin (KMO) was .73, the variance explained was 45.4%, and factor loadings on the one scale
ranged from .50 to .76. Therefore, the psychometric properties of the measure were good. The dependent variable for this analysis is the presence or absence of this more serious type of NSSI.

**Relatedness scale questionnaire (RSQ; Griffin & Bartholomew, 1994).** Attachment was captured using the four subscales of the RSQ. The RSQ is a widely used measure that has 30 items reflecting four subscales that correspond to the different types of attachment (secure, detached, preoccupied, and confused). Individuals score each item on a 5-point Likert-type scale based on “how well each item fits their characteristic style in close relationships” (Griffin & Bartholomew, 1994, p. 27). For this study the score for attachment was the mean of items included for each subscale. Convergent validity between the RSQ and the adult attachment interview (George, Kaplan, & Main, 1985) has been established (Griffin & Bartholomew, 1994).

**Dissociative experiences scale (DES; Bernstein & Putnam, 1986).** The 28-item measure is widely used and has strong psychometric properties. It is scored on an 11-item scale from 0% to 100% reflecting the percentage of time the respondent has for each experience. Test–retest reliability, interrater reliability, internal consistency, specificity, and sensitivity are all strong in different samples, and norms have been established for different diagnostic categories (Bernstein & Putnam, 1986; Carlson et al., 1993; Demitrack, Putnam, Brewerton, Brandt, & Gold, 1990). Cronbach’s alpha for this study was .94.

**Impact of event scale (IES; Horowitz, Wilner, & Alvarez, 1979).** The IES is a widely used measure that assesses for avoidance/numbing and intrusive/arousal posttraumatic symptoms. In previous analyses, it has been shown to be an empirically derived psychometric measure of posttraumatic symptoms with a sensitivity of .91 and specificity of .61. Test–retest reliability is .89 for intrusion and .79 for avoidance; internal consistency is .78 for intrusion and .82 for avoidance (Newman, Koloupek, & Keane, 1996). For this study, Cronbach’s alpha was .89.

**Personality assessment inventory (PAI; Morey, 1991).** The PAI is an inventory of adult personality and psychopathological syndromes. The measure has good internal consistency as a whole and with specific subscales (Boone, 1998; Conger & Conger, 1996). Only the traumatic stress scale was used for this study. Cronbach’s alpha for this measure was .90.

Because there were two measures capturing traumatic stress (the IES and PAI), different exploratory factor analyses were run to determine how best to capture posttraumatic symptoms, including avoidant and intrusive symptoms. When the IES scales were placed together in an exploratory factor analysis, the two factors emerged as expected (Bolen & Hodges, 2002). However, one of the intrusive scale items loaded on the avoidant factor,
and one of the avoidant factors loaded on the intrusive scale. With concerns about the way in which the items loaded and because of the brief nature of the IES, it was decided to factor analyze the IES and PAI traumatic stress scales, with the hope that a more robust measure of traumatic stress would emerge.

When the IES avoidant and intrusive scale items, along with the PAI traumatic stress items, were placed in an exploratory factor analysis, two larger factors captured 54.4% of the total variance, with all items loading at .40 or higher. The KMO for this final solution was .83. In the final rotation, seven IES avoidant items and one intrusive IES item loaded on the avoidant posttraumatic scale. The PAI, remaining intrusive IES items, and a single avoidant IES item loaded on the intrusive posttraumatic symptoms scale. The full-scale internal consistency was .93 for the intrusive posttraumatic symptoms scale and .84 for the avoidant posttraumatic symptoms scale. Thus, it was felt that the operationalization of traumatic stress was more robust and psychometrically sound when PAI and IES scale items were included and the IES items were allowed to load on factors based upon their highest factor loading.

