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Abstract

Objectives: We examine correlates and predictors for implicit associations with non-suicidal self-injury (NSSI) with the Self-Injury Implicit Association Test (SI-IAT) in a treatment-seeking sample. We also examine group differences on the SI-IAT among those with low/none, moderate, and high/clinically significant borderline personality disorder (BPD) symptomatology. **Methods**: Participants (N = 111; 58% female; 89% White; M_{age} = 30.25) completed the SI-IAT and self-report measures at two time points. **Results**: Higher BPD symptom scores were significantly, positively correlated with stronger implicit identification with NSSI, and predicted NSSI identity when controlling for depression indices, history of NSSI, and other covariates. With Time 1 SI-IAT scores entered as a covariate, BPD scores no longer significantly predicted Time 2 SI-IAT scores. Individuals with moderate and high/clinically significant symptom counts of BPD had higher/stronger implicit associations with NSSI identity than those with no/low BPD symptoms. **Conclusions**: Individuals with symptoms of BPD may implicitly identify with NSSI more than other clinical groups; examination of implicit assessments in BPD in future research is needed to further explore implicit identification with NSSI in this patient group to further understand both cross-sectional and prospective relations.

Keywords: Self-Injury Implicit Association Test (SI-IAT), Borderline Personality Disorder (BPD), non-suicidal self-injury (NSSI), implicit identity

Practitioner Points

- Cross-sectional relations between severity of BPD symptomatology and implicit identification with NSSI suggest clinicians may find it useful to discuss identification with NSSI directly with patients
- Implicit tests for NSSI may offer additional tools for improving identification of NSSI risk in patients with BPD symptoms

Implicit Associations with Non-Suicidal Self-Injury: Examination in a Clinical Sample by Borderline Personality Symptomatology

The Implicit Association Test (IAT) captures implicit associations made between constructs/concepts based on reaction times (Greenwald et al., 2022). The Self-Injury IAT – Identity task (SI-IAT; Nock & Banaji, 2007) assesses implicit associations with non-suicidal self-injury (NSSI), that is, behavior that occurs in the absence of suicidal intent, causes immediate damage to body tissue, and occurs outside of culturally/socially sanctioned norms (Favazza, 2011; Klonsky et al., 2014). The SI-IAT includes stimuli for one method of NSSI, cutting, and captures implicit associations with NSSI identity (i.e., identification with images of cut or not cut skin, paired with words associated with the self). Patients with NSSI have historically been assessed with self-report measures, which are not designed to capture implicit thoughts, and may present problems with reliability, as it is common to deny or underreport NSSI behaviors due to stigma, shame (Simone & Hamza, 2020), social desirability, and/or to avoid unwanted treatment/hospitalization (Nock & Banaji, 2007). Thus, the SI-IAT offers an alternative method of assessment to understand implicit associations with NSSI. The SI-IAT has been shown to have short-term predictive utility in predicting future NSSI (Cha et al., 2016); in other samples, implicit identification with NSSI on the SI-IAT has been a less robust predictor of future NSSI behavior (Powers et al., 2021). Notably, the SI-IAT has been repeatedly shown to differentiate between those who have versus have not engaged in NSSI (Franklin, Lee, et al., 2014; Franklin, Puzia, et al., 2014; Glenn et al., 2017), and higher scores have been consistently observed among individuals with NSSI history (Dickstein et al., 2015; Glenn & Klonsky, 2011; Glenn et al., 2016; Glenn et al., 2017).

The SI-IAT has been tested in community (e.g., Glenn et al., 2017) and clinical samples of adults (e.g., Franklin, Lee, et al., 2014; Steele et al., 2020); clinical samples have involved a range of diagnoses, with a focus on examining whether the SI-IAT distinguishes those with versus without a history of NSSI (Franklin, Lee, et al., 2014; Franklin, Puzia, et al., 2014; Glenn et al., 2017). To our knowledge, only one published study (Scheunemann et al., 2023) examined the SI-IAT among patients with borderline personality disorder (BPD). This study found that individuals with BPD showed stronger implicit NSSI identity and implicit positive attitudes towards NSSI compared to healthy controls (Scheunemann et al., 2023). Further exploration of the SI-IAT in BPD is warranted due to the high prevalence of NSSI in this clinical population (Reichl & Kaess, 2021; Zanarini et al., 2008). NSSI has been identified as an early marker for BPD, and NSSI is closely tied to core features of BPD (e.g., emotion regulation; Reichl & Kaess, 2021). Further, it is estimated that 65-80% of individuals with BPD engage in NSSI (Brickman et al., 2014).

