

SELF-INJURY IMPLICIT ASSOCIATION TEST: COMPARISON OF SUICIDE ATTEMPTERS AND NON-ATTEMPTERS

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Self-report data are frequently used in assessing suicide risk; however, the ability of suicidal patients to feel, experience, and report their suicidal ideation has been challenged by several studies. The discrepancies between self-reports of suicide risk and actual suicidal behaviors have emerged across several studies. Deisenhammer, DeCol, Honeder, Hinterhuber, and Fleischhacker (2000) examined inpatient suicides and found that 40.9% patients had not expressed any suicidal thoughts.¹ Fawcett et al. (1987)² found that suicidal ideation was more prevalent in individuals that did not complete suicide than those who did. Studies on completed suicides in inpatient psychiatric settings have found that between 22.7% and 51% of patients had an improvement in psychiatric symptoms prior to the completion.^{1,3,4,5} Risk of completions is significantly elevated immediately following discharge, presumably shortly after patients denied suicidal intent.^{6,7}

Abstract: Given the weaknesses of self-report measures, there has been an increased interest in alternative methods of suicide risk assessment, primarily the implicit measures of suicide risk. This study aimed to determine differences in implicit identification with self-injury and implicit attitude towards self-injury between attempters and non-attempters using the Self-Injury Implicit Association Test (SI-IAT). The SI-IAT is a computer test designed to measure the implicit associations about self-injury. Participants were 100 forensic and civil inpatients at three psychiatric hospitals. A history of attempted suicide was very common in this sample. All participants completed the SI-IAT. Attempters and non-attempters did not significantly differ with respect to implicit identification with self-injury and implicit attitude towards self-injury. Implications are presented for assessment of suicide risk and future research.

Key Words: Suicide Attempts • Implicit Attitudes • Risk Factor • Inpatient

American Association of Suicidology (AAS, 2005) emphasizes that patient's self-report of suicidal ideation is not always accurate.⁸ Purposeful concealment of suicidal ideation and plans, exacerbation of suicidal symptoms following a suicide risk assessment, and unawareness or lack of insight into suicidal thoughts may interfere with a more realistic self-report of suicidal ideation.⁹ Given the weaknesses of self-report measures, there has been an increased interest in alternative methods of suicide risk assessment, primarily the implicit measures of suicide risk. "Implicit attitudes are introspectively unidentified (or inaccurately unidentified) traces of past experience that mediate favorable or unfavorable feeling, thought, or action toward social objects."¹⁰ Implicit attitudes are assessed using performance-based measures. Implicit

measures are believed to tap into automatic processes without an opportunity to edit the responses. Implicit attitudes have been hypothesized to guide behavior in a spontaneous and affective manner, independent of deliberate and conscious processes.¹¹

The Self Injury-Implicit Association Test (SI-IAT) is a computer test designed to measure the implicit associations about self-injury. The Implicit Association Test (IAT) measures the strength of automatic association between representations of concepts by requiring rapid categorization of various stimuli. It is based on the assumption that easier pairings and the associated faster responses are indicative of stronger association than difficult pairings and the associated slower responses. Nock and Banaji (2007a) found that self-injurers strongly asso-

ciated self-injury with self while non-injurers did not.¹² Nock and Banaji (2007b) found significant differences between non-suicidal adolescents, suicide ideators, and attempters on the identity version of the SI-IAT. Of particular importance, identity version of the SI-IAT was more important than demographic and psychiatric risk factors in predicting non-suicidal self-injury, current suicide ideation, and attempt status.⁹

It is of interest to know whether these differential implicit perceptions co-occur with varying intensities of distress, nature and number of prior suicidal attempts, clinical variables, and overall suicide risk. Insight into implicit attitudes towards self-harm and suicidality can indicate differential prognostic expectations and thereby entail different therapeutic interventions. Thus, the inclusion of implicit attitudes in psychological theorizing about suicidality is expected to serve as a means to link our current understanding of the risk and protective factors and the actual suicide potential. By linking suicidality to issues that concern the self, psychological theories of suicidality will potentially be able to make better sense of the maladaptive behaviors and symptoms and the co-occurring risk and protective factors. Given the extent of distress inherent in suicidality as a major health problem, it is important that theories and research explore all possible mechanisms relevant to the maintenance or development of suicidality. It is hoped that this broader focus in conceptualization of suicidality will lead to newer and/or better prevention and treatment strategies.