Analyses. Attachment security, dissociation, and avoidant and intrusive posttraumatic symptoms were all standardized. Descriptive statistics first determined the characteristics of the sample, followed by ANOVAs that evaluated the probability of engaging in NSSI. Exploratory analyses were also done to determine which, if any, of the four attachment styles were more predictive of severe NSSI. Because secure attachment was most strongly related to NSSI, it was retained for the remaining analyses. Next, dissociation, posttraumatic intrusive and avoidant symptoms, and secure attachment were entered in Block 1 of a logistic regression analysis. In Block 2, the three possible two-way interactions using dissociation and the intrusive and avoidant posttraumatic symptoms were modeled, and in Block 3 a three-way interaction tested whether the shape of the two-way interaction between avoidant and intrusive posttraumatic symptoms changed at different levels of dissociation.

MODPROBE (Hayes & Matthes, 2009), a macro designed for Statistical Package for the Social Sciences (SPSS), was used to probe the two-way interactions. This macro generates different logit and probability values at different combinations of the moderator and focal variables. A Microsoft Excel macro developed by Dawson and Richter (2006) was used to probe the three-way interaction. This macro used the mean and standard deviation of the variables as well as the regression coefficients and intercept to chart the three-way interaction.
Results

Thirty-eight respondents (48.7%) had previously engaged in one or more severe types of NSSI, the most frequently endorsed of which were cutting oneself (50% of NSSI respondents) and hitting oneself with fists (50%), followed by scratching one’s skin (37%) and head banging (34%). The least frequently reported NSSIs were bone breaking (5%) and interfering with wounds (11%). NSSI respondents had engaged in an average of three types of NSSI over their lifetime and one type in the past year.

To compare those respondents who did not engage in NSSI with those who did, a series of one-way ANOVAs were computed. (See Table 1.) As compared with those who did not engage in NSSI ($\bar{X} = .34$), those who did engage in NSSI were less securely attached ($\bar{X} = -.51$, $F = 15.982, p < .001$). Those who engaged in NSSI also experienced greater dissociative symptoms ($\bar{X} = .55$, $F = 18.905, p < .001$) than those who did not $\bar{X} = -.36$), and experienced greater intrusive posttraumatic symptoms ($\bar{X} = .46$, $F = 12.028, p < .001$) than those who did not ($\bar{X} = -.28$).

A logistic regression analysis was conducted to assess the primary hypotheses. (See Table 2.) When all variables but the interaction terms were entered in step 1, this block of variables contributed significantly to the model ($\chi^2 = 31.841, df = 4, p < .001$). Seventy-seven percent of all cases were predicted

| Table 1. ANOVAs of Differences in NSSI and No-NSSI Groups Across Predictor Variables. |
|---------------------------------|------|----|   |
|                                  | Mean (M) |  F  | P  |
| Secure attachment                |        |    |    |
| No NSSI                          | .34   |    |    |
| NSSI                            | -.51  |    |    |
| Dissociation                     |        |    |    |
| No NSSI                          | -.36  |    |    |
| NSSI                            | .55   |    |    |
| Intrusive symptoms               |        |    |    |
| No NSSI                          | -.28  |    |    |
| NSSI                            | .46   |    |    |
| Avoidant symptoms                |        |    |    |
| No NSSI                          | -.08  |    |    |
| NSSI                            | .13   |    |    |

Note: NSSI = nonsuicidal self-injury.
in this step, with 64.5% of NSSI cases predicted correctly. Secure attachment, dissociation, and intrusive posttraumatic symptoms \( (p = .05) \) were significantly related to the probability of engaging in NSSI. Odds ratios were .448 for secure attachment, 2.704 for dissociation, and 2.182 for intrusion/arousal symptoms.

