

Nonsuicidal Self-Injury in Young Adolescent Girls: Moderators of the Distress–Function Relationship

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This study examined nonsuicidal self-injury (NSSI) in a community sample of young adolescent girls. Potential moderators of the relationships between different types of distress (internal and interpersonal) and particular functions of NSSI (emotion-regulation and interpersonal) were explored. Participants included 94 girls (49% Hispanic; 25% African American) ages 10–14 years who completed questionnaires regarding self-injurious behavior and other constructs of interest. Fifty-six percent of girls ($n = 53$) reported engaging in NSSI during their lifetime, including 36% ($n = 34$) in the past year. Internal distress (depressive symptoms) was associated with engaging in NSSI for emotion-regulation functions, and rumination moderated the relationship between depressive symptoms and engaging in NSSI for automatic positive reinforcement. Interpersonal distress (peer victimization) was associated with engaging in NSSI for social reinforcement, and quality of peer communication moderated this relationship. The clinical implications of these findings include designing preventions that address the particular contexts of self-injurious behavior.

Keywords: adolescence, self-injury, self-mutilation, deliberate self-harm, peer relationships

Nonsuicidal self-injury (NSSI), which is defined as direct, deliberate destruction of one's own body tissue without suicidal intent, is an alarmingly prevalent, dangerous phenomenon. Prior community-based NSSI research efforts have mainly been concerned with establishing prevalence rates among adults (1%–4%; Briere & Gil, 1998; Klonsky, Oltmanns, & Turkheimer, 2003) and older adolescents (13%–46%; Lloyd–Richardson, Perrine, Dierker, & Kelley, 2007; Ross & Heath, 2002). Very little data exist on NSSI among young adolescents (i.e., ages 10–14 years), an important time, developmentally, for the emergence of psychological distress, especially among girls (e.g., Nolen–Hoeksema & Girgus, 1994). Moreover, research on the contexts and functions of NSSI is lacking. This study investigated the contexts and functions of NSSI in an ethnically diverse sample of young adolescent girls. We focused on girls because prior research suggests that girls are at particular risk for psychological distress beginning in adolescence; for example, rates of depression rise for girls beginning in adolescence but not for boys (Hankin, Abramson, Moffitt, Silva, McGee, & Angell, 1998; Twenge & Nolen–Hoeksema, 2002). The main goal of this study was to explore potential moderators of the relationships between different types of distress (internal and interpersonal) and particular functions of NSSI (emotion-regulation

and social). A secondary goal was to examine NSSI in a sample whose age and other demographic characteristics are underrepresented in the literature.

A few investigators have pursued explanations for why individuals engage in NSSI (e.g., Chapman, Gratz, & Brown, 2006; Chapman, Specht, & Cellucci, 2005; Favazza, 1998; Gratz, Conrad, & Roemer, 2002; Nock & Prinstein, 2004, 2005). Nock and Prinstein (2004) proposed a functional model conceptualizing NSSI as having both automatic (i.e., emotion-regulation) functions and social (i.e., interpersonal) functions. An orthogonal dimension of the Nock and Prinstein model suggests that NSSI can be maintained by either positive reinforcement (i.e., followed by the presentation of a favorable stimulus) or negative reinforcement (i.e., followed by the removal of an aversive stimulus). These two dimensions result in four types of NSSI functions. The emotion-regulation functions involve automatic negative reinforcement, in which individuals engage in NSSI to avoid negative affective states (e.g., “To stop bad feelings”), and automatic positive reinforcement, in which individuals engage in self-harm to attain a desired physiological state (e.g., “To feel something, even if it was pain”). The interpersonal functions comprise social negative reinforcement, in which individuals engage in NSSI to avoid interpersonal task demands (e.g., “To avoid punishment from others”), and social positive reinforcement, in which individuals engage in NSSI to gain attention or access to other people (e.g., “To get attention”). The model's structural validity and reliability and its construct validity have been supported in research relating the individual functions to comparable clinical constructs in a sample of adolescent psychiatric inpatients (Nock & Prinstein, 2004, 2005).

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Multiple lines of evidence suggest that NSSI often occurs within the context of internal and interpersonal distress. For example, rates of NSSI in clinical populations are extremely high (e.g., 40%–61% of psychiatric adolescent inpatients; Darche, 1990; DiClemente, Ponton, & Hartley, 1991). Furthermore, NSSI has been associated with feelings of hopelessness in a psychiatric sample of adolescents (e.g., Nock & Prinstein, 2005) as well as emotional distress in individuals with borderline personality disorder (e.g., Brown, Comtois, & Linehan, 2002). There is some evidence that the particular type of distress an individual experiences is related to a parallel behavioral function of NSSI. For example, Nock and Prinstein (2005) found that social perfectionism was associated with social (but not automatic) functions. However, they also found that depressive symptoms were associated with both automatic and social functions. In the present study, we were able to explore the level of specificity between type of distress and function by examining depressive symptoms (i.e., internal distress, hypothesized to be specifically related to automatic functions) and peer victimization (i.e., interpersonal distress, hypothesized to be specifically related to social functions).

