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Longitudinal Study of Nonsuicidal Self-Injury Among Young Adolescents

Rates, Correlates, and Preliminary Test of an Interpersonal Model

Lori M. Hilt
Yale University

Matthew K. Nock
Harvard University

Elizabeth E. Lloyd-Richardson
Brown University Medical School

Mitchell J. Prinstein
University of North Carolina–Chapel Hill

This study examined rates, correlates and an interpersonal model of nonsuicidal self-injury (NSSI) among a sample of 508 sixth, seventh, and eighth graders. Questionnaires assessing NSSI, related health-risk behaviors, and relationships with parents were administered two times over an 11-month period. Overall, 7.5% reported engaging in NSSI within the past year with no significant differences across genders, ethnicities, or grade. Those engaging in NSSI were more likely to report having smoked cigarettes, taken drugs, and engaged in maladaptive eating behaviors. Consistent with an interpersonal model, those engaging in NSSI reported significant increases in the quality of their relationships with fathers over time. Clinical implications include considering the role of family members in efforts to prevent and treat NSSI.

Keywords: *adolescence; self-injury; parent-child relationships; self-mutilation; deliberate self-harm*

Nonsuicidal self-injury (NSSI), which refers to direct, deliberate destruction of one's own body tissue without suicidal intent, occurs at an alarming rate among both clinical and community samples. Much of the prior research on NSSI has focused on describing the phenomenon and establishing the prevalence rates in adult samples (e.g., Briere & Gil, 1998; Klonsky,

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Oltmanns, & Turkheimer, 2003). This work also has been extended to older adolescents, where the phenomenon has been found to be even more prevalent (e.g., DiClemete, Ponton , & Hartley, 1991; Ross & Heath, 2003).

Little data exist on rates of NSSI among young adolescents (i.e., middle-school students), precluding an understanding of the phenomenology of this behavior in younger populations. The estimated rate of NSSI in the general population of adults is 1 to 4% (Briere & Gil, 1998; Klonsky et al., 2003), and rates in community samples of high school aged adolescents are reported as 8.8 to 16.6% (Lloyd-Richardson, Perrine, Dierker, & Kelley, in press; Ross & Heath, 2003; see Safer, 1997, for a review). In clinical samples, rates of NSSI are two to three times greater among adolescents (40-60%; Darche, 1990; DiClemete et al., 1991) compared to adults (~21%; Briere & Gil, 1998). Therefore, one goal of the current study was to explore the incidence of NSSI in a large, community sample of young adolescents, extending previous work to a younger sample.

A further opportunity afforded by our large community sample of young adolescents was to address inconsistent and limited findings in prior research on adolescents by examining rates of NSSI separately by gender and grade. For instance, some studies have reported that adolescent females engage in NSSI more frequently than do males (Bhugra, Thompson, Singh, & Fellow-Smith, 2003), while others have failed to find such differences (e.g., DiClemente et al., 1991; Gratz, Conrad, & Roemer, 2002). Gender, grade, and ethnic differences in NSSI prevalence, therefore, were explored in this study.

Additionally, we examined other health-risk behaviors that may correlate with NSSI among young adolescents. Among adolescents and adults, extant work suggests that NSSI is moderately prevalent (22-62%) among individuals with eating disorders (Favaro & Santonastaso, 2000; Sansone & Levitt, 2002; Stein, Lilenfeld, Wildman, & Marcus, 2004). Therefore, associations among NSSI, pathological eating patterns, and body image were examined in this study. Based on findings from the adult and adolescent literature (Gupta & Trzepacz, 1997; Putnins, 1995), we also explored associations among NSSI, substance use, and risky sexual behavior to better understand possible risk behaviors that may occur with NSSI among young adolescents. We expected that those adolescents who engaged in NSSI would also engage in other health-risk behaviors, as studies have found that health-risk behaviors tend to cluster together among adolescents (e.g., Fortenberry, Costa, Jessor, & Donovan, 1997).