The two-way interaction terms were entered in Block 2, which was significant \( (\chi^2 = 9.737, df = 1, p = .021) \). In this block, 82% of all cases were accurately predicted, with 71% of the NSSI cases correctly predicted. All variables significant in Block 1 remained significant in Block 2. Of the three interaction terms, only the avoidant by intrusive posttraumatic symptoms interaction was significant.
Using MODPROBE, the moderator variable—avoidant posttraumatic symptoms—was modeled at one standard deviation below and above the mean and at its mean value. At each of these three values, the focal variable—intrusive posttraumatic symptoms—was allowed to range from $-2.73$ SD to $1.25$ SD in increments of 0.2. By graphing these values, the interaction between avoidant and intrusive posttraumatic symptoms becomes apparent. (See Figure 2.) When posttraumatic avoidant symptoms were held constant at one standard deviation above the mean, the probability of engaging in NSSI decreased as intrusive posttraumatic symptoms increased. As intrusive posttraumatic symptoms increased from $-2.73$ to 1.25, the probability of engaging in NSSI decreased from .81 to .23. When avoidant posttraumatic symptoms were held constant at the mean, the effect of avoidant posttraumatic symptoms on intrusive posttraumatic symptoms was not apparent at the lowest intrusive posttraumatic symptom levels ($-2.73$ SD to approximately $-1$ SD). From approximately $-1$ SD to 1.25 SD, however, the effect of avoidant posttraumatic symptoms on intrusive posttraumatic symptoms resulted in a near-linear increase in the probability of
engaging in NSSI as intrusive posttraumatic symptoms increased, with probability scores increasing from approximately .10 to .70. Finally, when avoidant posttraumatic symptoms were held constant at –1 SD and intrusive posttraumatic symptoms were approximately –1 SD or lower, the probability of engaging in NSSI hovered near zero. From approximately –1 SD to 1.25 SD, however, probability scores for intrusive posttraumatic symptoms increased from approximately .01 to .95.

The three-way interaction term entered in Block 3 contributed significantly to the model ($\chi^2 = 5.337, p = .021$). Both secure attachment and dissociation remained significant, with intrusive posttraumatic symptoms approaching significance ($p = .076$). The two-way interaction between avoidant and intrusive posttraumatic symptoms also approached significance ($p = .068$), although the interaction between dissociation and avoidant posttraumatic symptoms was now significant. (See Figure 3). As can be seen, the probability of engaging in NSSI increased across the three avoidant posttraumatic symptom conditions (i.e., at –1SD, the mean, and +1SD) as dissociation increased. However, the probability did not increase proportionately across the different levels of avoidant posttraumatic symptoms. When avoidant posttraumatic symptoms were low (–1 SD), the probability of engaging in NSSI increased most rapidly.

**Figure 3.** Probability of NSSI at Different Levels of Dissociative Posttraumatic Stress Symptoms for Set Values of Avoidant Posttraumatic Stress Symptoms.
as dissociation increased. Conversely, the probability of engaging in NSSI increased most slowly and linearly when avoidant posttraumatic stress symptoms were high (+1 SD).

The three-way interaction was also significant, as shown in Figure 4. When avoidant and intrusive posttraumatic symptoms were the same (either high/high or low/low), they shared the same trajectory. The probability of engaging in NSSI was low when dissociation was low and high when dissociation was high. When avoidant posttraumatic symptoms were high and intrusive posttraumatic symptoms were low, however, the opposite pattern occurred. The probability of engaging in NSSI was high when dissociation was low, and low when dissociation was high. Finally, when avoidant posttraumatic symptoms were low and intrusive posttraumatic symptoms were high, the probability of engaging in NSSI was high regardless of whether dissociation was low or high.