This study aimed to determine differences in implicit identification with self-injury and implicit attitude towards self-injury between attempters and non-attempters.

METHOD

Participants

One hundred patients were recruited from February 2009 through June 2009 from three psychiatric hospitals. The sample consisted of 63 males and 37 females ranging in age from 18 to 63 years ($M = 35.84$, $SD = 11.44$). The sample was 64% Caucasian, 29% African American, 4% Hispanic, and 3% biracial. Years of education ranged from seven to 17 ($M = 12.11$, $SD = 1.86$). Seventy-three percent of the patients were single, 5% were married, 16% were divorced, and 6% were separated. Among all 100 patients, 55% were involuntarily civilly committed, 11% were committed pursuant to judicial proceedings, 1% were voluntarily admissions, 21% were admitted by criminal courts as Not Guilty by Reason of Insanity (NGRI), and 12% were admitted during the pretrial phase of the criminal justice process as incompetent to stand trial. Among the 33 forensic patients, 91% were charged with a felony and 9% with a misdemeanor.

The patient's psychiatrist assigned diagnoses following the intake interview. Of the sample, 25% had a diagnosis of Major Depressive Disorder (MDD), 22% were diagnosed with Schizoaffective Disorder, 21% with Schizophrenia, 18% with Bipolar Disorder, 11% with Psychotic Disorder Not Otherwise Specified (NOS), 1% with Oppositional Defiant Disorder, 1% with Unspecified Episodic Mood Disorder, and 1% with Impulse Control Disorder. Eighty-two percent of the patients were diagnosed with a comorbid substance abuse/dependence disorder. Personality disorder diagnosis was present in 39% of patients, deferred in 51% of patients, and absent in 10%. The most common primary Axis II diagnosis was Antisocial

Personality Disorder (59%), followed by Borderline Personality Disorder (18%) and Personality Disorder NOS (18%); and the least common were Narcissistic Personality Disorder (2.5%) and Paranoid Personality Disorder (2.5%). Fourteen percent of the patients had two personality disorder diagnoses; the most common secondary personality disorder diagnosis was Borderline Personality Disorder. Axis V Global Assessment of Functioning (GAF) level at admission ranged from 10 to 65 ($M = 37.17$, $SD = 12.77$). The number of days of hospitalization ranged from one to 3391 ($M = 202.89$, $SD = 570.44$).

Nonparticipants.

Of the patients who participated in the study ($N = 205$) approximately 51% were excluded. Primary reasons for exclusion included aggressive behavior or the inability to complete the IAT. The mean age of participants ($M = 35.84$, $SD = 11.44$) was significantly lower than the mean age of nonparticipants ($M = 47.02$, $SD = 12.25$), $t(203) = -6.75$, $p < .0001$. Similarly, the mean educational level of participants ($M = 12.11$, $SD = 1.86$) was significantly higher than the mean educational level of nonparticipants ($M = 8.67$, $SD = 2.23$), $t(203) = 11.97$, $p < .0001$. With regards to the duration of hospitalization, there was no significant difference between the participants ($M = 202.89$, $SD = 570.44$) and nonparticipants ($M = 140.53$, $SD = 464.70$), $t(203) = .942$, $p = .35$. Like the participants, the majority of the nonparticipants were males (66%). Sixty-seven percent of the nonparticipants were Caucasian, 31% were African American, and 2% were Hispanic. Of the nonparticipants, 35% had a diagnosis of Bipolar Disorder, 30% were diagnosed with Schizophrenia, 19% with Major Depressive Disorder, 13% with Schizoaffective Disorder, and 3% with

Psychotic Disorder Not Otherwise Specified. Sixty-three percent of the nonparticipants were diagnosed with a comorbid substance abuse/dependence disorder. Personality disorder diagnosis was present in 53% of the nonparticipants, deferred in 26% of patients, and absent in 21%. The most common primary personality disorder diagnosis was Borderline Personality Disorder (26%), followed by Antisocial Personality Disorder (21%) and Personality Disorder NOS (53%). For the nonparticipants, Axis V Global Assessment of Functioning (GAF) level at admission ranged from 10 to 65 ($M = 36.37$, $SD = 12.81$) and this was not significantly different from the participants ($M = 37.17$, $SD = 12.77$), $t(203) = .45$, $p = .66$.