A predominant focus of most prior research in this area has offered descriptive data regarding the phenomenon and correlates of NSSI among adults

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and older adolescents. In addition to information on younger adolescents, the literature is missing an understanding of why individuals engage in these behaviors. Evidence that NSSI may be goal directed comes from both theoretical (e.g., Favazza, 1998) and empirical work (Brown, Comtois, & Linehan, 2002; Nock & Prinstein, 2004, 2005). Nock and Prinstein (2004, 2005) have proposed a functional model suggesting that NSSI can serve four primary functions that differ along two dichotomous dimensions: contingencies for NSSI that are automatic (i.e., within oneself) versus social (i.e., relating to others) and reinforcement that is positive (i.e., followed by the presentation of a preferred stimulus) versus negative (i.e., followed by the removal of an aversive stimulus). The four types of functions are not mutually exclusive; that is, individuals may engage in NSSI for multiple functions (Nock & Prinstein, 2004). Previous studies have supported the reliability and validity of this model among adolescent psychiatric inpatients (Nock & Prinstein, 2004, 2005).

The automatic or emotion-regulation functions of NSSI have received a great deal of attention in the literature. In their studies with psychiatric inpatients, Nock and Prinstein (2004, 2005) found that many adolescents reported engaging in NSSI for automatic positive (e.g., "to feel something even if it was pain") and negative (e.g., "to stop bad feelings") reinforcement. Additional support for such functions has come from clinic-based studies of women with borderline personality disorder (Brown et al., 2002) as well as from laboratory studies demonstrating a decrease in physiological arousal following a NSSI imagery task (Haines, Williams, Brain, & Wilson, 1995). Indeed, a recent review of NSSI focuses exclusively on these emotion-regulation functions (Chapman, Gratz, & Brown, 2006).

Although Nock and Prinstein (2004) found evidence that individuals also engage in NSSI for social positive (e.g., "to get attention") and negative ("to avoid punishment from others") reinforcement, the interpersonal functions of NSSI have received far less attention in the literature. However, the notion that interpersonal experiences may influence self-injurious behaviors more generally has been proposed previously. For example, Walker, Joiner, and Rudd (2001) suggested that decreased suicidal ideation and suicidal behaviors among adults following a suicide attempt might be due to increased interpersonal support (e.g., therapy, attention from others) following the behavior. They examined suicidal symptoms among suicidal attempters and ideators during and following a suicidal crisis, and they found that attempters had higher symptom levels right after an attempt (compared to ideators) but their symptoms improved slightly more than did

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those of ideators in the month following. Even though they did not measure interpersonal support, Walker et al. interpreted this lag in symptom relief to be indicative of increased interpersonal support rather than emotional catharsis, which should result in immediate symptom relief. Thus, it may be that individuals engage in self-injury, including NSSI, in order to obtain more social support, and this social positive reinforcement mechanism, though dangerous, may be adaptive in helping garner social support. Although the socially reinforcing properties of NSSI have found preliminary support through cross-sectional studies (Nock & Prinstein, 2004, 2005), this behavioral function has not been tested longitudinally. An important next step in testing this proposed function of NSSI is to examine whether perceptions of social support change following engagement in NSSI.

The current study offers a preliminary examination of the interpersonal function (i.e., social positive reinforcement) of NSSI in a community sample of young adolescents (sixth, seventh, and eighth graders, ages 10 to 14). By longitudinally examining perceptions of relationships with parents, this study offered an opportunity to examine whether adolescents who engage in NSSI perceive subsequent increases in their relationship quality with mothers and/or fathers. Previous work on adolescent-parent relationships has found differential effects for relationships with each parent (e.g., Gould, Shaffer, Fisher, & Garfinkel, 1998; Shek, 1998). For example, Gould et al. (1998) found that poor communication with fathers predicted suicide among adolescents while poor communication with mothers did not. Therefore, we examined perceptions of adolescents' relationship with each parent separately.

