Posttraumatic Stress Symptoms Mediate the Relation Between Childhood Sexual Abuse and Nonsuicidal Self-Injury

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Prior research consistently has shown a strong relation between childhood abuse and nonsuicidal self-injury (NSSI), yet it is unclear why this relation exists. The authors examined 2 specific posttraumatic stress disorder (PTSD) symptom clusters as potential mechanisms through which childhood abuse may be related to NSSI. Participants were 86 adolescents (78% female, 22% male; 73% Caucasian, 27% other races/ethnicities; mean age = 17.03 years, range = 12–19 years) who completed measures of childhood abuse, *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.) PTSD symptoms, and NSSI. Analyses revealed a significant relation between childhood sexual abuse in particular and the presence and frequency of NSSI. Moreover, data supported a theoretical model in which PTSD reexperiencing and avoidance/numbing symptoms independently mediate this relation. Future research must test the temporal relation between childhood sexual abuse, PTSD symptoms, and NSSI and identify additional pathways to engagement in NSSI.

Keywords: self-injury, child abuse, trauma, posttraumatic stress disorder, self-harm

Nonsuicidal self-injury (NSSI), the direct and deliberate destruction of body tissue in the absence of suicidal intent, is a major public health concern. Approximately 4% of adults in the general population exhibit NSSI (e.g., Klonsky, Oltmanns, & Turkheimer, 2003), and adolescents are at higher risk, with approximately 12%–21% reporting a lifetime history of NSSI (e.g., Ross & Heath, 2002). A significant association between a history of childhood abuse and engagement in NSSI has been consistently reported. This is especially true for the relation between childhood sexual abuse and various forms of self-injury (e.g., Glassman, Weierich, Hooley, & Nock, 2007; Nock & Kessler, 2006; Romans, Martin, Anderson, Herbison, & Mullen, 1995). However, an explanation of the pathway through which a history of childhood abuse might lead to NSSI is lacking. Building on prior work suggesting that childhood abuse is related to posttraumatic stress disorder (PTSD; e.g., Kaplow, Dodge, Amaya-Jackson, & Saxe, 2005) and that PTSD symptoms are associated with some specific functions of NSSI (Nock & Prinstein, 2005), here we investigate whether two specific PTSD symptom clusters mediate the relation between childhood abuse and NSSI.

Research has suggested that individuals most often engage in NSSI for the purposes of emotion regulation or communication with others (e.g., Nock & Prinstein, 2004, 2005). The two most frequently endorsed functions of NSSI are to stop bad feelings and to generate feelings (Nock & Prinstein, 2004). Such endorsement reflects the use of NSSI as an effort to regulate negative affect or an equally aversive state of deficient emotional experience (i.e., numbing).

Several clusters of PTSD symptoms may develop secondary to the experience of a traumatic event (e.g., Asmundson, Stapleton, & Taylor, 2004), and any cluster could be the cause of emotion dysregulation in a given moment. For example, *reexperiencing symptoms* include recurrent, distressing, intrusive thoughts or images of the traumatic event. Individuals who engage in NSSI have been shown to exhibit difficulty with suppressing unwanted thoughts in general (Najmi, Wegner, & Nock, 2007) and may experience particular difficulty with suppression of trauma-specific thoughts and images. *Avoidance and numbing symptoms*, initially conceptualized as a single cluster and more recently often divided into two distinct clusters[1] (e.g., Asmundson et al., 2004), include effortful avoidance of thoughts, feelings, places, and people associated with the trauma and a restricted range of affect. Finally, *hyperarousal symptoms*, such as hypervigilance and an exaggerated startle response, also are characteristic posttraumatic responses.

[1] The four-factor conceptualization of PTSD symptoms (e.g., Asmundson et al., 2004) is of particular relevance for the current investigation, as NSSI could be argued to represent both a form of effortful avoidance of aversive internal or external stimuli and an effort to generate feelings from a numb state. However, in the current relatively small sample of adolescents, the data best fit the original three-factor model, and we have conducted our analyses accordingly.

