

# Using Implicit and Explicit Measures to Predict Nonsuicidal Self-Injury Among Adolescent Inpatients

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**Objective:** To examine the use of implicit and explicit measures to predict adolescent nonsuicidal self-injury (NSSI) before, during, and after inpatient hospitalization.

**Method:** Participants were 123 adolescent psychiatric inpatients who completed measures at hospital admission and discharge. The implicit measure (Self-Injury Implicit Association Test [SI-IAT]) and one of the explicit measures pertained to the NSSI method of cutting. Patients were interviewed at multiple time points at which they reported whether they had engaged in NSSI before their hospital stay, during their hospital stay, and within 3 months after discharge.

**Results:** At baseline, SI-IAT scores differentiated past-year self-injurers and noninjurers ( $t_{121} = 4.02, p < .001, d = 0.73$ ). These SI-IAT effects were stronger among patients who engaged in cutting (versus noncutting NSSI methods). Controlling for NSSI history and prospective risk factors, SI-IAT scores predicted patients' subsequent cutting behavior during their hospital stay (odds

ratio (OR) = 8.19, CI = 1.56–42.98,  $p < .05$ ). Patients' explicit self-report uniquely predicted hospital-based and postdischarge cutting, even after controlling for SI-IAT scores (ORs = 1.82–2.34, CIs = 1.25–3.87,  $p$  values  $< .01$ ). Exploratory analyses revealed that in specific cases in which patients explicitly reported low likelihood of NSSI, SI-IAT scores still predicted hospital-based cutting.

**Conclusion:** The SI-IAT is an implicit measure that is outcome-specific, a short-term predictor above and beyond NSSI history, and potentially helpful in cases in which patients at risk for NSSI explicitly report that they would not do so in the future. Ultimately, both implicit and explicit measures can help to predict future incidents of cutting among adolescent inpatients.

**Key words:** self-injury, risk factor, prediction, IAT, self-report

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Nonsuicidal self-injury (NSSI), defined as direct and deliberate destruction of bodily tissue in the absence of intent to die, is a serious health problem. In addition to causing immediate physical harm, NSSI increases the likelihood of making a suicide attempt.<sup>1–3</sup> Youth and those with mental disorders are at especially high risk of NSSI, with up to 82% of psychiatrically hospitalized adolescents reporting past-year engagement in this behavior.<sup>4</sup> Despite these high prevalence estimates, there are no empirically based practices for assessing NSSI risk in hospital settings. This is concerning in light of contagion effects observed in adolescent treatment centers<sup>5</sup> and adolescents' propensity to learn NSSI behavior from each other.<sup>6</sup> Risk assessments that identify which individuals are likely to hurt themselves, either during or after hospitalization, may help to inform milieu management and treatment decisions.

Risk assessments can be either explicit or implicit in nature. Explicit measures capture psychological processes that respondents can consciously observe and report. For example, one could directly ask a patient about their NSSI risk (e.g., "What is the likelihood that you will hurt yourself without wanting to die in the future?"). This is a pragmatic assessment technique, but its predictive validity has rarely been tested. Related work on self-injurious (suicidal or nonsuicidal) adolescents<sup>7</sup> and suicidal patients<sup>8–10</sup> report that explicit self-report may be unreliable, or at least not

incrementally helpful. More focused on NSSI, one prior study involving college students revealed that self-reported future NSSI risk predicted NSSI frequency one year later, but not above and beyond NSSI history.<sup>11</sup> It remains unknown whether explicit self-report of NSSI risk is incrementally predictive in a clinical sample.

In contrast to explicit measures, implicit measures use respondents' automatic, observable response patterns to infer NSSI risk. The respondent may be unaware of the psychological processes captured by implicit measures, such that their responses are less susceptible to conscious control.<sup>12</sup> For example, the Self-Injury Implicit Association Test (SI-IAT)<sup>13</sup> is a computer task that measures respondents' reaction times to distinct word pairs on the computer screen (i.e., "Cutting–Me," "Cutting–Not Me"). By doing this, the SI-IAT evaluates the strength of the mental association a self-injurer holds between NSSI (i.e., cutting) and themselves (i.e., me). According to the Implicit Identification Hypothesis,<sup>14</sup> individuals' strong automatic association between NSSI and their self-concept (i.e., Cutting–Me) can guide their decision to select NSSI as a preferred coping strategy. Implicit identification with NSSI is therefore considered a proximal or short-term risk factor. Although this "short-term" status conceptually sets it apart from distal risk factors (e.g., childhood sexual abuse), the concrete time frame within which implicit identification with NSSI relates to subsequent behaviors remains unknown.