In NSSI research, identification with the behavior (e.g., identifying as a “cutter”) has been hypothesized to explain reasons for engaging in NSSI (Nock, 2009). The *implicit association hypothesis* suggests that NSSI may be chosen over and above other behaviors that may serve similar function once it has proven to be effective (Nock, 2009). In the absence of a stable sense of self, and deficits in emotion regulation (APA, 2022), individuals with BPD symptomatology may be particularly susceptible to implicitly identifying with NSSI. Thus, the current study aims to examine BPD symptoms as a predictor of implicit identification with NSSI on the SI-IAT (administered twice in a brief test-retest design) in a treatment-seeking sample with acute psychopathology. We also compare SI-IAT scores across groups by BPD symptom count. Patients with more BPD symptoms may show particularly strong implicit associations

with NSSI, due to the high prevalence of NSSI in this patient group (Brickman et al., 2014). Notably, NSSI has been identified as a risk factor for attempted suicide (Andover & Gibb, 2010) and suicidal behavior (Hamza et al., 2012), making its relevance to individuals with BPD especially important, as this patient group is at particularly high risk for suicide (i.e., 10% of individuals with BPD die by suicide; Paris, 2019). This is only the second study to explore implicit associations with NSSI in BPD, and involves a treatment-seeking sample, allowing for exploration of how individuals with BPD symptoms may score differently on the SI-IAT compared to other clinically distressed individuals, including those with subclinical BPD symptoms. To date, the only published study that has looked at SI-IAT scores examined them among individuals diagnosed with BPD (Scheunemann et al., 2023); we aim to examine BPD *symptoms* to expand this prior work, allowing for examination of BPD symptom count on SI-IAT performance.

Further, Scheunemann et al. (2023) compared individuals with BPD to healthy controls, limiting understanding of the impact any psychological disorder (e.g., major depression) may have on SI-IAT performance. NSSI is a transdiagnostic behavior seen across disorders and in the absence of psychopathology (Bentley et al., 2017). Depressive disorders have shown a strong relationship with NSSI, thought to be related to use of NSSI to regulate, manage, or alter affect (Zielinski et al., 2017). In DSM-5-TR criteria for major depressive disorder (MDD), self-injurious thoughts and behaviors are listed in the criteria (APA, 2022). Generally, research in this area has focused on adolescents, but the relationship has also been identified among adults. In an online sample of adults, approximately 12% of the sample who reported depression also endorsed NSSI history (Zielinski et al., 2017), and in both depressive and bipolar disorders, NSSI history has been associated with more severe depressive symptoms (Weintraub et al.,

2017). In a longitudinal study of depressed adolescents assessed one and eight years later (in young adulthood), NSSI was only predicted by prior NSSI at the eight-year follow-up, indicating occurrence of long-term, repetitive NSSI (Tuisku et al., 2014). Among college students, depression has been shown to predict (Peterson et al., 2014; Wilcox et al., 2012) and co-occur with NSSI (Andover et al., 2005). Finally, in a latent class analysis that examined subtypes of NSSI among young adults, Klonsky and Olino (2008) reported a distinct group characterized by: 1) using NSSI to regulate emotions, 2) extended latency (more than one hour) between NSSI urge and action, 3) a prior suicide attempt, and 4) high symptoms of depression, BPD, and anxiety. In our analyses, we will investigate the impact of depressive symptoms on associations between BPD symptoms and implicit NSSI identity. This is important given the recognized associations between depression and NSSI risk, and will allow us to look at the effects of BPD symptomatology more specifically.

Specific Aims, Hypotheses, & Planned Analyses

First, we examine relations between BPD symptoms and SI-IAT scores (Aim 1). We hypothesize that a) BPD symptoms will be significantly, positively correlated with implicit identification with NSSI (Pearson product-moment correlations), and b) those with clinically significant BPD will show higher/stronger SI-IAT scores than those without (independent samples *t*-test). Secondly, we explore number of BPD symptoms endorsed as a predictor of SI-IAT scores (Aim 2). We hypothesize that number of BPD symptoms will be the most robust predictor of SI-IAT scores, over and above depression indices and additional covariates (e.g., history of NSSI). Finally, we examine whether scores on the SI-IAT differ between groups (ANOVA with Bonferroni post hoc tests) based on BPD symptom counts (0-3 symptoms: none/low borderline traits, 4-6: moderate borderline traits, 7-10: clinically significant BPD; Aim

3). We hypothesize that those with clinically significant BPD scores will evidence the strongest implicit identification with NSSI on the SI-IAT.