Increases in rates of internal distress, specifically depressive symptoms, occur during early adolescence in girls (e.g., Twenge & Nolen-Hoeksema, 2002). Such internal distress (e.g., feeling bad about oneself, experiencing negative emotions) may be particularly difficult for some girls to cope with, and they may choose to cope with their internal distress via maladaptive means including self-injurious behavior. Although there are no longitudinal data published to demonstrate a temporal relationship, prior research has shown a correlation between depressive symptoms and automatic functions of NSSI (Nock & Prinstein, 2005). Therefore, we predicted that internal distress (in the form of depressive symptoms) would be related to engaging in NSSI for automatic reinforcement.

Not all girls who experience internal distress engage in NSSI; therefore, we were interested in exploring a construct that may moderate the relationship between internal distress and NSSI. Much of the functional research on NSSI has focused on the behavior as a maladaptive way to cope with one's unpleasant emotions. Researchers have suggested that the automatic negative reinforcement aspect of NSSI may be related to poor emotion-regulation skills (Brown et al., 2002; Penn, Esposito, Schaeffer, Fritz, & Spirito, 2003; Rodham, Hawton, & Evans, 2004). For example, Chapman et al.'s (2006) *experiential avoidance model of deliberate self-harm* suggests that individuals engage in NSSI in order to avoid unwanted emotional states. Chapman et al.'s conceptualization of NSSI is consistent with the automatic negative reinforcement function of NSSI in the Nock and Prinstein (2004) model. Both models suggest that individuals with high levels of distress that they cannot regulate will be more prone to engage in NSSI for automatic negative reinforcement (e.g., to stop bad feelings). In addition, research related to the automatic positive reinforcement aspect of NSSI has shown that those engaging in NSSI may experience a lack of emotional feeling preceding NSSI and have a higher threshold for physical feeling or pain (e.g., Russ et al., 1992). Furthermore, analgesia during NSSI has been shown to relate to greater dissociation, traumatic experiences, and depressive symptoms (Claes, Vandereycken, & Vertommen, 2006; Nock & Prinstein, 2005). These findings suggest that individuals who are distressed by a lack of feeling may engage in NSSI for

automatic positive reinforcement (e.g., to feel something, even if it is pain).

Considered together, the above evidence points to the possibility of an emotion-regulation deficit moderating the relationship between distress and NSSI for automatic reinforcement. Rumination, the tendency to brood and reflect on one's negative affect and behaviors and the consequences of one's depression (Nolen-Hoeksema, 1991), is an emotion-regulation strategy that has been found to exacerbate depressive symptoms in adults (e.g., Nolen-Hoeksema, Parker, & Larson, 1994) as well as youths (e.g., Abela, Brozina, & Haigh, 2002). Additionally, a ruminative response style has been associated with impulsive behaviors such as binge eating (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007) and binge drinking (Nolen-Hoeksema & Harrell, 2002), suggesting that it may also be related to NSSI for automatic reinforcement. Thus, we expected that the tendency to ruminate would interact with number of depressive symptoms to predict NSSI for automatic reinforcement.

Interpersonal concerns also increase for girls in early adolescence (e.g., Rudolph & Conley, 2005). Starting in middle childhood, girls report greater interpersonal sensitivity and concern about peer evaluation compared with boys (e.g., Kuperminc, Blatt, & Leadbeater, 1997; LaGreca & Stone, 1993; Rudolph & Conley, 2005). Although peer victimization has been associated with depressive symptoms among both adolescent boys and girls (see Hawker & Boulton, 2000, for a review), it seems to be particularly problematic for girls (e.g., Bond, Carlin, Thomas, Rubin, & Patton, 2001). Adolescent girls may be especially sensitive to weight-related teasing due to emerging body dissatisfaction that often accompanies puberty (Brooks-Gunn & Warren, 1988; Rierdan, Koff, & Stubbs, 1988). Additionally, prevalence rates for overweight and obesity among adolescents are increasing, particularly for Hispanic and African American adolescents (Ogden, Flegal, Carroll, & Johnson, 2002), making this a potentially salient area for interpersonal distress in these groups. Therefore, we predicted that interpersonal distress (in the form of weight-related teasing and other peer victimization) would be related to interpersonal functions of NSSI in our ethnically diverse sample.

Not all girls who experience teasing and other peer victimization engage in NSSI. One potential moderator of this relationship is the degree of positive communication and self-disclosure that a girl has with her close friends. Communication and trust with peers increase the likelihood of seeking social support, while poor quality of peer relationships contributes to the emergence of psychopathology among young adolescents (Armsden & Greenberg, 1987; Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990). For example, one study found that self-disclosure and intimate exchange predicted peer acceptance and high-quality friendships (Parker & Asher, 1993), and another study found that negative peer communication among adolescents exacerbated distress (Rose, 2002). Furthermore, social support may buffer some of the deleterious effects of peer victimization (Prinstein, Boergers, & Vernberg, 2001; Storch & Masia-Warner, 2004; Storch, Nock, Masia-Warner, & Barlas, 2003). Thus, we predicted that quality of peer communication would moderate the relationship between peer victimization and NSSI for interpersonal reinforcement, such that girls who had high-quality peer communication would be buffered, while girls with poor-quality peer communication would

be particularly vulnerable to engaging in NSSI for social reinforcement.