Measures

Self-Injury Implicit Association Test (SI-IAT, Nock & Banaji, 2007a). The SI-IAT is a computer test designed to measure the implicit associations about self-injury. The Implicit Association Test (IAT) measures the strength of automatic association between representations of concepts by requiring rapid categorization of various stimuli. Stimuli were presented one at a time in the center of the computer screen, and participants were instructed to classify them to the group labels appearing on the top half of the screen. Participants were instructed to press keys "e" (for stimuli to be classified on the left) and "i" (for stimuli to be classified on the right) immediately following the presentation of a stimulus. Following correct responses, participants were presented with the next stimulus. Following an incorrect response, a red "X" appeared below the stimulus and remained on the screen until the correct key was pressed. The importance of both speed and accuracy was emphasized.

In the present study, three different IATs were administered: The Flowers-Insects/Good-Bad IAT involved presentation of Flower names or Insect names along with Favorable words or Unfavorable words. The Identity version (i.e., the extent to which self-injury is associated with self) involved presentation of self-relevant words (e.g., *Myself, I*) or other-relevant words (e.g., *Their, Them*) along with self-injury images (e.g., pictures of skin that has been cut) or neutral images (i.e., pictures of non-injured skin). The Attitude version (i.e., the extent to which self-injury is associated with being a favorable vs. unfavorable behavior) involved the presentation of favorable words (e.g., *Relief, Peace*) or unfavorable words (e.g., *Incorrect, Ineffective*) along with self-injury or neutral images. The administration of the Flowers-Insects IAT always preceded the two SI-IATs. For counterbalancing, the presentation order of the identity and attitude versions varied across patients. Furthermore, the presentation of pairings within the attitude and identity versions of the IAT was counterbalanced. For each of the pairings of the attitude and identity versions of the IAT, patients were presented with one practice and one test trial block.

Inquisit 3.0 recorded the accuracy and the response times (in milliseconds) to each trial. Following the recommendations of Greenwald, Nosek, and Banaji (2003), response latencies of the practice and test blocks that involved pairings were analyzed using the most recent IAT scoring algorithm in Statistical Package for the Social Sciences (SPSS). Standardized D score was obtained by subtracting the mean latency of one pairing (e.g., *Cutting/Me*) from the mean latency of opposite pairing (e.g., *Cutting/Not Me*) and dividing this difference by the single standard deviation of both pairings. D score in-

dicates the relative strength of the association between the concepts relative to the inverse pairings. Following recommendations of Greenwald et al. (2003), a patient's D score was eligible for further analyses if the following conditions were satisfied: (1) the average latency of a patient was not greater (too slow responding) or lesser (too fast responding) than two standard deviations from the mean D score of the given IAT, (2) less than 11% of the trials were faster than 400 milliseconds, and (3) error rate was less than 33.3%. None of the patients' scores needed to be deleted for these reasons.

Procedure

This study was approved by the Institutional Review Boards and the three hospitals where data were collected. All patients were informed of the study and were invited to participate during on-unit groups or individually. The investigator explained the nature, purpose, and goals of the study, and potential risks involved in participation. To be included in the study, patients were asked to provide informed consent. For patients with guardians, consent was obtained from the legal guardians. Patients were excluded from the study if they refused to provide informed consent, were identified as having a developmental disability or dementia, were unable to complete the IATs, or posed a danger to the investigator.

Patients were administered the IATs by the investigator (clinical psychology doctoral student). The IATs were administered on a Dell Inspiron 630m personal computer using Inquisit 3.0 purchased from Millisecond Software. The investigator was passively present in the room during the administration of the IATs. All patients that participated in the study were debriefed and were reimbursed with hygiene items worth \$1.

Table 1
Comparison of Demographic and Clinical Characteristics of Attempters (N = 60) and Non-Attempters (N = 40)