Methods

Participants

Participants were recruited from an adult partial hospitalization program in a private psychiatric hospital (as described, *blinded for review*) that delivered cognitive-behavioral (including Dialectical Behavior Therapy; Linehan, 2015) individual and group therapy, and psychopharmacology. Recruitment for this study was part of a parent study (*blinded for review*), and was integrated into the program's research program. Participants were eligible for this study if they provided informed consent to participate in research while in treatment and spoke English (length of treatment: *sample mean* = 10.99 days; *SD* = 3.31 days; *blinded for review*). Exclusion criteria for the current study included current psychosis, mania, or cognitive impairment that would disrupt study procedures; these decisions were made by the first author in collaboration with the treatment team. One hundred and sixty-four patients were approached for recruitment, and 142 (87%) provided consent. The nature of the treatment program (e.g., discharges) did not allow all consented participants to complete the study; the final sample included 111 participants who completed the self-report screening for BPD (at admission) and the SI-IAT at both timepoints (typically day of admission, and roughly 3 days later). Study procedures were approved by the Institutional Review Board at the data collection site (*blinded for review,* #2014P001332). All procedures were performed in compliance with institutional guidelines.

The sample consisted of 64 females (58%), 46 males (41%), and one participant who identified as agender (1%), with a mean age of 30.25 years (*SD* = 11.04). Ninety-nine participants (89%) identified as white, 31 (28%) had graduated from college, 25 (23%) reported

graduate-level education, and 56 (51%) had been hospitalized previously for a mental health concern. According to the available diagnostic data (see Measures section below) completed for the majority of participants (*n* = 98), 76 (78%) met criteria for more than one psychological disorder at admission. The most common diagnoses on record determined by a structured clinical interview were: MDD (*n* = 42, 43%), bipolar disorder (*n* = 16, 16%), and generalized anxiety disorder (GAD; *n* = 14, 14%). According to the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003), 32 (29%) participants scored at or above the clinical cutoff (seven or above) for BPD.

Procedures

All patients in the program completed a research assessment battery at admission, which included demographic information and the MSI-BPD (Zanarini et al., 2003). One to three new patients were approached by the first author for recruitment each week if they met the above-mentioned inclusion criteria. The study was described, written consent was obtained, and a first (Time 1) SI-IAT assessment was scheduled. Assessments were conducted during lunch to avoid disruptions in treatment. Because research participation was an option built into the program structure, patients who agreed to engage in research were not compensated; thus, participants who enrolled in the current study participated on a volunteer basis.

2.2.1 *Time 1 (T1) Assessment*. If possible, the T1 SI-IAT assessment was scheduled for the same day that participants consented (i.e., day one). Assessments took place on a laptop in a private room with the first author, and safety concerns were brought to the participant's treatment team if necessary. Additional self-report measures were also completed at this time as part of the parent study (*blinded for review*).

Time 2 (T2) Assessment.

The SI-IAT was completed at T2 by all participants approximately three days after the T1 assessment (M = 3.82 days, SD = 1.60). No iatrogenic effects were reported regarding episodes of NSSI during or in response to study participation.

Measures

Demographic data. Demographic information was obtained as part of the program research initiative, and used in this study to describe the sample.

Depression Anxiety Stress Scale - Short Version (DASS-21; Lovibond & Lovibond, 1995). The DASS - Short Version includes 21 items assessing self-reported depression, anxiety, and stress on a 0-to-3 Likert scale (higher scores indicate more symptoms). Participants completed the DASS at both time points and were asked to report symptoms over the past 24 hours; for this study, the Depression subscale was used to examine self-reported depression. The DASS is a reliable and valid scale (Ng et al., 2007), and Cronbach's alpha showed good reliability in this sample at both timepoints for the Depression subscale: T1: .92, T2: .95.

Inventory of Statements About Self-Injury - Part A (ISAS; Klonsky & Olino, 2008). The ISAS is a self-report measure with two sections assessing methods (A) and functions (B) of NSSI. We utilized Part A to capture yes/no lifetime history for methods of NSSI, and to capture most recent NSSI episode. We used this to determine lifetime history of NSSI (e.g., if one or more methods were endorsed, a participant was included in the "NSSI group").

McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003). The MSI-BPD was included in the program's assessment to capture self-reported BPD symptoms. This measure consists of 10 items (yes/no) aligned with DSM-IV BPD criteria; scores $\leq$ 7 indicate clinically significant symptoms. This measure has been used to screen for BPD, and has shown good sensitivity and specificity in identifying the

presence/absence of BPD (.81 and .85, respectively; Zanarini et al., 2003). In this study, we used the MSI-BPD to examine symptom counts for BPD. For Aim 1 *t*-tests, we used a dichotomous variable for "BPD yes/no" based on MSI-BPD scores; participants who scored seven and higher were considered to have a positive/yes screen for BPD. This measure was also used to group participants into none/low BPD (scores of 0-3; n = 38, 34%), moderate BPD (scores of 4-6; n = 41, 37%), and high/clinically significant BPD (scores 7 and higher; n = 32, 29%) for Aim 3. Internal consistency in the current sample was good at .73.

Mini-International Neuropsychiatric Interview (MINI; Sheehan et al., 1998). The MINI was used in the program for diagnostic assessments at admission (n = 98). The MINI is a structured diagnostic interview that aligns with DSM diagnoses, and was completed by doctoral-level trainees or clinical psychologists. For this study, we used the diagnosis assigned by the assessor to determine current diagnosis of MDD. Diagnostic assessments were completed for 98 of the 111 participants due to varying program-related and clinical reasons (e.g., conflicts with treatment, patient declined to complete the interview, the clinical team deemed the assessment unnecessary due to a recent inpatient hospitalization). In some cases, participants had partial diagnostic assessments complete (e.g., 94 of 98 assessments had information available in the section assessing PTSD).

Self-Injury Implicit Association Test (SI-IAT; Nock & Banaji, 2007). The SI-IAT – Identity was designed to capture implicit associations of oneself with self-injury, as measured by reaction times during categorization of words and images related to the self and NSSI (cutting; Nock & Banaji, 2007). Participants are presented with either words (self-related or other-related, e.g., "Mine" or "They") or images (depicting cut or intact skin) in the center of the screen, and they sort these stimuli to the left or right side of the screen by pressing the "E" or "I" key

according to the words that appear on each side in each test block (e.g., “Cutting” vs. “No Cutting”; “Me” vs. “Not Me”). The same key allocation is used for different constructs. IATs consist of seven blocks/trials, with two critical test blocks (blocks four and seven on the SI-IAT; the order is counterbalanced) that list, for example, the word “Cutting” with the word “Me” and images of cut or non-cut skin (Nock & Banaji, 2007). The participant will then see the words in the second critical test block flipped; “Cutting” will appear with “Not Me” and “No Cutting” with “Me” as images of cut and non-cut skin appear in the center of the screen. The assumption is that the faster and more accurately the participant sorts the words/images in the center of the screen to words that appear on the left or right of the screen (e.g., sorts a picture of cut skin to the left side of a screen that says “Me or Cutting” on the left vs. “Not me or No Cutting” on the right), as compared to the reversed category coupling, the stronger the implicit association is between those concepts (response times are measured in milliseconds; Carpenter et al., 2019; Nock & Banaji, 2007). In the current study, participants completed one full SI-IAT (seven trials, three of which were practice blocks; no trials were excluded) at each timepoint. The SI-IAT was scored using the “improved scoring algorithm” as described by Greenwald et al. (2003); an error penalty was not used, in line with best practices (Greenwald et al., 2003, p. 206), as participants who made errors were required to correct their responses, so the recorded latencies include a “built-in error penalty” in the form of the additional time needed to make a correct response. Standardized d-scores were calculated and used to represent the strength of implicit NSSI identity, where higher scores indicate stronger associations between the paired concepts. The SI-IAT was administered twice as part of a parent study (*blinded for review*); multiple administrations of the IAT are in line with current best practices for use of the IAT in research, and internal consistency at each timepoint was calculated according to Greenwald et al.’s (2022,

p. 1172) guidelines. Specifically, we divided the trials from each combined task into two parts randomly, calculated d-scores for each part, and here report their correlations: .83 at both T1 and T2. SI-IAT scores were normally distributed at T1 and T2 assessments and are appropriate for planned multiple regression analyses.

Power

A priori analyses conducted with *G*Power* (Faul et al., 2007) for the parent study (*blinded for review*) revealed that an N of 139 would detect a medium effect ($f^2 = 35$) in multivariate regression models, including up to four predictors. A specific power analysis for current study aims was not conducted prior to data collection, as these aims were not explicitly included in the initial parent study, however, the sample size is similar to Scheunemann et al.'s (2023; 40 individuals with BPD and 25 healthy controls). Analyses were conducted in SPSS 29.0.2 and R 4.3.3 and 4.4.1.