The primary goal of the current study was to enhance understanding of the processes that underlie automatic and social functions of NSSI. Specifically, this study built on preliminary efforts to understand the functional model of NSSI through exploring potential moderators of the relationship between distress and NSSI functions (Nock & Prinstein, 2004). We predicted that depressive symptoms (i.e., internal distress) would be related to automatic (i.e., emotion-regulation) functions of NSSI, while peer victimization (i.e., interpersonal distress) would be related to social (i.e., interpersonal) functions of NSSI. Next, we examined constructs that were hypothesized to moderate these relationships. Regarding the emotion-regulation functions of NSSI, we examined whether rumination would moderate the relationship between depressive symptoms and automatic reinforcement. Regarding the interpersonal functions of NSSI, we examined whether peer communication would moderate the relationship between peer victimization and social reinforcement.

The secondary goal of the current study was to extend previous work on NSSI to a younger sample. By examining cross-sectional data from a community sample of young adolescent girls (ages 10–14 years) of diverse racial–ethnic backgrounds, this study applies the functional model within the context of a community-based sample. We explored whether rates of NSSI were similar between girls of different racial–ethnic backgrounds. Some research has indicated that Hispanic adolescents have higher rates of internalizing symptoms (Siegel, Yancey, Aneshensel, & Schuler, 1999) and suicidal behavior (Eaton et al., 2006), so we were interested in examining whether these findings also apply to NSSI. Additionally, the research regarding differences in internalizing symptoms and suicidal behavior in African American adolescents compared with Caucasian adolescents is mixed. One large epidemiological study indicated slightly higher feelings of hopelessness and injury by suicide attempt in African American adolescent girls compared with Caucasian girls (Eaton et al., 2006), so we explored potential differences in NSSI. Prior research also suggests that NSSI likely begins during early adolescence (Ross & Heath, 2002). Therefore, it is particularly important to understand NSSI during this developmental period in order to inform prevention work.

Method

Participants

Participants included 94 adolescent girls (ages 10.1–14.8 years, $M = 12.7$) in the northeastern United States. Participants were recruited from areas with diverse racial–ethnic and socioeconomic backgrounds, because self-injurious behavior is rarely studied among diverse, community samples of young adolescents. Ethnic composition was 49% Hispanic and 51% non-Hispanic, and the racial composition of the sample was 71% Caucasian, 25% African American, 2% Asian, 1% American Indian, and 1% biracial. The median income for the sample was \$37,500, and mothers' education levels were as follows: 12.5% did not finish high school, 26% had a high school diploma, 43% had some college, 13.5% had a 4-year college degree, and 5% had a graduate degree.

After the study was approved by Yale University's Institutional Review Board, participants were recruited as part of a mother–

daughter study on adolescent well-being. We recruited 57% of the sample from two public middle schools and the remaining 43% from community advertisements in school newsletters, local malls, and newspapers.¹ Of the 84 families we contacted that were eligible from the schools, 55 participated (65.5%). For the community recruitment, among the mothers with daughters ages 10–14 years, those who indicated interest in the study were told about the details over the phone and asked if they would like to be part of the study; 7 (14.3%) declined to participate, and 41 participated (83.7%). The combined sample included 96 participants; of these, 2 girls did not complete one of the main assessments for the study and were excluded from analyses.

Assessment Procedure

Families were given the choice to come to our laboratory or do the study in their homes. Eight families (8.3%) came to the laboratory, and the remaining were home visits. Informed consent was obtained from the participants' mothers, and assent was obtained from the adolescents. A researcher was present during completion of all self-report measures and checked for understanding as well as answered questions to ensure validity of assessment. All measures were completed individually in a room with only the participant and an experimenter. Adolescents were paid \$20 for their participation. Referral forms with lists of affordable psychological services in the area were given to all families of girls who indicated engaging in NSSI and/or reported substantial numbers of psychological symptoms. Additionally, any participant who disclosed engaging in a suicide attempt and/or serious NSSI (cutting, burning, etc.) was encouraged to tell her mother about the incident with the help of the interviewer, and all participants who were asked to do this agreed.

Self-injurious behavior. Participants completed the Functional Assessment of Self-Mutilation (Lloyd, Kelley, & Hope, 1997), a self-report measure of frequency and functions of self-injurious behavior. Eleven items assess various types of self-injurious behavior (e.g., "cutting/burning/scraping skin," "picking at a wound," "biting or hitting oneself," "inserting objects under skin," "hair pulling") engaged in during the past year, their frequency, and whether or not medical treatment was received. Six additional items inquire about other aspects of self-injury, including whether or not the participants had suicidal intent, how much pain they felt, how long they thought about it before doing it, whether or not they were taking drugs or alcohol at the time, how old they were the first time they harmed themselves, and whether or not they had ever engaged in self-injurious behavior (if not in the last year). Finally, 22 items assess the reasons why participants engaged in self-injurious behavior. Participants rated each reason on a 0–3 scale (0 = *never*, 1 = *rarely*, 2 = *some*, and 3 = *often*). Four subscales are derived from these functions (see Nock & Prinstein, 2004, for confirmatory factor analysis with individual item load-