In sum, there were three main goals for the present study. First, we examined rates of NSSI among a younger age group than has previously been focused on and explored potential differences in rates by gender, grade, and ethnicity. Second, we explored potential correlates regarding health-risk behaviors (eating pathology, substance use and risky sexual behavior) and expected to find more health-risk behaviors occurring among those engaging in NSSI. Finally, we tested the social positive reinforcement function of NSSI by examining changes in perceptions of mother and father relationship quality after engaging in NSSI. Based on limited past research (Gould et al., 1998), we predicted that perceptions of relationships with fathers may be a better predictor of NSSI than perceptions of relationships with mothers. Not only does this study extend the examination of a functional approach to a community sample, but it also allows for an opportunity to examine the phenomenology of NSSI in a younger sample than has previously been studied.

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Method

Participants

Participants included 508 students (51% female) in grades six (35%), seven (30%), and eight (35%) at the outset of the study attending a middle school in a moderately sized, middle-class community in the northeastern United States. The ethnic composition of the sample was 87% White or Caucasian, 4% Asian American, 2% African American, 2% Latino, and 6% from mixed ethnic backgrounds. According to neighborhood and school records, average adult per-capita income (total income divided by number of adults) was approximately $30,220 (compared to state average of $32, 317), and 11% of children were eligible for free or reduced-price lunch.

After this study was approved by the appropriate institutional review board, all sixth-, seventh-, and eighth-grade students were recruited for participation. Consent forms were returned by 92% of families ($n = 846$); 80% of these granted parental consent for study participation ($n = 677$; 74% of the total population), and 94% of these children fully completed Time 1 assessments. Participants were assured of confidentiality and signed assent forms before participating. Missing data were due to absenteeism on days of testing ($n = 35$), incomplete responses ($n = 13$), and refusal to participate ($n = 4$).

Of the 637 adolescents who participated at Time 1, 508 (86%) completed assessments 11 months later (i.e., Time 2), when students were in grades seven through nine. Attrition was due to students' moving away from the area ($n = 56$), absenteeism ($n = 7$), incomplete data ($n = 64$), and refusal to continue participation ($n = 2$). There were no significant differences on measures between those who participated at both time points or at only one time point. Additionally, there were no significant differences in basic demographics (i.e., gender and grade level) between those who chose to participate and those who did not. Given our sample size and using two-tailed tests with an alpha of .05, our statistical power to detect small, medium, and large effects was .71, .99, and .99, respectively.

Measures

NSSI and other health-risk behaviors. Youth's health-risk behaviors were assessed at Time 1 using items from established instruments (e.g., Youth Risk Behavior Survey; Centers for Disease Control, 1998; Dishion, Patterson, Stoolmiller, & Skinner, 1991; La Greca, Prinstein, & Fetter, 2001). Engagement in NSSI was determined by an affirmative response to

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the item "Have you harmed or hurt your body on purpose (for example, cutting or burning your skin, hitting yourself, or pulling out your hair)?" For participants who endorsed engaging in NSSI, follow-up questions were provided to assess frequency of the behavior within the past year and to inquire whether the participant had made a suicide attempt in the past year (90% reported they did not, suggesting that NSSI indeed involves nonsuicidal self-injury).

Other health-risk behaviors assessed for this study included the presence or absence of smoking cigarettes; using any drugs to get high; ever having sexual intercourse, and if so, how often the participant drank or used drugs beforehand. Additionally, participants were asked to report their height and weight and describe their weight (i.e., degree of underweight, overweight, or neither). Participants also answered questions about eating behaviors including one item regarding whether they fasted (going 24 hours or more without eating) in the last month to lose weight or keep from gaining weight and one item regarding whether they binged (eating and eating and feeling like you can not stop) within the past year. These items were answered either "yes" or "no" and are based on items from the Diagnostic Interview Schedule for Children eating disorders module (Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000).