Results

Fifty-eight participants (52%) reported lifetime NSSI history; 35 of those participants (60%) reported a history of cutting. One participant (2%) engaged in NSSI on the day of the study assessment, eight (14%) in the last week, 17 (29%) in the last month, seven (12%) in the last six months, five (9%) in the last year, and 20 (34%) more than one year ago. Group differences (independent samples *t*-test) for SI-IAT scores by NSSI recency were not significant for participants with past month NSSI ($n = 26$) compared to those with without ($n = 32$; i.e., NSSI occurred 30+ days prior to assessment) at T1 (with past month NSSI: $M = .03$, $SD = .60$, with no past month NSSI: $M = -.08$, $SD = .52$, $p = .43$, Cohen's $d = .21$) or T2 (with past month NSSI [$n = 26$]: $M = .15$, $SD = .59$, with no past month NSSI [$n = 32$]: $M = -.11$, $SD = .50$, $p =$

.08, Cohen's d = .47). This suggests that implicit identification with NSSI may be relevant to participants regardless of their most recent NSSI episode.

Participants who scored at or above the clinical cutoff for BPD did not differ significantly from those who did not by gender identity, or for diagnoses of current panic disorder, social anxiety disorder, obsessive compulsive disorder, generalized anxiety disorder, or psychotic disorder. Chi-square analyses showed differences for those with clinically significant BPD compared to those without for MDD (22.4% vs. 39.8%, χ^2 (1, n = 98) = 5.87, p = .02), bipolar (manic) episode (2.0% vs. 0%, χ^2 (1, n = 98) = 5.37, p = .02), PTSD (8.5% vs. 9.6%, χ^2 (1, n = 94) = 5.06, p = .03), and history of prior psychiatric hospitalization (9.0% vs. 40.5%, χ^2 (1, n = 111) = 6.02, p = .01). Those participants who scored above the cutoff for BPD were more likely to meet criteria for MDD (81.5% vs. 54.9%), bipolar disorder (manic episode; 7.4% vs. 0.0%), PTSD (33.3% vs. 12.9%), and to have been hospitalized previously (68.8% vs. 43.0%).

Please see Table 1 for demographic and clinical variables/scores in the full sample and by BPD symptom count.

Table 1

Key Variables in the Full Sample and by BPD Symptom Severity

Variable	Full sample (N = 111)	No/Low BPD (n = 38, 34%)	Mod. BPD (n = 41, 37%)	High/Clin. Sig. BPD (n = 32, 29%)
Gender identity (n, %)				
Female	64, 58%	22, 58%	21, 51%	21, 66%
Male	46, 41%	16, 42%	19, 46%	11, 34%
Agender	1, 1%	0, 0%	1, 2%	0, 0%
MSI-BPD total score (M, SD, α)	4.79, 2.60, .73	1.89, 1.03	4.95, 0.84	8.03, 0.86
	42, 43%	15, 48%	24, 60%	22, 81%

Current MDD diagnosis (*n*, %) (*n* = 98)				
DASS Dep T1 (*M, SD*, α)	15.60, 11.42, .92	12.63, 10.20	16.88, 11.34	17.55, 12.51
DASS Dep T2 (*M, SD*, α)	14.38, 12.11, .95	12.68, 10.91	13.95, 11.18	17.03, 14.42
SI-IAT Identity T1 (*M, SD*, α)	-.21, 0.51, .84	-.30, 0.42	-.26, 0.49	-.033, 0.60
SI-IAT Identity T2 (*M, SD*, α)	-.10, 0.49, .90	-.30, 0.40	-.02, 0.50	0.03, 0.52
History of NSSI (*n*, %)	58, 52%	16, 42%	20, 49%	22, 69%
No. of NSSI methods (*M, SD*)	1.63, 2.15	0.95, 1.43	1.61, 2.33	2.47, 2.38
Age of NSSI onset (*M, SD*)	16.0, 5.83	16.38, 6.51	14.47, 6.10	17.00, 5.03
NSSI recency (*n*, %)				
Today	1, 2%	1, 6%	0, 0%	0, 0%
Past week	8, 14%	2, 13%	2, 10%	4, 18%
Past mo.	17, 30%	1, 6%	8, 40%	8, 36%
Past 6 mos.	7, 12%	1, 6%	1, 5%	5, 23%
Past year	5, 9%	2, 13%	2, 10%	1, 5%
1 year+	20, 35%	9, 56%	7, 35%	4, 18%
Length of NSSI urge (*n*, %)				
< 1 hr	28, 48%	10, 63%	8, 40%	10, 45%
1-3 hrs	12, 21%	1, 6%	5, 25%	6, 27%
4-6 hrs	3, 5%	1, 6%	1, 5%	1, 5%
7-12 hrs	4, 7%	0, 0%	1, 5%	3, 14%
13-24 hrs	6, 10%	3, 19%	2, 10%	1, 5%
> 1 day	0, 0%	0, 0%	0, 0%	0, 0%