¹ There were some small differences in demographic variables between the community-recruited participants and the school-recruited participants (i.e., the community-recruited participants had slightly higher income, were slightly younger, and were less likely to be Hispanic: 33% Hispanic vs. 61% Hispanic in the school-recruited group). Despite these differences, there were no differences in the relationships between study variables when we included recruitment group as a potential moderator.

ings), which were found to be moderately to highly internally consistent in the present sample: Automatic Negative Reinforcement ($\alpha = .72$; e.g., “to relieve feeling ‘numb’ or empty”), Automatic Positive Reinforcement ($\alpha = .68$; e.g., “to feel something, even if it was pain”), Social Negative Reinforcement ($\alpha = .83$; e.g., “to avoid being with people”), and Social Positive Reinforcement ($\alpha = .92$; e.g., “to get attention”).

Internal distress. Internal distress was assessed with the Children’s Depression Inventory (CDI; Kovacs, 1980–1981), a 27-item questionnaire to assess the severity of cognitive and behavioral depressive symptoms. Each CDI item contains three statements, and participants check the item that has been most true for them during the previous 2 weeks (e.g., “I am sad once in a while,” “I am sad many times,” “I am sad all the time”), with items scored 0 through 2. A total score was computed, with a higher score indicating a higher level of depressive symptoms. Because the CDI taps into both depression and anxiety symptoms, it has been described as a measure of general distress (Saylor, Finch, Spirito, & Bennett, 1984). The CDI has demonstrated good psychometric properties, including reliability and validity (Saylor et al., 1984). Internal consistency in the present sample was high ($\alpha = .86$).

Rumination. Rumination was assessed with items from the Children’s Response Style Questionnaire (Abela et al., 2002), a 25-item measure that presents specific responses to depressive symptoms. For each response, participants rate how often they engage in it when they feel sad, using a 4-point scale (1 = *almost never*, 4 = *almost always*). The items are divided into three subscales: Rumination, Distraction, and Problem-Solving. Previous research on rumination has been criticized because the way it is measured may be confounded with depression; therefore, we used only items from the rumination scale that reflect brooding, which has been shown to be free of depressive content yet correlated with depression (Treyner, Gonzalez, & Nolen-Hoeksema, 2003). The brooding items include: “Think about a recent situation wishing it had gone better,” and “Think ‘Why can’t I handle things better?’” This subscale demonstrated moderate reliability for the present sample ($\alpha = .65$).

Quality of peer communication. The Communication With Peers subscale from the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987) includes eight items that participants complete in regard to their close friends (e.g., “When we discuss things, my friends care about my point of view”). Participants rate the accuracy of each item on a scale from 1 to 5 (1 = *almost never or never true*; 5 = *almost always or always true*). Higher scores indicate more positive perceptions of quality of peer communication. The inventory’s Peer scale has demonstrated good internal consistency ($\alpha = .92$), test–retest reliability ($\alpha = .86$), and validity (see Armsden & Greenberg, 1987). Reliability for the communication subscale for the present sample was good ($\alpha = .88$).

Peer victimization. We had three indicators of peer victimization, which were significantly intercorrelated and measured on the same scale; thus, we summed them for all analyses. Internal consistency for the combined indicators of peer victimization for the present sample was excellent ($\alpha = .89$).

Overt and relational forms of peer victimization were assessed with subscales from the Revised Peer Experiences Questionnaire (Prinstein et al., 2001). Both subscales contain three items (e.g., for

overt victimization, “A kid chased me like he or she was really trying to hurt me,” and for relational victimization, “A kid gossiped about me so that others would not like me”). Participants rate how often each one happened to them in the past year on a 5-point scale (1 = *never*, 5 = *a few times a week*), with higher scores indicating greater frequency of peer victimization. The questionnaire has demonstrated good internal consistency for each subscale along with convergent validity (Prinstein et al., 2001). The weight-related teasing scale from the Perception of Teasing Scale (Thompson, Cattarin, Fowler, & Fisher, 1995) was used to assess frequency of weight-related teasing experienced by participants. This scale contains six items relating to teasing about being overweight (e.g., “People make fun of you because you are heavy”). Participants rate how often they have been the target of such behavior on a 5-point Likert scale (1 = *never*, 5 = *very often*). This scale was standardized on a group of college women who were asked to think about the period in their life when they were growing up (ages 5–16 years). For the present study, directions and items were modified to use the present tense. This measure has good test–retest reliability (see Thompson et al., 1995).

Results

Means and standard deviations for all continuous variables are presented in Table 1. We first present descriptive information, followed by results from hypothesis testing regarding correlates and moderation. An alpha level of .05 was used for all statistical tests, and 95% confidence intervals (CI) are reported for effect sizes involving principal outcomes.