Post hoc analyses were conducted to determine whether the pattern of higher intrusive than avoidant posttraumatic symptom was related to the more extreme trauma, more severe abuse, or more types of abuse. A variable was created that dichotomized the condition in which intrusive posttraumatic symptom scores were higher than avoidant posttraumatic symptom scores. The relationship between this variable and the severity of trauma, the severity...
of the abuse, and the greater types of abuse was assessed. In one-way ANOVAs, the relationship between the total use of force across incidents of abuse and the number of incidents approached significance \( F(1,77) = 3.754, p = .056 \) for the use of force, and \( F(1,77) = 3.318, p = .073 \) for the number of incidents]. Further examination of the latter found that when the number of incidents involving penetration was used, the relationship was significant \( F(1,77) = 4.473, p = .038 \). In each case, severity of abuse and number of incidents were greater when posttraumatic intrusive symptoms were greater than avoidant posttraumatic symptoms. To explore further the relationship with trauma, other childhood abuse was used. This relationship was also significant \( F(1,77) = 6.944, p = .010 \). Again, those with greater intrusive posttraumatic symptoms than avoidant posttraumatic symptoms had higher scores, indicating more severe child maltreatment.

**Discussion**

This study tested a series of increasingly complex hypotheses. The first hypothesis tested was that persons would experience a higher probability of engaging in NSSI when avoidant posttraumatic symptoms were lower and intrusive posttraumatic symptoms were higher, as compared with when avoidant and intrusive posttraumatic symptoms were both higher. This hypothesis was supported. Furthermore, this was the only condition in which dissociative symptoms did not affect their interaction. Regardless of whether dissociative symptoms were low or high, probability of engaging in NSSI was high when avoidant posttraumatic symptoms were low and intrusive posttraumatic symptoms were high. Some may consider PTSD to be a homogenous diagnosis (Stein & Paulus, 2009), with intrusive and avoidant posttraumatic symptoms increasing as PTSD becomes more severe. Indeed, such a phenomenon would likely be considered adaptive, as the avoidant posttraumatic symptoms could help the individual move away from the intrusive posttraumatic symptoms when overwhelmed (Weierich & Nock, 2008). Certainly, this phenomenon can be seen in therapeutic sessions when traumatized individuals appear to shut down when the traumatic material is not titrated appropriately by the therapist. From this perspective, avoidant posttraumatic symptoms become increasingly necessary as a self-protective mechanism as intrusive posttraumatic symptoms increase. Yet, in this study, some survivors of CSA seemed to lose the self-protective function of having high avoidant with high intrusive symptoms. It is possible this is the reason they engaged in NSSI.
The reason for such a pattern remains conjecture. It could be that individuals for whom avoidant posttraumatic symptoms are lower than intrusive posttraumatic symptoms experienced the more extreme trauma, the more severe abuse, or more types of abuse. In post hoc analyses, this hypothesis had some support, as the pattern of lower avoidant posttraumatic symptoms and higher intrusive posttraumatic symptoms was significantly related to overall child maltreatment severity and the number of incidents of CSA, especially the number of incidents involving penetration. The total use of force across incidents also approached significance. It is possible that for some or all of these survivors, avoidant and intrusive posttraumatic symptoms increased in tandem until some threshold was met after which individuals were less capable of deploying avoidant posttraumatic symptoms. This possibility needs to be investigated in future research.

It was also suggested that survivors are more likely to engage in NSSI when the PTSD approach-avoidance system is out of balance than when it is in balance. In this conceptualization, NSSI is an extreme attempt to balance the neurophysiological PTSD approach-avoidance system. Such a conceptualization would be in keeping with the hypothesis of Stein and Paulus (2009) that PTSD is caused by an imbalance between the approach and avoidant neurophysiological systems. Indeed, the findings of this study—that NSSI probability was high when avoidant and intrusive posttraumatic symptoms were out of balance (i.e., one was high and one was low)—lends support to the model of Stein and Paulus. Thus, persons in the high avoidance/low intrusive posttraumatic symptom state might engage in NSSI to deactivate the avoidant system (i.e., to feel something), whereas persons in the low avoidance/high intrusive posttraumatic symptoms state might use NSSI to activate the avoidant system (i.e., to feel less of something).

The conceptualization of NSSI as an attempt to rectify an imbalance between the avoidance and approach systems is in keeping with the findings of the study except for one occasion. There was a low probability of engaging in NSSI in the condition of high avoidant/low intrusive posttraumatic symptoms but only when dissociative symptoms were high. In this case, however, the avoidant system may already have been activated because dissociation is considered an avoidant mechanism (Briere et al., 2010).