Despite its theoretical conceptualization, implicit identification with NSSI has yet to be tested within a time frame shorter than 6 months. Cross-sectional work using the SI-IAT reveals that adolescent self-injurers have stronger implicit identification with NSSI compared to noninjurers,<sup>13</sup> and that self-injurers have stronger implicit identification with NSSI compared to suicide attempters and healthy adolescents.<sup>15</sup> Both 6- and 12-month prospective studies, limited to community-based samples, have shown that implicit identification with NSSI did not predict future NSSI frequency, remission, or recurrence.<sup>11,16</sup> Instead, robust predictors pertained to history of NSSI, specifically the frequency of prior episodes and number of NSSI methods. It still remains unknown whether implicit identification with NSSI is a poor predictor altogether, or whether it simply does not predict 6- or 12-month NSSI. This is an important consideration for a behavior such as NSSI, which tends to have a relatively short-lived course<sup>17</sup> and can be readily replaced by other behaviors within a matter of weeks.<sup>18</sup> An adolescent who strongly identifies with NSSI at 3 years of age, for example, may no longer identify as a self-injurer 5 years or even 1 year later.

One of the greatest challenges with testing short-term prediction models is achieving a high enough base rate of the outcome. The shorter the prospective time frame, the fewer individuals will have engaged in NSSI at follow-up. A high-risk group (i.e., individuals more likely to reengage in NSSI in the future) represents an optimal sample for short-term prediction and would be more likely to produce more promising statistical power at follow-up time points. Short-term prediction models of NSSI would ideally be assessed in a clinical population, which reveals higher rates of NSSI.<sup>4</sup> Higher follow-up rates of NSSI may also be achieved with younger samples. Prior longitudinal SI-IAT studies have assessed young adults (means = 19.1–24.4 years),<sup>11,16</sup> who are more likely to stop (versus start or continue) engaging in NSSI and thereby leave fewer subsequent NSSI episodes to predict.<sup>17</sup>

The present study tested the short-term predictive validity of implicit and explicit measures of NSSI risk. In doing so, we addressed the aforementioned gaps in the current literature and assessed predictive validity in a way that is closer to what happens in actual clinical practice. More specifically, we examined whether implicit and explicit measures can predict the occurrence of NSSI over the course of hospitalization (i.e., 14.5 days on average), and within 3 months of hospital discharge. These are referred to as “hospital-based NSSI” and “post-discharge NSSI,” respectively. We tested 2 specific hypotheses. First, we hypothesized that patients’ SI-IAT scores would be associated with their history of NSSI such that they would distinguish self-injurers and noninjurers at baseline. Second, we hypothesized that SI-IAT scores would improve 2-week and 3-month prediction of NSSI above and beyond NSSI history. We similarly tested the predictive validity of explicit self-report as a measure of NSSI risk—a highly pragmatic but understudied prediction tool.

As a final feature of this study, we explored change in implicit identification with NSSI over the course of inpatient

stabilization by administering the SI-IAT at admission and at discharge. It remains unknown whether such change is possible, or whether it predicts subsequent NSSI behavior (i.e., after patients leave the hospital). Prior work has shown that IAT scores related to depression or anxiety change across the course of treatment and relate to symptom reduction.<sup>19–21</sup> These findings would highlight the malleability of implicit associations and their subsequent connection to clinical change. As a comparison, explicit self-report measures from admission and discharge were examined as well.