Notes. BPD = Borderline Personality Disorder; MDD = Major Depressive Disorder; NSSI = Non-suicidal self-injury; DASS Dep = Depression Subscale of the Depression, Anxiety, Stress Scales (short-form); T1 = Time 1 assessment at baseline/admission; T2 = Time 2 assessment; SI-IAT = Self-Injury Implicit Association Test; MSI-BPD total score = score on the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; clinical cutoff for BPD = 7); M = Mean; SD = Standard deviation; α = Cronbach's alpha in the full sample.

Regarding diagnostic comorbidity with depression, participants with a diagnosis of MDD had significantly higher BPD scores (M = 5.20, SD = 2.52) than those without (M = 4.08, SD = 2.52; t (96) = -2.13, p = .04, Cohen's d = .44). Self-reported depression scores on the DASS did not differ by those with versus without clinically significant BPD at T1 (p = .35, Cohen's d = .20) or T2 (p = .24, Cohen's d = .29).

Aim 1: BPD symptoms & SI-IAT scores

Our first aim focused on associations between BPD symptom counts and SI-IAT scores. As predicted, MSI-BPD total scores were significantly, positively correlated with SI-IAT - Identity scores at T1 (r = .22, p = .02) and T2 (r = .27, p = .004; see Table 2). BPD scores were also significantly, positively correlated with NSSI history (r = .23, p = .02), a diagnosis of MDD (r = .21, p = .04), and self-reported depression on the DASS at T1 (r = .22, p = .02).

Table 2

Bivariate Correlations for Main Variables of Interest

Variable	1	2	3	4	5	6	7
1. MSI-BPD scores	—						
2. T1 SI-IAT Identity	.22*	—					

3. T2 SI-IAT Identity	.27**	.58**	—				
4. Current MDD	.21*	.15	.06	—			
5. T1 DASS scores	.22*	.17	.18	.51**	—		
6. T2 DASS scores	.14	.22*	.14	.48**	.77**	—	
7. NSSI	.23*	.36**	.23*	.21*	.31**	.25**	—

Note. MSI-BPD = McLean Screening Instrument for Borderline Personality Disorder total score; T1 = Time 1 d-score; T2 = Time 2 d-score; SI-IAT- I = Self-Injury Implicit Association Test - Identity; MDD = major depressive disorder (yes/no for current diagnosis); DASS = Depression, Anxiety, Stress Scales- Depression subscale score; NSSI = non-suicidal self-injury (yes/no history of NSSI). Pearson product-moment correlations were used to test bivariate relationships between quantitative/numeric variables. Point-biserial correlations were used to test bivariate relationships between a quantitative/numeric and a dichotomous variable (Current MDD and NSSI).

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

Next, an independent samples *t*-test showed that individuals with clinically significant scores on the MSI-BPD had higher scores on the SI-IAT (M = -.03, SD = .60) than those without (M = -.28, SD = .45; t (45.83) = -2.06, p = .045) at the T1 assessment, which were statistically significant. The magnitude of the differences in the means (mean difference = -2.44, 95% *CI*: -.48 to -.01) was small to medium (Cohen's d = .49). At T2, differences on the SI-IAT between individuals with clinically significant scores on the MSI-BPD (M = .03, SD = .52) and those without (M = -.15, SD = .47) were not significant, t (109) = -1.73, p = .09, Cohen's d = .36.

Aim 2: Regressions predicting SI-IAT scores from BPD symptoms, depression, and clinical covariates

Next, standard multiple regression analyses were used to examine predictors of implicit NSSI identity (see Table 3).