Some research has suggested that, in particular, the reexperiencing and avoidance/numbing symptoms are episodic (e.g., Litz & Gray, 2002). This characteristic of posttraumatic symptoms is of particular interest in the current investigation, as NSSI also is an episodic behavior that is enacted to decrease aversive cognitive or emotional experiences or to generate feelings when numb. It is possible then, that the reexperiencing and avoidance/numbing symptoms may mediate the relation between trauma exposure and NSSI. One case study provides support for the former hypothesis (Lyons, 1991), and we suggest that the latter also might be the case. We also note that major depression and symptoms of borderline personality are highly comorbid with PTSD symptoms and are associated with NSSI (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). However, we suggest that although the characteristics of borderline personality and the more tonic nature of symptoms of depression, similar to that of the PTSD hyperarousal cluster, may predispose individuals to dysregulation, major depressive disorder (MDD) and most borderline symptoms do not map mechanistically onto specific episodes of NSSI. Accordingly, we are interested in the potential mediating roles of PTSD symptoms above and beyond MDD and borderline symptoms.

Our goal was to test two potential mediators of the relation between a history of childhood abuse and the frequency of NSSI. We were particularly interested in the relation between trauma-related symptoms and individuals' engagement in NSSI, above and beyond the association of NSSI with major depression and symptoms of borderline personality. We hypothesized that individuals who have experienced childhood abuse may engage in NSSI to manage the two distinct manifestations of emotional dysregulation that commonly follow trauma. In particular, given the potential correspondence of the specific function of NSSI with the episodic nature of trauma-related symptoms, we hypothesized that independently (a) reexperiencing symptoms will mediate the relation between abuse and NSSI, and (b) avoidance/numbing symptoms will mediate the relation between abuse and NSSI.

Method

Participants

We recruited 94 adolescents ages 12–19 ($M = 17.14$, $SD = 1.88$) from the community using advertisements placed in local psychiatric clinics, newspapers, community bulletin boards, and on the internet to participate in a comprehensive laboratory-based study of self-injurious behavior. We recruited twice as many participants with a lifetime history of NSSI ($n = 64$) as those without such a history ($n = 30$), given our interest in studying this behavior problem. As the purpose of the current study was to examine correlates of both the presence and frequency of NSSI, we included both self-injurers and noninjurers in this study. Eighty-six participants (mean age = 17.03 years, $SD = 1.92$) completed all of the measures examined in the present study and therefore were included in the current analyses (see Table 1 for participant characteristics). These participants were examined in several other published reports from this study (e.g., Glassman et al., 2007; Nock, Holmberg, Photos, & Michel, 2007); however, these anal-

Table 1
Participant Characteristics

Variable	All participants ($N = 86$)	Women ($n = 67$)	Men ($n = 19$)
Age in years, *M (SD)*	17.0 (1.9)	17.2 (1.9)	16.5 (1.9)
Race/ethnicity, *n* (%)			
Caucasian	63 (73)	52 (78)	11 (58)
African American	3 (3)	1 (1)	2 (11)
Latino/Hispanic	6 (7)	5 (7)	1 (5)
Asian	4 (5)	2 (4)	2 (11)
Other	10 (12)	7 (10)	3 (15)
Presence of NSSI, *n* (%)	56 (65)	45 (67)	11 (58)
Form of NSSI, *n* (%)			
Cutting or carving skin	51 (91)	41 (91)	10 (91)
Scraping skin	29 (52)	23 (51)	6 (55)
Hitting self	27 (48)	21 (47)	6 (55)
Picking wound	26 (46)	24 (53)	2 (18)
Biting self	21 (38)	18 (40)	3 (27)
Picking at body	21 (38)	18 (40)	3 (27)
Burning skin	18 (32)	13 (29)	5 (45)
Pulling out hair	15 (27)	11 (24)	4 (36)
Giving self tattoo	11 (20)	9 (20)	2 (18)
Inserting object under skin	10 (18)	8 (18)	2 (18)
Erasing skin	4 (7)	2 (4)	2 (18)

Note. NSSI = nonsuicidal self-injury.

yses are reported separately given the novel hypotheses and data in the current study.