| <i>Variable</i> | <i>Attempters</i> | <i>Non-Attempters</i> |
|---------------------------|-------------------|-----------------------|
| Mean Age | 36.13 | 35.40 |
| Gender (% Male) | 55 | 75 |
| Ethnicity (%) | | |
| Caucasian | 71.7 | 52.5 |
| African American | 20 | 42.5 |
| Hispanic | 6.7 | 0 |
| Other | 1.7 | 5 |
| Marital Status (%) | | |
| Single | 73.3 | 72.5 |
| Married | 6.7 | 2.5 |
| Divorced | 16.7 | 15 |
| Separated | 3.3 | 10 |
| Sexual Orientation (%) | | |
| Heterosexual | 95 | 100 |
| Homosexual | 5 | 0 |
| Mean Years of Education | 12.33 | 11.93 |
| Axis I Diagnosis (%) | | |
| Schizophrenia | 13.3 | 32.5 |
| Schizoaffective | 23.3 | 20 |
| Bipolar Disorder | 21.7 | 12.5 |
| Major Depressive | 35 | 10 |
| Psychotic Disorder NOS | 3.3 | 22.5 |
| Other | 3.3 | 2.5 |
| Substance Abuse (%) | | |
| Present | 81.7 | 82.5 |
| Axis II Diagnosis (%) | | |
| Antisocial | 28.3 | 15 |
| Narcissistic | 0 | 2.5 |
| Borderline | 11.7 | 0 |
| Paranoid | 0 | 2.5 |
| Other | 8.3 | 5 |
| None/Deferred | 51.7 | 75 |
| Mean GAF | 37.4 | 36.83 |
| Mean Days since Admission | 121.9 | 324.38 |

Note. GAF = Global Assessment of Functioning; Other Axis I diagnosis included Oppositional Defiant Disorder, Unspecified Mood Disorder, and Impulse Control Disorder; Other Axis II diagnosis included Personality Disorder Not Otherwise Specified and Cluster B Traits.

RESULTS

Descriptive Statistics

Mean average latency for the Attitude version of the SI-IAT was 1655.79 milliseconds (*SD* = 460.13) and for the Identity version was 1704.37 milliseconds (*SD* = 536.13). The mean error percentage for the Attitude version, as recorded by the computer, was 6.25 (*SD* = 5.84) and for the Identity version 7.02 (*SD* = 6.71). As previously noted, none of the patients had an error percentage greater than 33.33. None of the patients had more than 6.67% of latencies less than 400 milliseconds. Greenwald et al., (2003) indicate that latencies less than 400 milliseconds imply too fast responding and latencies more than 10,000 milliseconds imply too slow responding.

Incidence of Suicidality

The majority of patients (60%) had attempted suicide at least once. The number of suicide attempts ranged from a minimum of 0 to a maximum of 55 (*M* = 2.22). Among the patients with at least one suicide attempt, 41.67% had attempted suicide in the 18-day period prior to the survey date, 5% had attempted suicide in the 19-day to two-month period prior to the survey date. A

much larger percentage of patients (53.33%), however, attempted suicide in the 60-day to 10-year period prior to the survey date. In terms of methods of attempt, overdose/poisoning was most common (71.67%), followed by cutting (35%), hanging (23.33%), and jumping (13.33%). The least common methods were car exhaust (3.33%), firearm (1.67%), and drowning (1.67%).

Differences between Attempters and Non-Attempters

Table 1 summarizes the demographic and clinical characteristics of attempters and non-attempters. Both attempters and non-attempters had fairly similar characteristics with regards to mean age, sexual orientation, marital status, mean education level, and mean GAF score. With regards to ethnicity, 71.7% of attempters and 52.5% of non-attempters were Caucasians. Fifty-five percent of the attempters were male, whereas 75% of the non-attempters were male. Attempters were more likely to be given a diagnosis of Bipolar Disorder and Major Depressive Disorder compared to the non-attempters. Schizophrenia and Schizoaffective Disorder were more common in the non-attempters. Substance abuse was equally prevalent in both the groups. With regards to personality disorder diagnoses, Anti-

social Personality Disorder was the most common diagnosis in both the groups. Attempters were more likely to be given a diagnosis of Borderline Personality Disorder compared to non-attempters. There was a trend for Narcissistic and Paranoid Personality Disorder diagnoses to be more common in the non-attempter group. The inpatient mean length of stay for the attempters was 122 days and for the non-attempters was 324 days.