Table 3

Regression Models Examining Predictors and Covariates of SI-IAT – Identity Scores

Predictor	Model 1[a]	Model 2[b]	Model 3[a]	Model 4[b]	Model 5[a]	Model 6[b]	Model 7[a]	Model 8[b]
MSI-BPD scores	.20	.27**	.20*	.26**	.19	.27**	.13	.23*
Current MDD	.11	.00			.06	-.06	.07	-.06
T1 DASS scores			.12		.09		.02	
T2 DASS scores				.10		.13		.11
Gender							.07	.05
NSSI							.07	-.12
NSSI: Cutting							.37**	.43**
R^2	.06	.08	.06	.09	.07	.09	.23	.21
F	3.08	3.83*	3.66*	4.95**	2.22	3.01*	4.41**	4.08**

Note. Standardized regression coefficients are presented. [a] Refers to models where Time 1 SI-IAT scores were the dependent variable. [b]Refers to models where Time 2 SI-IAT scores were the dependent variable. T1 = Time 1; T2 = Time 2. MDD = Current diagnosis of Major Depressive Disorder; DASS = Depression, Anxiety Stress Scales- Depression subscale score (self-report); NSSI = Non-suicidal self-injury.

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

First, we examined MSI-BPD effects on SI-IAT scores while controlling for MDD diagnosis. For T1 SI-IAT scores, total variance explained by the full model was 6.1%, F (2, 95) = 3.08, p = .051 (see Table 3, model 1). MSI-BPD scores showed positive regression weights (ß = .20) that were not significant (p = .05) in predicting T1 SI-IAT scores. For T2 SI-IAT scores, total variance explained by the full model was 7.5%, F (2, 95) = 3.83, p = .01 (see Table 3, model 2). MSI-BPD score also showed significant positive regression weights (ß = .27) in predicting T2 SI-IAT Identity scores.

Next, we explored MSI-BPD effects on SI-IAT scores while controlling for DASS depression scores. For T1 SI-IAT scores with T1 DASS scores, total variance explained by the full model was 6.4%, F (2, 107) = 3.66, p = .04 (see Table 3, model 3). MSI-BPD scores showed significant positive regression weights (ß = .20) in predicting implicit associations with T1 SI-IAT scores. For T2 SI-IAT scores with T2 depression scores, total variance explained in the full model was 8.5%, F (2, 107) = 4.95, p = .01 (see Table 3, model 4). Again, MSI-BPD scores showed significant positive regression weights (ß = .26) in predicting implicit NSSI identity at T2.

We then included both depression indices by timepoint in the regression models to further explore relations between MSI-BPD scores and implicit NSSI identity. For T1 SI-IAT scores with T1 DASS scores, MDD, and BPD, the full model was not significant (p = .09; see Table 3, model 5). When predicting T2 SI-IAT scores with T2 DASS scores, MDD, and BPD, total variance explained in the full model was 8.8%, F (3, 94) = 3.01, p = .03 (see Table 3, model 6). Again, MSI-BPD score showed significant positive regression weights (ß = .27) in predicting implicit NSSI identity at T2.

Lastly, to explore the impact of additional covariates, T1 SI-IAT scores were predicted by MSI-BPD scores, MDD, DASS scores, gender identity, lifetime NSSI history, and lifetime cutting history (the only NSSI method shown on the SI-IAT). For T1 SI-IAT scores, total variance explained by the full model was 22.7%, F (6, 90) = 4.41, $p < .001$ (see Table 3, model 7). Lifetime history of cutting was the only variable with significant positive regression weights (ß = .37) in predicting implicit NSSI identity at T1. For T2 SI-IAT scores, total variance explained by the full model was 21.2%, F (6, 91) = 4.08, $p < .01$ (see Table 3, model 8). Both lifetime history of cutting (ß = .43) and MSI-BPD scores (ß = .23) evidenced significant positive regression weights in predicting implicit NSSI identity at T2.

We also explored the impact of entering T1 SI-IAT scores as a covariate in the abovementioned models predicting T2 SI-IAT scores, as the SI-IAT was completed twice roughly three days apart in the parent study's (*blinded for review*) brief test-retest design. T1 SI-IAT scores were the most robust predictor of T2 SI-IAT scores, and in each model that originally predicted T2 SI-IAT scores (see 2, 4, 6, and 8 in Table 3), BPD scores were no longer significant (all *p*s > .06). Although exploratory, these findings are expected, as prior work has shown temporal stability of the SI-IAT; that is, participants' scores were not observed to change significantly across time through brief repeated assessments *(blinded for review*).