Procedure

All study procedures were approved by the Harvard University institutional review board. Data were obtained during a single laboratory visit. Participants received a written and oral description of study procedures and provided informed consent/assent to participate. None of the potential participants refused to participate and none withdrew. Following informed consent, adolescents were interviewed and assessed without parents present in order to maximize the likelihood of candid responses. All adolescents and parents were informed during the consent procedure that all information would be kept confidential unless an adolescent or parent reported knowledge of danger of serious harm to anyone, an important issue given our focus on both self-injury as well as child abuse. We further informed them that in such instances we would enact all necessary measures to ensure the safety of those involved, such as informing the parent or contacting the local hospital if we believed an adolescent's self-injury or suicidal thoughts/plans put him or her at imminent risk of serious harm. We conducted a comprehensive risk assessment at the end of the visit to be sure that adolescents did not leave the laboratory in distress, to be sure that adolescents and parents were aware of the adolescents' current level of risk, and to provide clinical referrals if needed. All participants were paid $100 for study participation.

Measures

Childhood abuse. We assessed past occurrence of childhood abuse using the Child Trauma Questionnaire (CTQ; Bernstein, Ahluvalia, Pogge, & Handelsman, 1997). This 28-item measure

assesses five forms of maltreatment that may have occurred during "your experiences growing up as a child and a teenager": physical abuse, sexual abuse, emotional abuse, physical neglect, and emotional neglect. Participants rate items on a 5-point scale from *never true* to *very often true*. The reliability and validity of the CTQ have been established (Bernstein et al., 1997). We were interested in the historical occurrence of the three abuse categories most likely to be associated with PTSD symptoms: sexual, physical, and emotional abuse. As PTSD symptoms are assessed with respect to the occurrence of a specific traumatic event, we converted CTQ subscale scores into dichotomous abuse occurrence variables rather than continuous severity scores. No participant reported current abuse.

Nonsuicidal self-injury. NSSI was assessed using the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007), a clinician-administered interview that assesses suicidal behaviors and NSSI. Participants reported the presence and frequency of NSSI in the past month, which was the time frame of interest. The SITBI has demonstrated strong interrater reliability (average $\kappa = .99$, $r = 1.0$) and test–retest reliability over 6 months (average $\kappa = .70$, intraclass correlation coefficient $= .44$; Nock et al., 2007). Construct validity also was shown via strong correspondence between the SITBI and other measures of NSSI.

PTSD symptoms. Past traumatic events and current PTSD symptoms were assessed using the PTSD module of the Kiddie Schedule for Affective Disorders and Schizophrenia—Present and Lifetime Version (K-SADS–PL; Kaufman, Birmaher, Brent, Rao, & Ryan, 1997). This interview provides symptom totals for reexperiencing symptoms, avoidance/numbing symptoms, and hyperarousal symptoms. Interviews were conducted by Matthew K. Nock and four trained and supervised research assistants and demonstrated excellent interrater reliability (average $\kappa = .93$). We focus on present, rather than lifetime, symptoms and diagnoses given that our hypotheses center on the nature of the relation between current PTSD symptoms and current NSSI.

Depression. The association between major depression and NSSI is well-documented, and we therefore controlled for the influence of MDD in our analyses. We assessed for a diagnosis of MDD using the major depressive disorder module of the K-SADS–PL (Kaufman et al., 1997).

Borderline personality symptoms. We measured self-report of symptoms consistent with borderline personality disorder (BPD) using the Structured Clinical Interview for DSM–IV–II—Personality Questionnaire (First, Gibbon, Spitzer, Williams, & Smith Benjamin, 1997). We used a total symptom count rather than assign diagnoses, as the measure does not assess the duration requirement for diagnosis of personality disorders in individuals under age 18. For the current analyses, we excluded the two NSSI items.

Data Analyses

The raw NSSI frequency variable was positively skewed; we used a logarithmic transformation to achieve acceptable normality for this variable. We also used z-scores to standardize the PTSD symptom cluster variables. Prior studies have demonstrated success in using the CTQ subscales to differentiate between types of childhood abuse in the examination of NSSI (e.g., Glassman et al., 2007). As the literature consistently has presented a uniquely strong relation between sexual abuse and NSSI, we sought to

examine the potential effect of sexual abuse (with or without other forms of abuse) above and beyond the effects of physical and/or emotional abuse. We therefore coded abuse type into three groups in order to further differentiate the effects of abuse type on NSSI. *No abuse* ($n = 26$) indicates that the participant did not endorse the occurrence of emotional, physical, or sexual abuse. *Nonsexual abuse* ($n = 42$) indicates endorsement of the occurrence of emotional and/or physical abuse but not sexual abuse. *Sexual abuse* ($n = 18$) indicates endorsement of the occurrence of sexual abuse; within this group, emotional and/or physical abuse also may have been endorsed. Thus, the coding of abuse groups takes into account the presence of multiple forms of abuse.