## METHOD

### Study Sample

We approached 249 adolescents who had recently been admitted to a psychiatric inpatient unit, of whom 137 provided parental consent and child assent (response rate = 55.0%). Among this sample, 123 patients provided data relevant to our hypotheses (i.e., completed both the SI-IAT and explicit self-report measures). Exclusion criteria included the presence of any factor that impaired an individual’s ability to comprehend and to effectively participate in the study, including an inability to speak or write English fluently, the presence of gross cognitive impairment, or the presence of extremely agitated or violent behavior. Fourteen patients were excluded because of behavioral, medical, or cognitive limitations to providing reliable self-report responses ( $n = 8$ ), invalid SI-IAT data at baseline ( $n = 4$ ), and decision to withdraw from the study ( $n = 2$ ). The final sample consisted of 123 adolescents ranging from 10 to 17 years (mean = 14.8 years,  $SD = 1.5$  years), predominantly female (71.5%), and white (87.0% white, 4.9% Hispanic, 2.4% African American, 1.6% Asian, 4.1% other), with complex diagnostic presentations (1–5 psychiatric diagnoses at admission, mean = 2.0,  $SD = 0.9$ ). More than half of the final sample reported past-year history of NSSI ( $n = 68$ , 55.3%). A total of 115 participants completed the follow-up assessment at discharge (response rate = 93.5%), and 100 completed the 3-month follow-up assessment (response rate = 81.3%). The average duration between admission and discharge assessments was approximately 2 weeks (mean = 15.2 days,  $SD = 21.4$  days).

### Measures

*Self-Injurious Thoughts and Behaviors Interview.* Adolescents’ engagement in NSSI was assessed using the Self-Injurious Thoughts and Behaviors Interview (SITBI),<sup>22</sup> which is a structured interview about engagement in self-injurious thoughts and behaviors including NSSI. The SITBI was used to assess history of NSSI at admission, hospital-based NSSI, post-discharge NSSI, and adolescents’ self-reported future likelihood of NSSI. NSSI was captured through questions about whether an adolescent had engaged in NSSI during the respective time frames, how frequently he or she engaged in NSSI, and what types of methods he or she used. The SITBI also assessed future likelihood of NSSI, described below in greater detail.

*Self-Injury Implicit Association Test.* We used Self-Injury Implicit Association Test (SI-IAT)<sup>13</sup> scores to capture our primary predictor, namely, implicit associations about NSSI. The SI-IAT is a brief reaction time test during which patients sort images and words into concept categories (Cutting, Not Cutting) and attribute categories (Me, Not Me) by pressing either a left or right key on a computer keyboard. A total of 40 presented category pairs of Cutting/Me on one side and Not Cutting/Not Me on the other side. In addition, 40 trials presented reversed category pairs of Cutting/Not Me on one side and Not Cutting/Me on the other side. The SI-IAT compares the speed at which a person classifies stimuli when the paired

concept–attribute categories match an individual’s implicit associations (e.g., Cutting/Me) versus the speed of classification when the paired categories do not match an individual’s implicit associations (e.g., Cutting/Not Me). The order of trials was randomized across adolescents, which did not significantly affect performance on the SI-IAT at either time point ( $t$  values = 0.62–1.85,  $p$  values = .07–.54,  $d$  values = 0.12–0.34). Please visit [www.implicitmentalhealth.com](http://www.implicitmentalhealth.com) for samples of the test, and a separate article for sample stimuli.<sup>13</sup> Faster response latencies indicate stronger implicit associations between the paired concept–attribute categories. In this case, we would expect self-injurers to categorize pictures of cut skin into the cutting category faster when cutting was paired with me (versus not me). This is indicated by a higher and more positive  $D$  score, whose calculation is based on prior IAT work.<sup>23</sup> Internal consistency was assessed by correlating  $D$  scores for odd and even SI-IAT trials at baseline and applying the Spearman–Brown correction, yielding good split-half reliability ( $r = 0.77$ ). This IAT was administered within a larger battery of suicide-related IATs that will be reported separately by Miller et al. (unpublished manuscript). In an additional manuscript, Cha et al. report little to no iatrogenic effects of administering these IATs to this sample (manuscript under review).

**Explicit Self-Report Measures.** We examined patients’ explicit self-report in 2 ways. First, we captured their self-reported future likelihood of NSSI, which was assessed through a question on the SITBI: “On a scale of 0 to 4, what do you think are the chances that in the future you will purposely hurt yourself without wanting to die?” (0 = Not at all likely; 4 = Extremely likely). Second, we gauged their explicit identification with cutting behavior, which was assessed through a visual analogue scale. This scale presented a horizontal line with “Not Cutting” labeled on the left and “Cutting” labeled on the right. Patients were asked to place a single mark along the line indicating which side they identified with more. Since visual analogue scale scores were strongly correlated to adolescents’ self-reported future likelihood of NSSI ( $r = 0.74$ ,  $p < .001$ ), described above, we created composite scores by calculating and then summing up  $z$  scores from each explicit measure. Similar to previous comparisons of implicit and explicit measures,<sup>19,20</sup> this allowed us to preserve power and to reduce the risk of Type I error.