Finally, after controlling for the two- and three-way interactions in the study, attachment security, dissociation, and intrusive posttraumatic symptoms, which approached significance, were related to NSSI. For each one standard deviation increase in dissociation, the probability of engaging in NSSI increased by a factor of 4.1. For each one standard deviation increase in intrusive posttraumatic symptoms, the probability of engaging in NSSI
increased by a factor of 2.8. The probability of engaging in NSSI decreased by a factor of 0.3 for every one standard deviation increase in attachment security. The latter finding replicates that of Gormley and McNeil (2010), who found that the probability of NSSI and suicide attempts increased as attachment anxiety increased (i.e., as attachment security decreased). In their study, both attachment anxiety and avoidance were mediated by depressive symptoms. In another study, the reward dependence subscale of attachment quality decreased as NSSI increased (Chapman, Derbidge, Cooney, Hong, & Linehan, 2009). Attachment appears to be an approaching and reward-based neurophysiological mechanism. Thus, more secure attachment might balance the approach-avoidant neurophysiological system.

The findings in this study are novel, as no known study has yet reported interaction effects among dissociation and avoidant and intrusive posttraumatic symptoms in predicting NSSI. Such an interaction effect suggests that the role of NSSI, and perhaps other defensive avoidance mechanisms (Briere et al., 2010), especially in the context of PTSD and dissociation, may be more complicated than previously hypothesized. If the interaction effects found in this study continue to be replicated in larger and more diverse studies, support will build for a theoretical perspective in which at least some NSSI experiences may be explained as an attempt at balancing the approach-avoidant neurophysiological system. Such a model might explain the affect-regulating properties of NSSI.

The findings of this study must be considered in relation to the limitations inherent in this study. This was a small sample of treatment-seeking survivors of CSA. The small sample size had the effect of reducing the power of the study such that nonsignificant findings might have been shown to be significant were the sample larger. This possibility was most likely to impact the findings in Block 3 of the logistic regression for intrusive posttraumatic symptoms and for the avoidant by intrusive posttraumatic symptoms interaction. Another limitation was that the convenience sample of treatment-seeking survivors of CSA engaging in therapy at a single agency in a large southwestern town was quite selective. It is also likely that this group was more representative of survivors with more severe symptomatology. Because CSA is a known predictor of NSSI, it is not known whether the same constellation of findings would have emerged if the sample did not have a history of CSA nor if they were not treatment-seeking. Nor is it known how closely this sample reflects the general population of treatment-seeking survivors of CSA. Furthermore, the scales used to assess avoidant and intrusive posttraumatic symptoms were not diagnostic. The
percentage of the population with posttraumatic symptoms that actually had a diagnosis of PTSD is not known. Finally, because the study was cross-sectional, there is no way of knowing how posttraumatic and dissociative symptoms might change over time in high-trauma, treatment-seeking adults, nor how the effect of their therapy modified their symptoms. Therefore, replication of this study is necessary to build confidence in its findings. A longitudinal study that follows adult survivors of CSA from the time they enter therapy is also necessary to place the findings in a larger context.

In conclusion, this study assessed a series of increasingly complex hypotheses about the relationships of attachment, dissociation, and intrusion/arousal and avoidant posttraumatic symptoms in treatment-seeking adult survivors of CSA. In keeping with the hypotheses, the probability of engaging in NSSI increased as attachment became more insecure, when dissociation was higher, and when the intrusion/arousal and avoidant posttraumatic symptoms were out of balance. These findings suggest that NSSI may be used to regulate both affect and state. Finally, the balance between avoidant and intrusive posttraumatic symptoms appeared essential to establishing the probability of NSSI. When these symptoms differed in severity, NSSI was more likely, depending on the severity of dissociative symptoms. These complex relationships support the hypothetical model presented in this article.

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