Results

Descriptive Data

Participant characteristics and rates of various forms of NSSI are presented in Table 1. The only significant gender difference was that female participants who engaged in NSSI were more likely to pick wounds than were male participants who engaged in NSSI, $F(1,54) = 4.59$, $p < .05$. Participant diagnoses, symptoms, and rates of NSSI by abuse category are presented in Table 2.

Correlations Among Study Constructs

The zero-order correlations among childhood abuse categories, PTSD symptoms, and NSSI presence and frequency are presented in Table 3. Only sexual abuse was significantly associated with presence or frequency of NSSI. Also, only sexual abuse was significantly associated with PTSD symptom clusters.

Unique Relations Between Child Abuse, PTSD Symptoms, and NSSI

We conducted a hierarchical linear regression to determine the relation between sexual abuse, PTSD symptoms, and NSSI frequency after statistically controlling for the presence of MDD and number of BPD symptoms reported. As presented in Table 4, MDD and BPD symptoms each had a small and nonsignificant relation with NSSI frequency in Step 1. In Step 2, sexual abuse was significantly associated with NSSI even after controlling for MDD and BPD symptoms. In Step 3, MDD, PTSD reexperiencing, and PTSD avoidance/numbing symptoms were significantly associated with NSSI after controlling for BPD symptoms and sexual abuse, although PTSD hyperarousal symptoms were not. These results support the examination of the mediating role of these PTSD symptoms.

Mediating Role of PTSD Symptoms in NSSI Frequency

We conducted separate series of regression analyses to examine reexperiencing and avoidance/numbing symptoms as mediators of the relationship between childhood sexual abuse and frequency of NSSI. We tested our mediation models separately following the method outlined by Baron and Kenny (1986). Given the association between major depression and frequency of NSSI observed in the above-mentioned hierarchical regression model, we controlled for diagnosis of MDD in the first step of both sets of mediation

Table 2

Diagnoses, Symptoms, and Reported Incidents of NSSI by Abuse Category

Variable	No abuse ($n = 26$)	Nonsexual abuse ($n = 42$)	Sexual abuse ($n = 18$)	Statistic
Age in years, *M (SD)*	17.2 (1.9)	16.9 (2.0)	17.1 (1.9)	$F(2, 85) = 0.09$
Gender, *n (%)*				
Women	20 (76)	30 (71)	17 (94)	$\chi^2(2, 86) = 3.90$
Men	6 (24)	12 (29)	1 (6)	$\chi^2(2, 86) = 6.05$
Ethnicity, *n (%)*				
Caucasian	22 (77)	27 (64)	14 (85)	
Non-Caucasian	4 (23)	15 (36)	4 (15)	
MDD diagnosis, *n (%)*	4 (15)	12 (29)	8 (45)	$\chi^2(2, 86) = 4.48$
PTSD diagnosis, *n (%)*	0 (0)$_a$	2 (5)$_a$	6 (33)$_b$	$\chi^2(2, 86) = 16.01^{**}$
No. of reexperiencing symptoms, *M (SD)*	0.3 (0.7)$_a$	0.7 (1.3)	1.4 (1.6)$_b$	$F(2, 85) = 4.39^*$
No. of avoidance/numbing symptoms, *M (SD)*	0.3 (0.9)$_a$	0.57 (1.4)$_a$	2.5 (2.4)$_b$	$F(2, 85) = 12.53^{**}$
No. of hyperarousal symptoms, *M (SD)*	0.1 (0.2)$_a$	0.5 (1.1)$_a$	1.4 (1.4)$_b$	$F(2, 85) = 9.83^{**}$
BPD symptoms, *M (SD)*	3.3 (3.2)$_a$	5.7 (3.5)$_a$	6.6 (3.6)$_b$	$F(2, 82) = 5.77^*$
NSSI presence, *n (%)*	15 (58)	25 (59)	16 (89)	$\chi^2(2, 86) = 5.69$
Raw NSSI frequency in past month, *M (SD)*	0.9 (1.5)	13.2 (75.4)	36.8 (118.9)	
Log of NSSI frequency in past month, *M (SD)*	0.42 (0.6)$_a$	0.69 (1.2)$_a$	1.56 (1.6)$_b$	$F(2, 85) = 5.33^*$