**Demographic Information and Psychiatric History.** Information on demographic factors and psychiatric diagnoses was collected after baseline assessment. This was extracted from medical charts by research assistants to decrease patients’ time and burden.

## Procedure

Approval for this study was provided by the institutional review boards of Boston Children’s Hospital and Harvard University. Each patient’s admission packet included a recruitment brochure about the current study. Patients and their parents who indicated interest in this study informed a unit or research staff member and were then approached by a research assistant to potentially provide informed assent/consent. Those patients who agreed to participate met with a research assistant to complete implicit and explicit measures once at admission and once again before discharge. They were also contacted by telephone 3 months after discharge for their follow-up interview. Patients were given a \$25 gift card for each assessment time point.

## Data Analysis

To test our first hypothesis, we conducted independent-samples  $t$  tests comparing self-injurers and noninjurers’ SI-IAT scores at baseline. The “past year” timeframe and baseline analyses were selected to match earlier tests of the SI-IAT.<sup>13</sup> Given the focus of the SI-IAT on cutting behavior, we tested the specificity of SI-IAT performance to methods of NSSI (i.e., cutting versus noncutting).

To test our second hypothesis, we conducted a series of logistic regressions predicting hospital-based NSSI and post-discharge NSSI. All prospective analyses were conducted only among adolescents reporting lifetime history of NSSI ( $n = 78$ ), thereby controlling for history of NSSI. We first identified risk factors of follow-up NSSI (i.e., hospital-based NSSI, post-discharge NSSI) to serve as covariates in prospective analyses (Table 1). We then ran bivariate regressions and 2 sets of multivariate regressions. The first multivariate model controlled for known risk factors entered into the first step of a hierarchical logistic regression analysis. The second multivariate model controlled for explicit self-report from admission

**TABLE 1** Risk Factors for Nonsuicidal Self-Injury (NSSI) Persistence Among Baseline Self-Injurers

	Hospital-Based NSSI OR (95% CI)	Post-Discharge NSSI OR (95% CI)
Age in years	0.62* (0.42, 0.90)	0.49** (0.32, 0.76)
Sex	0.63 (0.22–1.81)	2.12 (0.71–6.35)
Race/ethnicity	0.77 (0.35–1.72)	0.58 (0.25–1.33)
Psychiatric diagnoses (%)		
Mood disorder	0.27 (0.04–1.72)	0.65 (0.10–4.14)
Anxiety disorder	0.81 (0.30–2.20)	1.14 (0.42–3.08)
Eating disorder	0.75 (0.24–2.42)	1.00 (0.34–2.96)
Impulse control disorder	2.56 (0.66–9.90)	1.67 (0.43–6.59)
Alcohol/substance use disorder	0.88 (0.25–3.18)	0.62 (0.16–2.44)
Other disorder	0.36 (0.07–1.75)	0.20 (0.04–1.04)
Other psychiatric factors		
Total no. of disorders	0.72 (0.40–1.31)	0.71 (0.38–1.33)
GAF at admission	0.95 (0.89–1.02)	0.98 (0.93–1.05)
No. prior hospitalizations	0.86 (0.63–1.17)	0.83 (0.62–1.09)
Lifetime NSSI frequency	1.00 (0.99–1.00)	1.00 (0.99–1.01)
No. of NSSI methods	1.45* (1.06–1.97)	1.40* (1.01–1.94)

Note: Table lists hospital-based NSSI—included and postdischarge NSSI—included cutting behavior only, as baseline findings showed heightened specificity of Self-Injury Implicit Association Test scores to previous cutting behavior. GAF = global assessment of functioning; NSSI = nonsuicidal self-injury; OR = odds ratio.

\* $p < .05$ ; \*\* $p < .01$ .

entered into the first step of a hierarchical logistic regression analysis.