Quality of relationships with parents. The Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) was used to assess participants' perceived quality of relationships with parents at Time 1 and again, 11 months later, at Time 2. The IPPA includes 25 items that participants completed for both parents (e.g., "My mother/father accepts me as I am"; "My mother/father expects too much of me"). Participants rated the accuracy of each item as a description of their own relationships on a scale from 1 to 5 (1 = almost never or never true; 3 = sometimes true; 5 = almost always or always true). All negative items are reverse coded so that higher scores indicate more positive perceptions of quality of relationship with the parent. The measure was created to be used as a total scale or as three subscales to examine respondents' perceptions of parent trust, communication, and alienation (negatively coded) with both mothers and fathers. Subscales measuring these three relationship qualities were highly intercorrelated (rs = .61 to .81). Total scores were thus computed for relationship quality with mothers and with fathers, and an overall parental relationship quality variable was created by combining these two scores. The IPPA has demonstrated good internal consistency (for mother relationship quality, α = .87; for father relationship quality, α = .89) and validity (see

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Armsden & Greenberg, 1987). Internal consistency for the IPPA total scales for mother and father relationship quality at both time points in the present sample were very high (all αs $> .94$).

Data Analytic Plan

First, we examined the overall rate of NSSI by identifying the proportion of individuals who endorsed engaging in the behavior. We then conducted chi-square analyses in order to examine potential differences in rates by gender, grade, and ethnic group. Next, we tested our hypothesis that the NSSI group would engage in more health-risk behaviors by comparing the NSSI group to the non-NSSI group on various health-risk behaviors using chi-square tests. Finally, we tested the social positive reinforcement function of NSSI by examining changes in perceptions of mother and father relationship quality after engaging in NSSI using a 2 (self-injurers vs. non-self-injurers) $\times$ 2 (Time 1 vs. Time 2) repeated measures analysis of variance (ANOVA).

Results

Preliminary Results: Rates and Correlates of NSSI

Forty-nine of the participants (7.5%) reported engaging in NSSI in the past 12 months. There were no significant differences in the rates of NSSI by gender, grade, or ethnicity (White vs. non-White), as presented in Table 1. Of the students who reported engaging in NSSI, 36% reported frequency of at least once per month.

It was anticipated that engagement in NSSI would be associated with engagement in other health-risk behaviors, including substance use, eating pathology, and sexual risk behaviors. Results from chi-square analyses revealed that participants who engaged in NSSI were more likely to have engaged in hard drug use, $\chi^2(1, N = 173) = 32.86, p < .001$, and nicotine use in the past year, $\chi^2(1, N = 176) = 13.03, p < .001$. In addition, although young adolescents who had engaged in NSSI were no more likely than others to have ever had sexual intercourse, $\chi^2(1, N = 481) = .74$, *ns*, those who reported engaging in NSSI were more likely to have used substances while engaging in intercourse in the past year compared to those who did not engage in NSSI, $\chi^2(1, N = 334) = 8.75, p < .01$. Lastly, results indicated that although participants who had engaged in NSSI were no different from those who did not regarding height or weight, $t(466) = .11$, *ns*, and $t(473) = .74$, *ns*, respectively, they were more likely than those in the

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Table 1
Self-Reported Rates of Nonsuicidal Self-Injury (NSSI)

	Rate of NSSI (%)	χ^2	ϕ
Gender		.33	–.03
Boys (n = 250)	6.8		
Girls (n = 258)	8.1		
Grade		.52	.03
Sixth (n = 177)	7.3		
Seventh (n = 155)	6.5		
Eighth (n = 176)	8.5		
Ethnicity		.01	.00
White or Caucasian (n = 438)	7.5		
Other ethnicity (n = 64)	7.8		

Note. None of the χ^2or ϕ coefficients were significant at the $p < .05$ level. Ethnicity is not divided into each ethnic group reported due to expected count being less than 5 in chi-square analysis. Additionally, six students did not report on ethnicity.

Table 2
Correlates of Nonsuicidal Self-Injury (NSSI) in Percentages

	NSSI Group (n = 49)	Non-NSSI Group (n = 459)
Ever used drugs to get high	46.7	4.4
Smoked cigarettes in the past year	73.3	28.0
Had sexual intercourse in the past year involving drinking or using drugs beforehand	33.3	11.9
Describe self as overweight	45.9	25.8
Fasted to lose weight or keep from gaining weight in the past month	43.3	7.9
Binged in the past year	76.3	41.1

non-NSSI group to describe themselves as overweight, $\chi^2(1, N = 498) = 10.28, p < .05$, to have fasted to lose weight, $\chi^2(1, N = 296) = 33.30, p < .001$, and to have binged in the past year, $\chi^2(1, N = 505) = 17.69, p < .001$ (see Table 2).