Descriptive Data

Just over half of the sample (56.4%, $n = 53$) reported engaging in self-injurious behavior at least once in their lifetime, and 36.2% ($n = 34$) reported doing so in the past year. Past year prevalence for the most severe forms of self-injurious behavior (e.g., cutting, carving, or burning one’s skin or inserting objects under the nails or skin) was 22.3% ($n = 21$). Among those participants who self-injured in the past year, the average number of times was 12.8 ($SD = 22.5$). None of these adolescents reported engaging in NSSI while taking drugs or alcohol, and the majority of them (94%) reported little or no pain, with the remaining 6% reporting severe pain. Twenty-one percent ($n = 11$) of the self-injurers reported receiving medical treatment as a result of their self-injurious behavior. Four of the self-injurers indicated that they had suicidal intent while self-injuring, and the remaining 92% ($n = 49$) reported no suicidal intent. Therefore, this phenomenon is, indeed, largely nonsuicidal self-injury. Comparisons of the length of time that these two groups thought about engaging in self-injury before doing it suggest that those engaging in NSSI thought about these acts much less compared with the suicidal intent group. Those who engaged in NSSI thought about these acts for 0 to 60 min ($M = 2.33$, $SD = 10.94$), and the 4 participants who reported suicidal ideation contemplated self-injurious behavior for 11.2 hr to 325 hr ($M = 171.7$ hr, $SD = 162.4$ hr) beforehand. The average age at the first NSSI incident was 10.2 years ($SD = 3.0$). See Table 2 for differences between those who engaged in NSSI and those who did not. Of note, those who engaged in NSSI were slightly older, and

Table 1
Means (Standard Deviations) and Correlations Among NSSI Behavioral Functions, Distress, and Predicted Moderators

Variable	1	2	3	4	5	6	7	8
Behavioral function								
1. Automatic negative reinforcement	—							
2. Automatic positive reinforcement	.71**	—						
3. Social negative reinforcement	.57**	.53**	—					
4. Social positive reinforcement	.50**	.56**	.74**	—				
Distress								
5. Depressive symptoms	.52**	.43**	.24	.16	—			
6. Peer victimization	.20	.12	.39**	.38**	.37**	—		
Predicted moderator								
7. Rumination	.34**	.51**	.35*	.23	.57**	.39**	—	
8. Peer communication	-.25	-.18	-.24	-.35**	-.06	.04	-.13	—
Mean (SD)	0.47 (0.77)	0.55 (0.79)	0.25 (0.54)	0.35 (0.59)	6.54 (5.76)	12.48 (7.47)	1.70 (1.62)	28.43 (7.28)

Note. NSSI = Nonsuicidal self-injury.

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

there were no significant differences in rates of NSSI by ethnicity or by race.

Behavioral Functions of NSSI

Correlations among behavioral functions of NSSI, types of distress, and potential moderators are presented in Table 1. We explored whether internal distress (in the form of depressive symptoms) would be related to engaging in NSSI for automatic reinforcement, and whether interpersonal distress (in the form of weight-related teasing and other peer victimization) would be related to engaging in NSSI for social reinforcement. In fact, we found evidence for specificity, such that depressive symptoms were related only to automatic functions (when controlling for peer victimization, pr for automatic positive reinforcement = .41, $p < .01$, pr for automatic negative reinforcement = .49, $p < .001$) and peer victimization was related only to social functions (when controlling for depressive symptoms, pr for social positive reinforcement = .35, $p < .05$, pr for social negative reinforcement = .35, $p < .05$).

Next, we tested our moderation hypotheses by first centering the potential moderator variables and then entering main effects (predictor and moderator) into a multiple regression equation, followed by the interaction term. First, we tested whether rumination would moderate the relationship between depressive symptoms and en-

gaging in NSSI for automatic positive reinforcement (e.g., to feel something, even if it is pain). The interaction term was significant, $B = .59$, $t(49) = 2.52$, $p < .05$, $\Delta R^2 = .08$, overall $R^2 = .38$ (CI for $R^2 = .19-.57$), suggesting that those who ruminate more are more likely to engage in NSSI for automatic positive reinforcement when experiencing depressive symptoms (see Figure 1). Next, we tested whether rumination would moderate the relationship between depressive symptoms and engaging in NSSI for automatic negative reinforcement (e.g., to stop bad feelings). The interaction term was not significant, $B = .27$, $t(49) = 1.10$, $p = .28$, $\Delta R^2 = .02$, overall $R^2 = .30$ (CI for $R^2 = .11-.49$), suggesting that rumination does not moderate the relationship between depressive symptoms and NSSI for automatic negative reinforcement.