Related to the second hypothesis, we also conducted post hoc exploratory analyses via logistic regression to assess the predictive validity of IAT performance among those explicitly reporting high (versus low) future likelihood of NSSI. To test this, we examined the predictive validity of the IAT separately in those who reported a high likelihood of future NSSI (3–4 on the likelihood scale) and those who reported a low likelihood (0–2 on the likelihood scale).

Finally, we computed admission-to-discharge change in explicit self-report scores, such that higher scores indicated increased identification with and likelihood of cutting. Hierarchical logistic regressions predicting post-discharge NSSI were then conducted using these change scores.

## RESULTS

### Association With Past NSSI

Consistent with our first hypotheses, past-year self-injurers had significantly stronger implicit identification with NSSI than noninjurers ( $t_{121} = 4.02, p < .001, d = 0.73$ ) (Figure 1a). This effect appears to be driven by self-injurers who specifically used cutting as their NSSI method, which matched the stimuli featured in the SI-IAT (e.g., images of cut skin). Self-injurers who cut themselves differed from noninjurers and from self-injurers who used alternative methods of NSSI (e.g., hitting, scratching;  $F_{2,120} = 14.67, p < .001$ ) (Figure 1b). Post hoc analyses (with Bonferroni corrections) revealed that self-injurers who cut themselves had significantly higher SI-IAT scores than other groups ( $p$  values  $< .001$ ), and that there was no significant difference between noninjurers and self-injurers who did not cut ( $p = 1.00$ ). In light of these findings, results reported hereafter focus on NSSI using cutting.

### Short-Term Prediction of Future NSSI

Participant age and number of NSSI methods used in the past were the only demographic and clinical factors that

predicted NSSI during the follow-up periods (Table 1). Specifically, the younger the patients and the more methods of NSSI they had used in the past, the more likely they were to cut themselves during or after hospitalization. These variables were included as covariates in the prospective multivariate analyses described below.

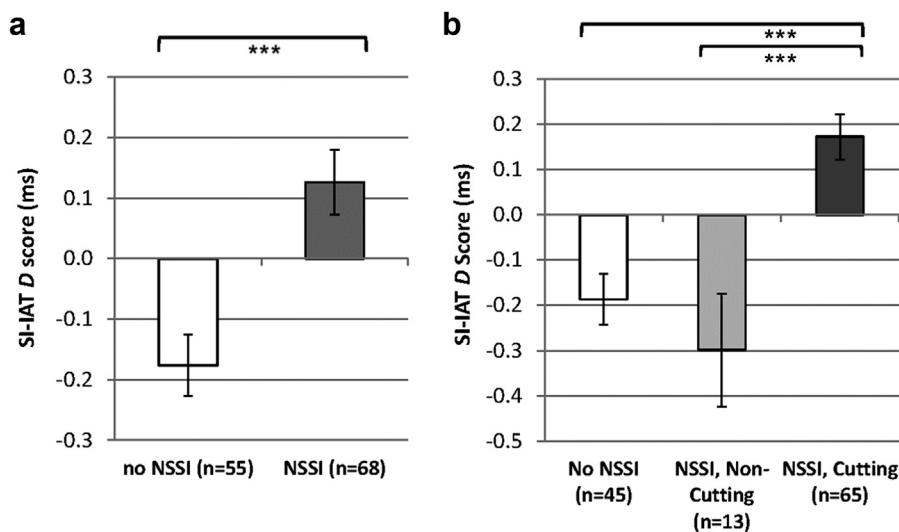
SI-IAT scores significantly predicted hospital-based cutting. This was demonstrated through a significant bivariate prediction model (odds ratio [OR] = 13.34, CI = 2.84–62.67,  $p = .001$ ) and multivariate prediction model controlling for age and number of NSSI methods (OR = 8.19, CI = 1.56–42.98,  $p = .01$ ). The multivariate model controlling for explicit self-report scores was marginally significant (OR = 5.77, CI = 1.00–33.50,  $p = .05$ ). SI-IAT scores were less predictive of post-discharge cutting behavior and did not predict post-discharge cutting in any of the bivariate or multivariate analyses (ORs = 1.50–3.10, CIs = 0.39–9.94,  $ps > .05$ ). Explicit self-report scores predicted hospital-based cutting (OR = 2.34, CI = 1.42–3.87,  $p = .001$ ) and post-discharge cutting (OR = 1.82, CI = 1.25–2.65,  $p = .002$ ), above and beyond SI-IAT scores.