Note. Nonsexual abuse includes physical and/or emotional abuse. Sexual abuse includes sexual abuse with or without physical and/or emotional abuse. Raw nonsuicidal self-injury (NSSI) frequency data are presented for illustration; all statistical analyses were conducted using a logarithmic transformation of the NSSI frequency variable to adjust for skewness. Means and counts with different subscripts within a line differ significantly in the Tukey honestly significant difference comparison or the chi-square test, respectively. MDD = major depressive disorder; PTSD = posttraumatic stress disorder; BPD = borderline personality disorder.
$^* p < .01.$ $^{**} p < .001.$

analyses. Both mediational paths were significant. In the first series, reexperiencing symptoms fully mediated the relation between sexual abuse and NSSI frequency (see Figure 1). In the second series, avoidance/numbing symptoms also fully mediated the relation between sexual abuse and NSSI frequency (see Figure 2).

Discussion

NSSI is a serious problem among adolescents, yet little is known about the mechanisms through which these behaviors may develop. Our results indicate that retrospectively reported childhood sexual abuse is associated with NSSI during adolescence—a finding consistent with prior research in this area. Nonsexual abuse, including physical and/or emotional abuse, was not significantly associated with the presence or frequency of NSSI. These findings suggest that not all types of child abuse are associated with NSSI and that victims of sexual abuse are at increased risk for this

harmful behavior. It is notable that these findings are consistent with those from a prior report based on the same participants (Glassman et al., 2007), and although the current study used a different strategy for classifying child abuse and NSSI, the same relations emerged.

The primary goal of the current study was to conduct a novel test of potential mediators of the association between childhood abuse and NSSI. Given our hypotheses that the episodic nature of NSSI may correspond to the prominence of different symptom clusters during particular episodes of dysregulated emotion, we examined the mediating roles of discrete PTSD symptom clusters independently. Reexperiencing symptoms, which include intrusive images of trauma and physiological reactivity secondary to reexperiencing, and the avoidance/numbing symptoms, which include efforts to avoid reminders of trauma and difficulty feeling positive emotions, independently mediated the association between childhood sexual abuse and NSSI. It is important that although symp-

Table 3

Correlations Between Child Abuse Categories, NSSI, and PTSD Symptom Clusters

Variable	1	2	3	4	5	6	7	8
1. No abuse	—							
2. Nonsexual abuse	$-.63^{**}$	—						
3. Sexual abuse	$-.33^{**}$	$-.50^*$	—					
4. NSSI presence	$-.08$	$-.12$	$.26^*$	—				
5. NSSI frequency	$-.20$	$-.08$	$.32^{**}$	$.48^{**}$	—			
6. Reexperiencing	$-.22^*$	$-.02$	$.28^{**}$	$.30^{**}$	$.53^{**}$	—		
7. Avoidance/numbing	$-.23^*$	$-.18$	$.48^{**}$	$.26^{**}$	$.55^{**}$	$.80^{**}$	—	
8. Hyperarousal	$-.29^*$	$-.06$	$.41^{**}$	$.28^{**}$	$.45^{**}$	$.84^{**}$	$.83^{**}$	—

Note. NSSI = nonsuicidal self-injury; PTSD = posttraumatic stress disorder.
$^* p < .05.$ $^{**} p < .01.$

Table 4
Hierarchical Regression Analysis for Variables Predicting Frequency of NSSI

Variable	B	SE B	β	p	R^2	ΔR^2	ΔF
Step 1					.12	.12	5.74**
Major depression	0.55	0.32	.20	.089			
Borderline symptoms	0.08	0.04	.22	.056			
Step 2					.18	.06	6.17*
Major depression	0.44	0.31	.16	.163			
Borderline symptoms	0.06	0.04	.18	.105			
Sexual abuse	0.75	0.31	.25	.019*			
Step 3					.40	.22	9.29**
Major depression	0.59	0.28	.21	.041*			
Borderline symptoms	0.02	0.04	.06	.598			
Sexual abuse	0.31	0.31	.10	.329			
Reexperiencing	0.59	0.25	.43	.021*			
Avoidance/numbing	0.56	0.24	.42	.024*			
Hyperarousal	−0.54	0.27	−.38	.053			

* $p < .05$. ** $p < .01$.

toms of hyperarousal were associated with NSSI, this relation decreased to a nonsignificant level after controlling for the presence of borderline symptoms and MDD, whereas reexperiencing and avoidance/numbing symptoms remained significantly related to NSSI. These findings demonstrate the specificity of the mediation models examined.