Attitude Version of the Self-Injury Implicit Association Test

An independent samples t-test was conducted to determine if attempters and non-attempters showed different associations on the Attitude version of the SI-IAT. The mean score for attempters (*M* = -.56, *SD* = .34) was not significantly different from the mean score of non-attempters (*M* = -.49, *SD* = .38), $t(96) = .93, p = .35$. These data are presented in Table 2. Although the sizes of the two groups were imbalanced (58 attempters, 40 non-attempters), the Levene's test was not significant, $F = .19, p = .66$. The 95% confidence interval for the difference in means between attempters and non-attempters was -.08 to .21, thus including the expected value of 0 and thereby indicating that the difference was not statistically significant. Therefore, there was no statistically signifi-

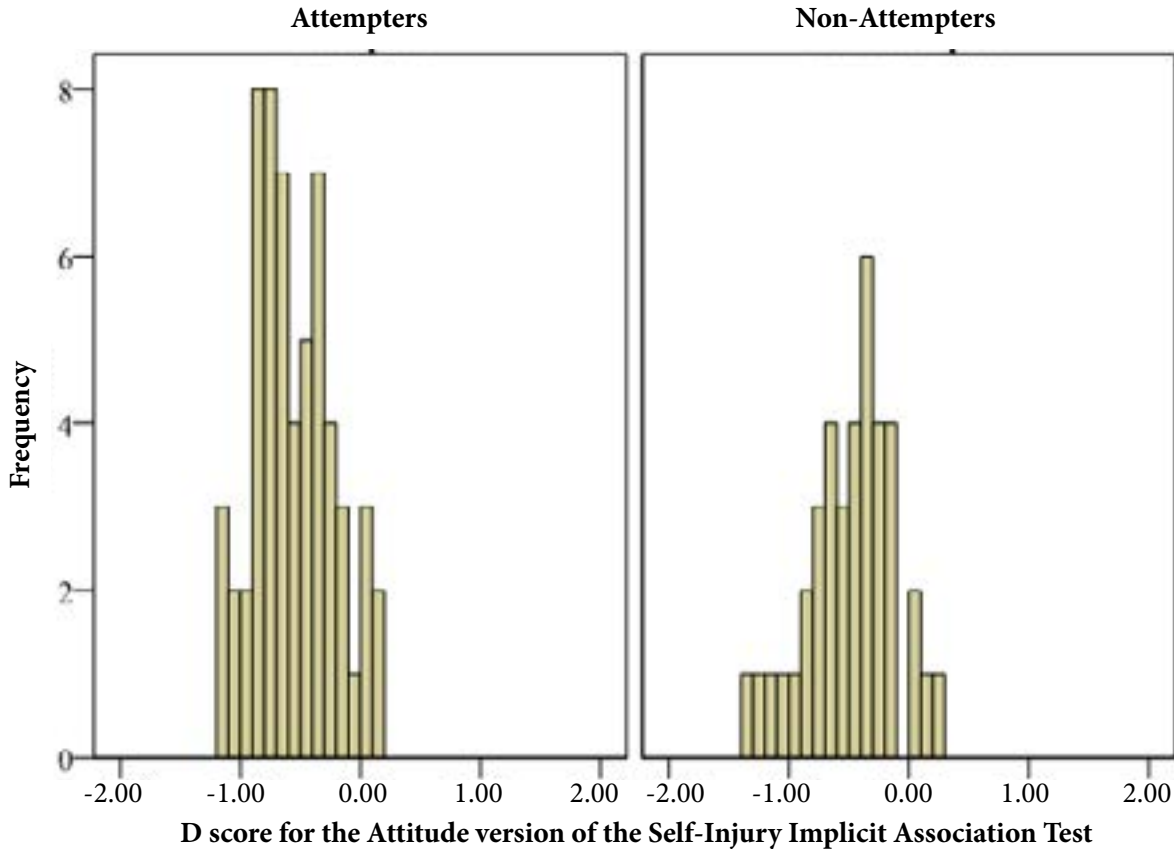
Table 2
Summary of T-Tests for the Attitude and Identity Versions of the Self-Injury Implicit Association Test for Attempters (N = 58) and Non-Attempters (N = 40)

| | <i>Attempters</i> | <i>Non-Attempters</i> | <i>t</i> | <i>df</i> |
|-----------------|-------------------|-----------------------|----------|-----------|
| Attitude | -.56 (.34) | -.49 (.38) | .93 | 96 |
| Identity | -.30 (.44) | -.29 (.36) | .11 | 96 |

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

Note. Standard deviations appear in parentheses below means.

Figure 1
Comparison of Performance of Attempters (N = 58) and Non-Attempters (N = 40)
on the Attitude Version of the Self-Injury Implicit Association Test



Note. Negative or positive values indicate the direction of the association (negative = *Cutting/Bad*, positive = *Cutting/Good*)

cant difference on the Attitude version of the SI-IAT between attempters and non-attempters. The histograms (Figure 1) show a similar distribution for the standardized *D* score for the Attitude version of the SI-IAT for attempters and non-attempters. The distribution is positively skewed for both the groups thereby indicating that most individuals in the two groups associated “Cutting” with “Bad.”