One possible reason for this pattern of findings is that implicit measures do not carry much explanatory value when self-injurers report that they are going to continue engaging in NSSI, but perhaps implicit measures provide novel information when self-injurers say they are going to stop. Results revealed more modest prediction among self-injurers ( $n = 32$ ) reporting high likelihood of future NSSI (OR = 8.77, CIs = 1.21–63.60,  $p = .03$ ) and stronger prediction among self-injurers ( $n = 43$ ) reporting low likelihood of future NSSI (OR = 38.63, CIs = 1.41–1061.01,  $p = .03$ ). These post hoc results should be interpreted with caution, given the small sample size, and explored further with larger samples.

### Change From Admission to Discharge

Finally, we examined the predictive validity of admission-to-discharge change scores. Change in explicit measure scores

**FIGURE 1** Self-Injury Implicit Association Test (SI-IAT) scores at baseline: (a) nonsuicidal self-injury (NSSI) engagement (past year); (b) NSSI methods used (lifetime). Note: Error bars represent standard error. ms = milliseconds. \*\*\* $p < .001$ .



was a significant predictor, such that higher scores at discharge compared to admission increased the chance of post-discharge cutting (OR = 1.87, CI = 1.12–3.13,  $p = .02$ ). Change in SI-IAT scores was not a significant predictor (OR = 0.91, CI = 0.41–2.02,  $p = .82$ ).

## DISCUSSION

There are 5 key findings in this study. First, effect sizes of implicit measures are more modest among clinical samples than among community-based samples. Second, the SI-IAT measure is highly specific to cutting behavior. Third, implicit identification with NSSI predicts cutting behavior during inpatient stays. Fourth, patients' explicit self-reports are predictive of both hospital-based and post-discharge cutting. Fifth, implicit identification with NSSI can be useful in cases in which patients explicitly report low NSSI risk. Each finding is discussed in detail below.

Our first hypothesis was supported and replicates the results observed in the original SI-IAT study.<sup>13</sup> Notably, this study including psychiatric inpatients as both cases and controls produced more modest group differences ( $d = 0.73$ ) than those found among community-based adolescents ( $d = 1.20$ ). This is aligned with the recent meta-analytic finding that clinical samples produce more moderate between-group effects due to greater clinical severity of control groups.<sup>24</sup> Future work adapting the SI-IAT to clinical settings should anticipate moderate observed differences between self-injurers and noninjurers.

Second, the SI-IAT measure is specific to the NSSI method of cutting. At baseline, patients who used NSSI methods other than cutting (e.g., burning, inserting objects under their skin) did not differ from controls in their SI-IAT scores. This finding informs interpretation of SI-IAT scores, which should be elevated when assessing patients who cut themselves. It also points toward potential advantages of the existing SI-IAT, since cutting is the most common form of NSSI. These findings also highlight concrete and feasible ways for future IATs to target other outcomes of interest. An idiographic approach could be applied to further tailor task stimuli to a person's method of NSSI (e.g., images of bruises for someone who uses hitting as a method of NSSI). Indeed, the use of idiographic (versus nomothetic) IAT stimuli has been shown to effectively differentiate groups based on aggressiveness,<sup>25</sup> self-esteem,<sup>26</sup> and alcohol use status.<sup>27</sup>

Third, we provide initial evidence that implicit identification with NSSI is a viable short-term risk factor. Until now, the shortest follow-up time frame had been 6 months,<sup>16</sup> which did not produce positive results relative to other risk factors. By narrowing the time frame in the current study, we identified a time frame of approximately 2 weeks within which implicit identification with NSSI predicted subsequent cutting behavior. In addition to better understanding the strengths of implicit measures, we now also know the limits. Implicit identification with NSSI appears to have only an approximate 2-week period of predictive validity, thereby confirming its status as a proximal, NSSI-specific risk factor. Since implicit identification with NSSI did not predict NSSI occurring 3 months later, it is less

surprising that it did not predict NSSI 6 or 12 months later in prior studies.<sup>11,16</sup> Practically speaking, this illuminates the strengths (2-week prediction) and limits (3-month prediction) of this measure.