Regarding the interpersonal functions of NSSI, we again conducted two regression equations, one predicting social positive reinforcement and one predicting social negative reinforcement. First, we tested whether quality of peer communication would moderate the relationship between peer victimization and social positive reinforcement (e.g., to get attention). The interaction term was significant, $B = -.68$, $t(47) = -3.15$, $p < .01$, $\Delta R^2 = .13$, overall $R^2 = .39$ (CI for $R^2 = .20-.58$), suggesting that those who experience peer victimization and have poor quality peer communication are more likely to engage in NSSI for social positive

Table 2
Comparisons Between NSSI Group and Non-NSSI Group

Variable	NSSI ($n = 53$)	Non-NSSI ($n = 41$)	Test for group difference	p	Effect size
Age ^a	13.06 (1.11)	12.30 (1.04)	$t = -3.31$.001	$d = 0.71$
SES ^b	\$43,073 (\$30,634)	\$50,755 (\$32,815)	$t = 1.15$.26	$d = 0.24$
Ethnicity ^c	52.8% Hispanic	43.9% Hispanic	$\chi^2 = 0.39$.26	$\phi = 0.09$
Race ^d	26% African American	25% African American	$\chi^2 = 0.91$.56	$\phi = 0.01$

Note. NSSI = nonsuicidal self-injury; SES = socioeconomic status.

^a Mean age (SD) is given in years.

^b Mean income (SD) indicates socioeconomic status.

^c Ethnicity consists of Hispanic and Non-Hispanic.

^d Race is limited to African American and Caucasian participants in order to have power to detect differences.

reinforcement. Next, we tested whether quality of peer communication would moderate the relationship between peer victimization and social negative reinforcement (e.g., to avoid being with people). Again, the interaction term was significant, $B = -.67$, $t(47) = -2.97$, $p < .01$, $\Delta R^2 = .13$, overall $R^2 = .33$ (CI for $R^2 = .14-.52$), suggesting that those who experience peer victimization and have poor quality peer communication are also more likely to engage in NSSI for social negative reinforcement (see Figure 2)².

Discussion

This study enhances the contextualization and understanding of the automatic and social functions of NSSI by examining the relationships between types of distress and behavioral functions. Additionally, it extends research on NSSI to a younger, racially and ethnically diverse community sample of adolescent girls. Importantly, we did not find significant differences between ethnic groups (Hispanic vs. non-Hispanic) or between the two largest racial groups (Caucasian and African American), with over 80% power to detect a medium effect size. This is one of the few studies we are aware of with sufficient numbers of individuals in racial-ethnic groups to test for group differences.

Compared with studies on older adolescents, the current study reports greater prevalence of NSSI occurring among younger adolescents. For example, in a review of studies of older adolescents, Safer (1997) found a median lifetime rate of self-injury of 12.7%. By contrast, we found that 56% of the younger adolescent girls in this study reported ever having engaged in NSSI and 36% having engaged in NSSI in the past year. Our results are certainly within the range of rates reported by adolescents in previous research (e.g., 46% of older adolescents endorsed NSSI in Lloyd-Richardson et al., 2007), although they more closely resemble rates among clinical adolescent samples (40%–61%; Darce, 1990; DiClemente et al., 1991).

The few studies that have examined NSSI among younger adolescents have reported 12-month prevalence rates as low as 2.5% (Garrison et al., 1993) and as high as 7.5% (Hilt, Nock, Lloyd-Richardson, & Prinstein, in press), with lifetime prevalence of 13%–21% (Ross & Heath, 2002). The higher rates of NSSI

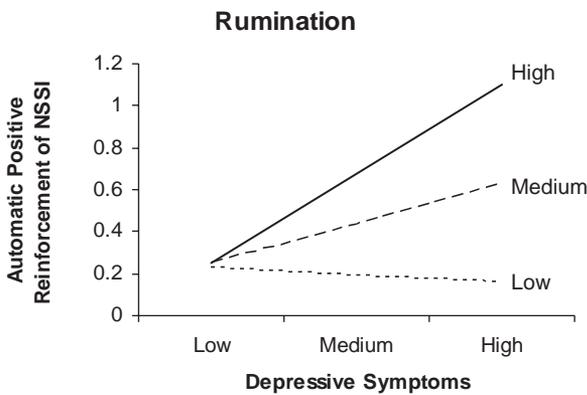


Figure 1. The moderating effect of rumination on the relationship between depressive symptoms and NSSI for automatic positive reinforcement. Values for “Low” are 1 SD below the mean, “Medium” are at the mean, and “High” are 1 SD above the mean.

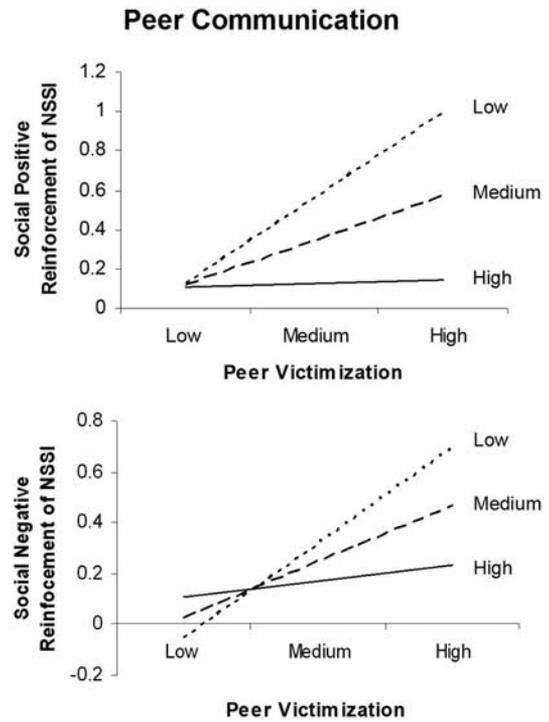


Figure 2. The moderating effect of peer communication on the relationship between peer victimization and NSSI for social reinforcement. Top panel displays social positive reinforcement, and bottom panel displays social negative reinforcement. Values for “Low” are 1 SD below the mean, “Medium” are at the mean, and “High” are 1 SD above the mean.