Identity Version of the Self-Injury Implicit Association Test

An independent samples *t*-test was conducted to determine if attempters showed a stronger associa-

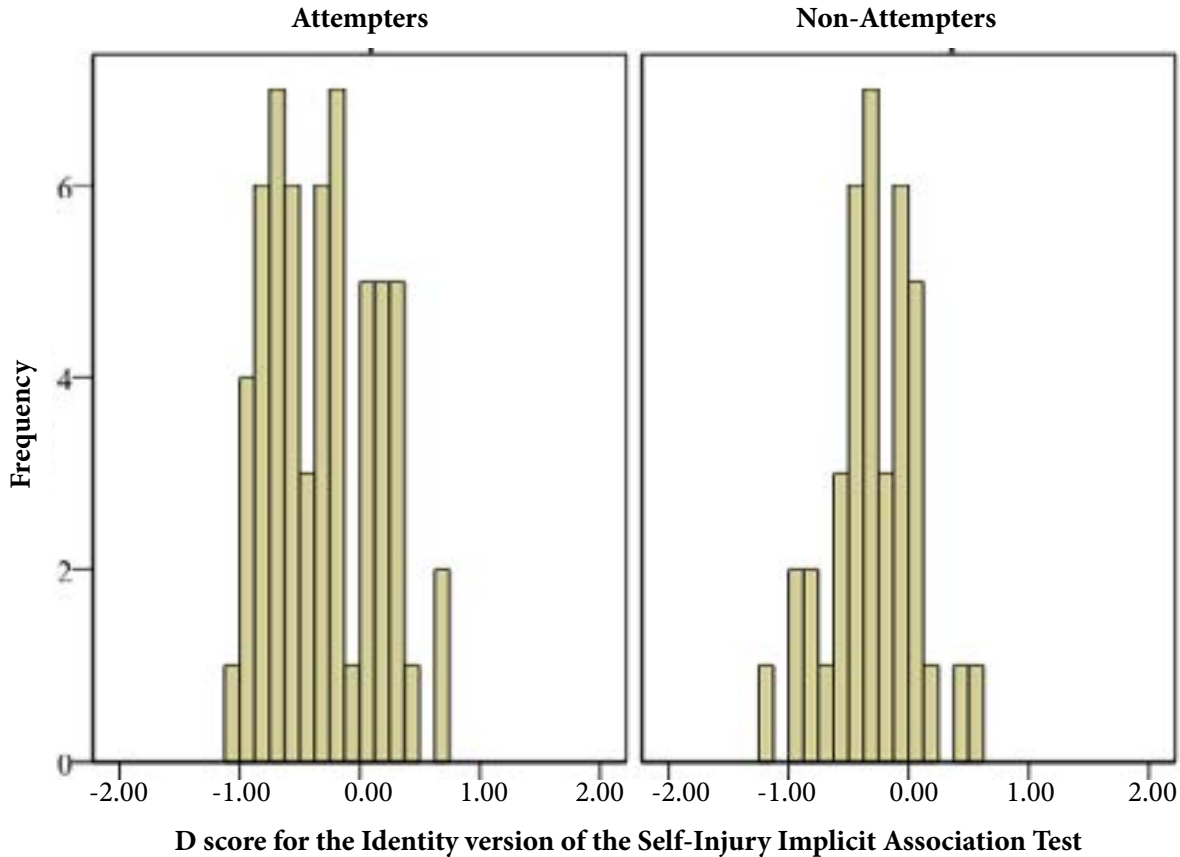
tion between “Cutting” and “Me” than non-attempters. The mean score for attempters ($M = -.30, SD = .44$) was not significantly different from the mean score of non-attempters ($M = -.29, SD = .36, t(96) = .11, p = .91$). These data are summarized in Table 2. Although the sizes of the two groups were imbalanced (58 attempters, 40 non-attempters), the Levene’s test was not significant, $F = .357, p = .06$. The 95% confidence interval for the difference in means between attempters and non-attempters was $-.16$ to $.17$ which contains the expected value of 0 thereby indicating that the sample statistic belongs to the null distribu-

tion. Therefore, there was no statistically significant difference on the identity version of the SI-IAT between attempters and non-attempters. The histograms (Figure 2) show a positively skewed distribution for attempters and non-attempters thereby indicating that most individuals in these two groups associated “Cutting” with “Not Me.”