Fourth, patients' explicit self-report is a robust predictor of NSSI among adolescent inpatients. This counters initial expectations that patients may be reluctant to openly discuss sensitive topics (e.g., NSSI) because of fear of embarrassment or consequences.<sup>28</sup> There are several reasons why NSSI may not be as sensitive a topic as originally thought. First and foremost, adolescent inpatients may not perceive disclosure of NSSI as affecting their inpatient stay as much as suicidal urges. An important caveat of studies reporting weak predictive validity of self-report is that they involved suicide-related outcomes.<sup>7-10</sup> Adolescents may be more forthright about how much they identify with cutting behavior, or how likely they are to self-injure again. Similar patterns of more open self-reporting have been observed among violent inpatients, whose self-reported perceptions of future risk have been shown to predict post-discharge instances of self-injurious and violent behavior.<sup>29,30</sup> Alternatively, adolescent inpatients may be less reluctant to discuss self-injurious urges once they have been admitted to the inpatient unit (i.e., already deemed in need of greater care), compared to when they are presenting at a psychiatric emergency department (i.e., degree of care not yet determined) or seen outside the hospital. A final possibility is a recent cultural shift deeming it acceptable to discuss NSSI, which is evidenced by the increasing mention and presence of NSSI in the media.<sup>31</sup> Adolescents may therefore not perceive the topic of NSSI as sensitive in either a hospital or community setting. Future work is encouraged to clarify whether the predictive validity of self-report varies as a function of the predicted outcome, the treatment setting, or broader changes in how NSSI is perceived. Regardless of the reason, clinicians are encouraged to put substantial weight on adolescent inpatients' explicit self-report when gauging NSSI risk.

Fifth, patients' implicit and explicit responses can be combined to more strongly predict cutting behavior. Although explicit self-report largely outperformed the SI-IAT, there are 2 reasons why the former should not necessarily replace the latter. First, implicit identification with NSSI was a stronger predictor than the longstanding risk factors of NSSI history and number of NSSI methods, and it thereby carries valuable and incremental predictive validity beyond what we as a field already know. Second, implicit identification with NSSI remained predictive of cutting behavior among those individuals explicitly reporting low NSSI risk. This suggests that implicit measures may be especially useful when patients' self-reports do not match their past behavior. Clinically, these are situations that leave clinicians unclear on patients' actual levels of risk, and it is here that measures such as the IAT may offer some guidance. Importantly, future research should more rigorously test this post hoc finding.

The study findings should be interpreted in light of several important limitations. First, patients experienced variable lengths of stay at the inpatient unit. Although patients on average stayed for approximately 2 weeks, this

ranged from as few as 30 hours to as many as 116 days. The varying durations of stay between admission and discharge resulted in different amounts of time that patients had for their hospital-based NSSI to be captured. Related to repeat assessments, there remains the possibility of practice effects over time, as observed in other IAT studies.<sup>32</sup>

Second, we had limited statistical power to detect small effects. Although prior community-based research suggests large group differences in implicit associations about NSSI, clinical samples are likely to produce more moderate effects. One possibility is that the predictive validity of the SI-IAT weakens (i.e., yields smaller effect sizes) as the duration of the follow-up period increases. Larger sample sizes, whether community based or clinical, may be required to detect the smaller effect sizes of longer-term SI-IAT prediction models. Third, there was a limited range of risk factors to which implicit and explicit measures were compared. It should be kept in mind that the incremental predictive validity of implicit identification with NSSI and explicit self-report is relative only to risk factors that were controlled for; there remain strongly predictive risk factors that were not accounted for, such as childhood adversities, borderline personality disorder features, or low aversion to self-cutting stimuli.<sup>11,16,33</sup> Of note, past self-injurious thoughts and behaviors have been shown to be among the most robust predictors of future behavior,<sup>34-36</sup> so additional predictive variance may have been largely eliminated by controlling for NSSI history in the present study. Future work is encouraged to test shorter-term predictive models involving multiple behavioral measures and risk factors of NSSI.

Despite these limitations, the current findings mark an important extension of previous work. This study is the first to prospectively test the SI-IAT among clinically severe youth, and demonstrates its strengths in short-term

prediction. In light of current findings, we encourage incorporation of both implicit and explicit measures of NSSI in acute treatment settings. Through continued research and practice, the field will become better informed on where, with whom, and how these different assessments can be optimally used. &

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