There are several limitations to the current work. First, these data are cross-sectional, and it therefore is not possible to draw inferences about the temporal relations among constructs. Prior evidence has supported the notion that sexual abuse precedes NSSI (Romans et al., 1995), and we suggest that the onset of trauma-related symptoms also occurs before the onset of NSSI, although we are unable to present data in support of this time frame. Second, although recent systematic reviews have suggested that retrospective recall of childhood events can provide fairly accurate data, there is a significant tendency to underreport instances of maltreatment (cf., Hardt & Rutter, 2004). Although our adolescent participants were not as temporally removed from the reported events as adults, underreporting of childhood events may have reduced the effect sizes of the relations. Third, these data from our relatively small sample do not allow us to draw conclusions regarding the influence of the developmental range of our sample (e.g., influence of age at first potentially traumatic event). Finally, our participants were adolescents who consented to participate in a lab-based study. Our findings may not generalize to other populations, including adolescents who continue to conceal their NSSI, self-injurious adolescents in inpatient settings, or adolescents who choose not to participate in research studies.

The current work provides support for a model in which episodic reexperiencing and avoidance/numbing symptoms constitute specific mechanisms through which childhood sexual abuse is associated with subsequent presence and severity of NSSI. Clinically, the results suggest that the assessment of trauma-related symptoms in individuals who have experienced childhood sexual abuse can aid in treatment planning with the goal of preventing or minimizing NSSI. For example, helping clients acquire skills for reducing distress secondary to reexperiencing symptoms might alleviate the urges of the individual to manage dysregulation through NSSI. The current results also have important implications for NSSI research. The explication of additional mediators between child maltreatment and NSSI will help to identify warning signs and potentially malleable risk factors for NSSI, which in turn will inform the development of better methods for the identification and treatment of NSSI in adolescents.
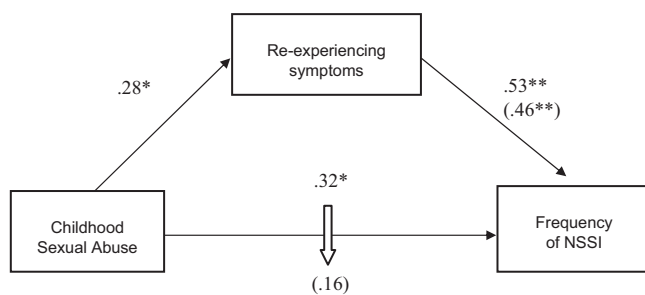

Figure 1. Reexperiencing symptoms (e.g., intrusive imagery, flashbacks, physiological reactivity to reminders) mediate the relationship between childhood sexual abuse and the frequency of nonsuicidal self-injury (NSSI). Analyses control for presence of major depression. Sobel z-value = 2.15, $p < .05$. * $p < .01$. ** $p < .001$.
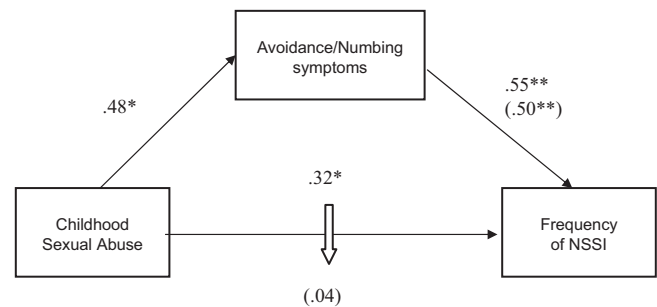

Figure 2. Avoidance/numbing symptoms (e.g., diminished interest in activities, hard time feeling, efforts to avoid trauma reminders) mediate the relationship between childhood sexual abuse and the frequency of nonsuicidal self-injury (NSSI). Analyses control for presence of major depression. Sobel z-value = 3.44, $p < .001$. * $p <.01$. ** $p <.001$.

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