reported in this study may be due to demographic factors such as the lower socioeconomic status of our sample, which brings with it high levels of chronic stress. Additionally, at least one study has found significantly higher rates of self-injury in girls compared with boys (Ross & Heath, 2002); thus, the fact that our sample was all girls may partially explain the high rates. Methodological considerations, such as the setting of assessment, as well as the assessment format and specific items, may also contribute to higher reported occurrence of NSSI. Assessments completed in a school or classroom setting (Garrison et al., 1993; Hilt et al., in press) may result in reluctance to endorse engaging in NSSI, because students may not feel confident that their answers will not be seen by other nearby students or the teacher. In contrast, asking participants to report on NSSI in a situation with an experimenter who has established rapport and assured confidentiality (as done in this study and in Ross & Heath, 2002) may result in a greater willingness to accurately endorse engaging in NSSI. Additionally, although the definition of NSSI was similar across studies, the assessment items varied widely. For example, Hilt et al. (in press)

² In order to examine the specificity of the moderators’ effects, we conducted additional regression equations to see whether rumination moderated the relationship between peer victimization and social functions of NSSI and whether peer communication moderated the relationship between depressive symptoms and automatic functions of NSSI. None of the four interaction effects was significant, suggesting that the moderators had specific effects as predicted.

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assessed cutting, burning, hitting, and hair pulling. Ross and Heath (2002) added scratching, pinching, and biting. We also included skin picking, wound picking, and inserting objects under skin; therefore, we may have captured a wider range of self-injurious behaviors. Our rate of 22.3% for the most severe forms of NSSI (e.g., cutting, carving, or burning one's skin) is perhaps a more comparable statistic, given the narrower range of items assessed in some prior studies.

Our other descriptive results extend findings from clinical samples to a community sample. Consistent with findings from an adolescent inpatient sample (Nock & Prinstein, 2005), the majority of participants in our study (including the 4 with suicidal intent) reported little or no pain when engaging in NSSI. Additionally, our finding that adolescents spent very little time thinking about NSSI before engaging in it is consistent with findings from an adolescent inpatient sample also suggesting that NSSI is a rather impulsive behavior (Nock & Prinstein, 2005).

Regarding the behavioral functions of NSSI, we explored potential specificity between type of distress experienced and function of NSSI and found evidence for specificity, providing further evidence for the construct validity of the functional model. Specificity for the interpersonal functions was previously demonstrated by Nock and Prinstein (2005), who found that social perfectionism was associated with social, but not automatic, functions. Our finding that peer victimization was associated with social, but not automatic, functions lends further evidence of specificity. We also found evidence that internal distress (i.e., depressive symptoms) was specifically related to automatic, but not social, functions. This finding is somewhat novel given that Nock and Prinstein (2005) found that depressive symptoms related to both automatic and social functions. These findings suggest that although different forms of distress are related to engaging in NSSI, there are unique functions that the behavior serves relating to the particular form of distress. As Nock and Prinstein (2004) suggest, treatments that address the specific functions that the behavior serves may be particularly helpful. While evidence-based treatments exist for adolescent depression (e.g., cognitive-behavioral therapy, Clarke, Rohde, Lewinsohn, Hops, & Seeley, 1999; interpersonal therapy, Mufson, Weissman, Moreau, & Garfinkel, 1999), little work has been done on treatments that specifically address adolescent NSSI. The specificity findings also help to show that results are not simply due to shared method variance, a potential alternate explanation for the findings.

In further exploring the relationship between distress and function, we found that rumination moderated the relationship between depressive symptoms and engaging in NSSI for automatic positive reinforcement. Specifically, experiencing depressive symptoms interacted with having a more ruminative response style to predict engaging in NSSI for automatic positive reinforcement (e.g., to feel something, even if it is pain). A ruminative response style involves isolating oneself to think about one's depressive symptoms (Nolen-Hoeksema, 1987, 1991). NSSI for automatic positive reinforcement involves self-injuring to feel something, to relax, or to punish oneself. In order to understand this relationship, one must consider the potential content of ruminative thoughts. For example, rumination about analgesia (i.e., thinking about how one feels nothing) might correspond to self-injuring for automatic positive reinforcement (i.e., to feel something, even if it is pain). Rumination about personal faults and inadequacies could be re-

lated to self-injuring to punish oneself. An important direction for future research is to examine the specific content of ruminative thoughts that are associated with engaging in NSSI.