Relationship Between NSSI and Relationship Quality

To examine the hypothesis that children who engaged in NSSI would experience perceived increases in the quality of their relationships with parents, a 2 (self-injurers vs. non-self-injurers) × 2 (Time 1 vs. Time 2)

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Table 3
Perceived Relationship Quality With Mothers and Fathers, Means (Standard Deviations)

	Time 1		Time 2	
	NSSI	Non-NSSI	NSSI	Non-NSSI
Mothers	3.67 (0.72)	4.16 (0.66)	3.70 (0.81)	4.12 (0.72)
Fathers	3.17 (0.91)	3.94 (0.78)	3.45 (0.81)	3.87 (0.84)

Note. NSSI = nonsuicidal self-injury. Means and standard deviations are from the Inventory of Parent and Peer Attachment total score for relationship quality with mothers and fathers.

repeated measures ANOVA was conducted. The main effect for time was not significant, $F(1, 502) = 1.22$, *ns*, $\eta^2 = .00$, but the main effect for NSSI was, $F(1, 502) = 24.31$, $p < .001$, $\eta^2 = .05$, such that individuals who engaged in NSSI reported lower parental relationship quality than did those who did not engage in NSSI. Additionally, the interaction was significant, indicating that only participants who engaged in NSSI reported an increase in positive relationship quality with their parents from Time 1 to Time 2, $F(1, 502) = 5.54$, $p < .05$, $\eta^2 = .01$. We further explored this hypothesis by examining the interaction separately for mothers and fathers (see Table 3 for means and standard deviations). In the ANOVA for mothers, the interaction was not significant, $F(1, 506) = .40$, *ns*, $\eta^2 = .00$. However, in the ANOVA for fathers, the interaction was significant, indicating that only participants who engaged in NSSI reported an increase in positive relationship quality with their fathers from Time 1 to Time 2, $F(1, 506) = 10.82$, $p < .01$, $\eta^2 = .02$ (see Figure 1).

Discussion

Consistent with the hypothesized interpersonal model of NSSI, young adolescents reporting NSSI experienced a significant increase in the quality of relationships with their fathers. This finding, though preliminary, offers initial empirical support for the social positive reinforcement function of NSSI. This model seemed to apply specifically to fathers, suggesting that relationships with fathers may be more influenced by situational factors as compared to relationships with mothers. Indeed, ratings of relationship quality with mothers remained fairly stable across both time points for all participants, with considerably less variability than father-child

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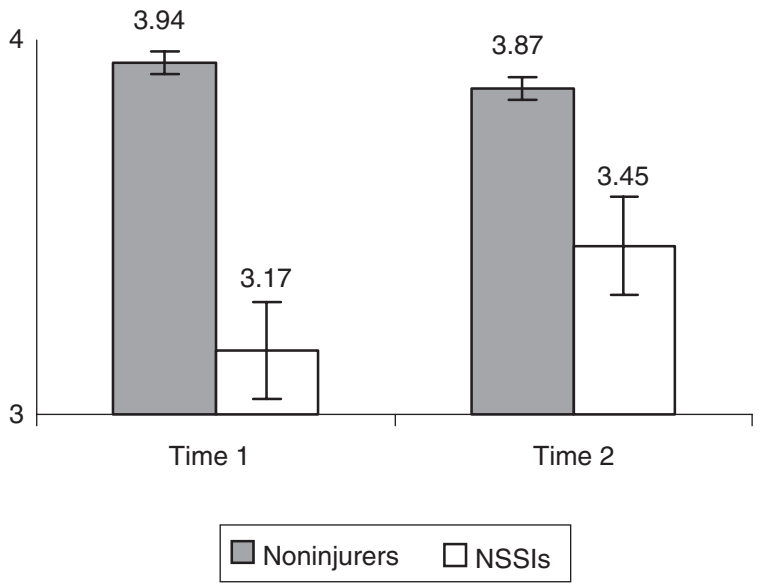
Figure 1
Perception of Positive Relationship Quality for Fathers at Times 1 and 2 in Adolescents Who Did and Did Not Engage in Nonsuicidal Self-Injury (NSSI)