DISCUSSION

It was hypothesized that attempters would show a stronger positive association between “Cutting” and “Me,” and “Cutting” and “Good,” whereas

Figure 2
Comparison of Performance of Attempters (N = 58) and Non-Attempters (N = 40)
on the Identity Version of the Self-Injury Implicit Association Test



Note. Negative values indicate association between *Cutting/Not Me* and positive values indicate association between *CuttingMe*.

non-attempters would show a stronger positive association between “*Cutting*” and “*Not Me*,” and “*Cutting*” and “*Bad*.” However, most patients in the present sample demonstrated lack of identification with self-injury and demonstrated unfavorable attitude towards self-harm. This pattern of associations is consistent with prior research on the SI-IAT.¹²

The absence of an association between the implicit and explicit measures of suicide risk warrants discussion. Given the distinct nature of explicit and implicit mental representations, low correlations are expected.^{13,14} Previous research has shown that the correlations between implicit and ex-

PLICIT measures depend on the psychological attribute being examined¹⁵ and structural fit between the implicit and explicit measures.¹⁶ Egloff and Schmukle (2002) argue that low correlations between the implicit and explicit measures are not likely to be the result of methodological issues because both implicit and explicit measures usually show a good distribution and adequate reliability.¹⁷

In previous research, non-suicidal individuals, ideators, and attempters have been found to significantly differ in terms of the association between self-injury and oneself.⁹ In the present study, neither implicit identity

nor implicit attitude distinguished between attempters and non-attempters, and this pattern of results was not consistent with expected findings. Nock and Banaji (2007b) suggest that images of skin cutting unambiguously represent the construct of self-injury. In their investigation, images of skin cutting predicted suicide criteria beyond the relation of these images to non-suicidal self-injury.⁹ However, all the suicide attempters in their study had a history of non-suicidal self-injury, and most of these attempters had engaged in cutting. On the contrary, the majority of patients in the present study had used overdose/poisoning as a method of attempting suicide. It is

possible that the differences in the nature of suicide attempts accounted for this unexpected finding. Given that the majority of patients in the present sample had used methods other than cutting, images of cutting may not have tapped into the associations between self-injury and oneself. Furthermore, the relationship between self-harm and suicide is complicated.

Another possible explanation for the failure of the implicit measures to predict attempter and non-attempter status is the prevalence of *recent* suicidality in the present sample. Although suicidality was very common in the present sample, only 18 patients had *recently* attempted suicide. In fact, the majority of patients had attempted suicide in the 6-month to 10-year period prior to the survey date. This is a particularly important consideration because IATs have been hypothesized to predict actual behavior only when the behavior results from *recurrent* impulsive behavioral activation.¹⁸ According to the Behavioral Process Model of Personality (BPMP),¹⁹ indirect tests like Thematic Apperception Test and IAT assess impulsive processes, wherein automatic processing of situational cues and automatic actions create associative representations of the self (e.g., “Me” – “Cutting”). Back et al. (2009) argue that the strength of these associations depends on the frequency of the behavior – “The more often an individual executes such a course of action, the stronger her/his association between the self and the respective trait concept will be” (p. 534).¹⁸ In the present study, a relatively low number of patients had *recently* attempted suicide, and this may have made the impulsive processes tapped by the IATs less pronounced in the present sample. Perhaps this result may be counteracted by studying a large sample of suicidal individuals with recent attempts.

Limitations

The findings of the present study should be interpreted in the context of several important limitations. First, psychotropic medications could have influenced performance on the IATs; however, medication information was not recorded for the patients. The potential of medications on suppressing suicidality cannot be dismissed. Although the investigation of the effect of psychotropic drugs on this measure was not the primary aim of our study, the influence of drug treatment is a relevant issue that deserves further investigation. Second, some patients who were severely ill because of psychiatric symptoms were unable to complete the IATs, which could have biased sample selection.

Future Research

A completed suicide is one of the most dreaded outcomes in the field of mental health. Studies that examine implicit attitudes in combination with transient risk factors of depression and hopelessness may lead to a more comprehensive understanding of suicide risk. Researchers could attempt to determine how these three variables interact with depression and hopelessness. It is possible that interactions among these variables result in an increased likelihood of suicidal attempts and eventually, completions.

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