We predicted that ruminators might also engage in NSSI for automatic negative reinforcement as a way to escape their negative thoughts and feelings, and the significant correlation between rumination and automatic negative reinforcement offers some evidence that this may be the case. However, rumination did not moderate the relationship between depressive symptoms and automatic negative reinforcement. There are many possible explanations for this finding. Rumination may be directly related to NSSI for automatic negative reinforcement rather than acting as a moderator of depressive symptoms. The relationship between depressive symptoms and automatic negative reinforcement may be direct, or there may be a different moderator. Additionally, there may be individual differences among ruminators that wash out the moderation effect. For example, negative beliefs about rumination (e.g., it represents unwanted negative thoughts) may be related to engaging in NSSI for automatic negative reinforcement, while positive beliefs about rumination (e.g., it is helpful for gaining insight) may not be. Future research can further examine how beliefs about rumination may be related to NSSI functions.

Regarding interpersonal distress, peer communication moderated the relationship between peer victimization and NSSI for social reinforcement. Specifically, girls with lower quality peer communication were likely to engage in NSSI for social reinforcement when experiencing higher levels of peer victimization. This is not surprising given the importance that girls place on peer evaluation (e.g., Rudolph & Conley, 2005). Both social positive and social negative reinforcement were predicted by the interaction of peer victimization and peer communication. This suggests that NSSI may serve multiple and complex interpersonal functions for girls (e.g., helping them feel more connected to others, getting attention, and avoiding activities and/or other people).

One important future direction is to examine these processes developmentally through cohort and longitudinal designs. The interpersonal functions of NSSI, in particular, may be moderated by different factors throughout childhood and adolescence. Communication with peers becomes increasingly important during adolescence, especially for girls (e.g., Rudolph & Conley, 2005), so we may expect this to be an even stronger moderator for girls later in adolescence, while communication with parents might be a more important moderator for younger girls. The high rate of NSSI among this sample of young adolescent girls also raises an important question about whether this maladaptive behavior will be replaced by more adaptive emotion-regulation strategies as girls mature, or whether early onset of this behavior will predict future engagement in NSSI. Clearly, longitudinal studies of NSSI and its contexts and functional processes are important foci for future work.

One of the strengths of this study was the focus on young adolescent girls and constructs that are particularly relevant for girls. Women and girls of various ages have been found to engage in rumination more than men and boys (e.g., Broderick, 1998; Butler & Nolen-Hoeksema, 1994); therefore, it is not surprising that this was an important context for understanding the relationship between depressive symptoms and NSSI for emotion regulation in the present study. Similarly, peer communication (e.g., Parker & Asher, 1993), social evaluation (e.g., Rudolph & Conley,

2005), and especially body-image-related concerns (e.g., Brooks-Gunn & Warren, 1988) are particularly salient for adolescent girls and were also important contexts for socially reinforced NSSI in the present study. Of course, the focus on constructs particularly relevant for girls limits the generalizability of results to adolescent girls. It is likely that different contexts are important for understanding NSSI among boys. Although some studies have found higher rates of NSSI among girls compared with boys (e.g., Ross & Heath, 2002), some have also found similar rates for both genders (e.g., Garrison et al., 1993). Therefore, it will be important for researchers to explore contexts for NSSI that are particularly important for boys. For example, aggression may be a more salient form of distress for boys, and athletic competence may be an important moderator. Additionally, there may be other moderators for girls and boys (e.g., self-competence, attributional style) that were not assessed in this study that could be explored in future research.

One limitation of this study and most of the work on NSSI is the use of a cross-sectional design; therefore, one of the most important foci for future research is longitudinal work that extends understanding of the temporal relationships among variables that are associated with engagement in NSSI. For example, the behavioral functions of NSSI could be further validated in a study that demonstrated a decrease in distress following engagement in NSSI (i.e., evidence for negative reinforcement of NSSI) or an increase in positive affect or relationship quality following NSSI (i.e., evidence for positive reinforcement of NSSI; see Hilt et al., in press). Another important limitation is that this study relied on self-report data. It is important to note that our data reflect individual perceptions of constructs such as peer communication and peer victimization, which may differ from others' reports of these constructs. We attempted to increase validity of assessment by having an experimenter explain directions for each questionnaire and answer questions; however, shared method variance is a potential problem when relying on all self-report data. Future work should also include other informants and/or observational methods to ensure that the relationships demonstrated in this study and others are not due to shared method variance.

Finally, results from this study can inform intervention work. The high rate of NSSI in this sample suggests that clinicians (primary care and mental health professionals) should routinely assess for NSSI throughout adolescence. Given that this study involved a community sample and only 11 participants sought medical treatment for their self-injurious behavior, it is unlikely that most girls receive treatment for their self-injurious behavior. Although the sample size was relatively small, the high rate of NSSI among this sample of 10- to 14-year-olds also suggests that primary prevention efforts may be a better way to address this pervasive problem. Prevention work could address NSSI by targeting its contexts, including rumination and peer communication. For example, a program that teaches girls more adaptive emotion-regulation strategies, such as problem-solving skills to address interpersonal conflicts, could help prevent NSSI for both automatic and social reinforcement.

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