Note. Means and confidence intervals are for IPPA relationship quality with fathers.

relationship quality. Though previous research rarely has examined adolescents' relationships with mothers and fathers separately, these results highlight the relative importance of father-adolescent relationships that has been a theme of recent work (e.g., Gould et al., 1998; Shek, 1998). For example, one study revealed that poor communication with fathers (and not mothers) increased the risk of suicide in intact families (Gould et al., 1998). Another study indicated that father-adolescent conflict was especially predictive of poor psychological well-being (Shek, 1998).

Additionally, these findings may offer important implications for understanding interpersonal influences on NSSI that are associated with ongoing engagement in self-harm throughout adolescence. The increases in perceptions of positive relationship quality following engagement in NSSI suggest that perceptions of social reinforcement may maintain young adolescents' self-harm. It is important to note that because we were not able to manipulate

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engagement in NSSI for obvious ethical reasons, it is possible that changes in relationship quality occurred due to some other construct not evaluated in this study. Additionally, NSSI was evaluated at Time 1 and thus occurred prior to this evaluation, precluding us from demonstrating that relationship quality improved specifically and immediately following NSSI. This is a common limitation of studies on self-harm behavior. Nevertheless, the present study is best viewed as preliminary, and the interpersonal function of NSSI requires replication in future work.

In the present study we did not ask participants about the functions of their NSSI. Rather, we were interested in whether there were predictable behavior changes following engagement in NSSI. This study is unable to determine whether possible social reinforcement serves a conscious, intentional function of NSSI or a more implicit function. It is also possible that NSSI may initially be modeled from the behavior of others and is socially reinforced from the reactions of others, but over time it is maintained via its emotion-regulation properties (Brown et al., 2002; Haines et al., 1995; Nock & Prinstein, 2004, 2005) or vice versa. Future studies may benefit by exploring the degree to which others have awareness of young adolescents' NSSI and how they may alter their behavior explicitly. This may be done by collecting data from parents regarding their awareness of NSSI in their children and their reactions to it.

The rate of NSSI in the past 12 months for this sample was 7.5%. Relatively little data exist regarding rates of nonsuicidal self-injury among young adolescents; therefore, these data offer an important resource for clinicians and others working with young adolescents. Of particular interest regarding possible gender differences, rates were as high among boys compared to girls, which is consistent with other previous studies with adolescents (Gratz et al., 2002; Lloyd-Richardson et al., in press). Rates of NSSI appear to be consistent across ethnicities, as in previous research with older adolescents (Bhugra et al., 2003; Gratz et al., 2002). However, the current study (and most research on NSSI) included a relatively small portion of individuals from ethnic minority groups, and studies with larger, more representative samples of individuals are needed to examine ethnic differences in NSSI.

There were no significant differences across grade levels. The rate among the 8th graders in our sample (8.5%) was consistent with the lower range of rates reported among 9th through 12th graders in other studies (Safer, 1997), and these rates are much higher than those reported in adult samples (e.g., Briere & Gil, 1998). This suggests that NSSI may increase throughout early adolescence and peak during later adolescence before tapering off in adulthood. In fact, NSSI has been reported in children as

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young as age 6, but average onset appears to be around age 13 (Nock & Prinstein, 2004). Alternately, there may be a cohort effect for engaging in NSSI. Future research should examine rates of NSSI among even younger samples to establish age of onset and determine the appropriate time for primary prevention. Although retrospective studies could be done to determine whether rates of NSSI have increased in recent years or whether rates have remained consistently high among young adolescents, longitudinal studies are needed to truly examine the development of NSSI.

Because the rates of NSSI are higher in our young adolescent sample compared to rates reported for adults (see Briere & Gil, 1998), early adolescence may be a particularly important developmental period for further study and primary prevention. Adolescent self-injury may occur among youth at risk for other health-risk behaviors; findings indicate that those engaging in NSSI were more likely to smoke cigarettes, use drugs, and engage in other health-risk behaviors. In particular, maladaptive eating habits (e.g., fasting and bingeing) and poor body image (i.e., reporting being overweight despite reporting normal height and weight) were more common among the NSSI group, consistent with findings of overlap with eating disorders and self-injury in adults and older adolescents (e.g., Favaro & Santonastaso, 2000; Sansone & Levitt, 2002; Stein et al., 2004). Although this information can help clinicians to predict who might engage in NSSI, it is unclear whether these correlates are part of a general phenomenology (e.g., a latent construct of impulsive behaviors that are socially reinforced; see Donovan, Jessor, & Costa, 1994) or serve as precipitants or consequences of NSSI. It will be important for future research to examine a broad age range in larger samples of children and adolescents, following them over time to determine when each of these health risk behaviors develops in relation to the others to further understand the phenomenology of NSSI.

The large sample size, longitudinal design, and low attrition rate for a school-based sample are among the strengths of this study; however, the findings should be interpreted in light of the limitations of this study. First, although a relatively large, community sample was used in this study, all participants were from a largely Caucasian community in the northeastern United States, and it is unclear if these results will generalize to adolescents in other areas. Additionally, this study offered an important screening of NSSI; however, we note that the assessment involved one item, and a more detailed assessment of NSSI among young adolescents should be explored in future research. For example, future studies should assess different types of NSSI separately because hair pulling, for example, may serve a different function from cutting. Finally, the effect size for the test of the interpersonal

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function of NSSI was small. It should be noted that scores on measures of parent-child relationship quality within community samples are often negatively skewed; therefore, this small increase may represent an important change that should be explored further in future research.

Despite these limitations, the current study provides important information about the rate of NSSI among young adolescents and preliminary evidence for a possible relation between engagement in NSSI and improved relationship quality. As discussed above, the alarming rate of NSSI within this community sample of young adolescents can serve as an important indicator for clinicians. NSSI is a behavior that is likely to be seen in outpatient settings and should be routinely assessed by clinicians.

Given that NSSI may be associated with positive changes in interpersonal relationships, specifically father-adolescent relationships, treatment for young adolescents who engage in NSSI may benefit from focusing on other means for improving parent-child relationships or removing accidental reinforcements. For example, a recent study found dialectical behavior therapy to be effective in reducing self-injurious behavior in suicidal adolescent inpatients (Katz, Cox, Gunashkara, & Miller, 2004). Future studies in this area should continue to explore the interpersonal effects of, and influences on, adolescent NSSI, as such information will be useful in improving efforts to identify, assess, and treat individuals engaging in this maladaptive behavior.

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Lori M. Hilt, MS, M Phil, is a clinical psychology graduate student at Yale University. Her research focuses on the development of psychopathology in early adolescence. She is particularly interested in biopsychosocial models of depression and nonsuicidal self-injury.

Matthew K. Nock, PhD, is an associate professor of clinical psychology at Harvard University. His research interests focus primarily on the etiology, assessment, and treatment of self-injurious and aggressive behaviors, particularly among children and adolescents, along with evaluation of factors that mediate and moderate clinical change.

Elizabeth E. Lloyd-Richardson, PhD, is an assistant professor of psychiatry and human behavior at Brown Medical School and The Miriam Hospital. She is a clinical psychologist specializing in child and adolescent psychopathology, particularly as it relates to medical conditions and health behaviors.

Mitchell J. Prinstein, PhD, is an associate professor of clinical psychology at University of North Carolina–Chapel Hill. His research examines cognitive and interpersonal models of depression, suicidality, and health risk behaviors (e.g., substance use, sexual risk behavior) among children and adolescents.

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