Aim 3: BPD symptom severity group differences on SI-IAT Identity scores

Finally, participants were grouped into three categories based on MSI-BPD scores to further examine BPD symptom count and SI-IAT scores. As mentioned, 38 participants (34%) scored in the none-to-low range for BPD (0-3 on MSI-BPD), 41 (37%) scored in the moderate range (4-6), and 32 (29%) scored in the high/clinically significant range for BPD (7–10). A one-way between-groups analysis of variance was conducted to explore the impact of BPD symptom

count on SI-IAT scores. Scores were not significantly different at T1 (p = .07, eta squared = .05). At T2, there was a statistically significant difference in SI-IAT scores by BPD symptom count: F (2, 108) = 4.95, p = .01, eta squared = .08. Bonferroni post hoc tests showed that the significant differences in implicit NSSI identity were between the none/low BPD group (M = -.29, SD = .40) and the moderate (M = -.02, SD = .50) BPD group ($mean_{difference}$ = -.28, SE = .11, p = .03, 95% CI: -.54, -.02), and the none/low BPD group and the high/clinically significant (M = .03, SD = .52) BPD group ($mean_{difference}$ = -.32, SE = .11, p = .02, 95% CI: -.60, -.04). Scores did not differ significantly for the moderate versus high/clinically significant BPD groups.

Discussion

In NSSI research, the *implicit association hypothesis* explains one way to conceptualize and understand how and why NSSI is chosen over adaptive behaviors once it has proven effective in serving a particular function (e.g., affect regulation; Nock, 2009). The SI-IAT offers a tool to assess the strength of implicit NSSI identity (Nock & Banaji, 2007). As Scheunemann et al. (2023) noted in the only published study to date that has examined implicit associations with NSSI in patients with BPD symptomatology, it is surprising that the SI-IAT has not been tested in this patient population. There is an incredibly high prevalence of NSSI among individuals with BPD (Brickman et al., 2014; Zanarini et al., 2008), and it has been found to be a useful diagnostic marker of BPD (Reichl & Kaess, 2021). This is only the second study to examine the SI-IAT and BPD symptoms, and the first study to examine implicit identification with NSSI on the SI-IAT among individuals with varying levels of BPD symptom counts, and between those with BPD symptoms and those with other types of current psychopathology (e.g., mood disorders).

In this study, BPD symptom scores showed a significant, positive relationship with implicit NSSI identity, indicating that individuals who endorsed more symptoms of BPD evidenced stronger/higher implicit identification with NSSI, supporting our Aim 1a hypothesis. Those participants with clinically significant BPD showed higher/stronger SI-IAT scores than those without, supporting our Aim 1b hypothesis. These findings were consistent with prior research (Scheunemann et al., 2023). Notably, in the current study we were able to compare individuals with clinically significant BPD to those without (Scheunemann et al., 2023 used healthy controls for comparison), all of whom were experiencing current psychopathology, and many of whom also endorsed subclinical symptoms of BPD.

Results for Aims 2 and 3 represent a preliminary examination of BPD symptom count as a prospective predictor of SI-IAT scores, and group differences on the SI-IAT by BPD symptom severity. These findings are novel, as prior literature in this area is scarce. Aim 2 hypotheses regarding the predictive ability of BPD symptom scores for SI-IAT scores were partially supported. BPD symptom scores significantly predicted implicit NSSI identity when controlling for current MDD and self-reported depression. When additional covariates were added to the model, BPD scores continued to significantly predict implicit NSSI identity at the T2 assessment. The only other variable with significant regression weights in this model was "history of cutting". These findings suggest that BPD symptom scores, second only to history of cutting, are predictors of implicit NSSI identity. However, inclusion of T1 SI-IAT scores as a covariate in models predicting T2 SI-IAT scores rendered BPD scores nonsignificant across models. Finally, we found that individuals with moderate to high/clinically significant symptoms of BPD showed significantly stronger/higher implicit association with NSSI identity than individuals with no/low BPD symptoms, partially supporting our Aim 3 hypothesis. These group

comparisons suggest that presence of even a few symptoms of BPD may be associated with stronger implicit NSSI identity, making a distinction between the ways in which those with BPD symptoms respond to the SI-IAT compared to those who experience no symptoms or very few symptoms of BPD.

Limitations & Future Directions

Study results should be interpreted with the following limitations in mind. First, BPD symptom severity was assessed with a self-report measure commonly used as a quick and efficient screen for BPD (Zanarini et al., 2003). Future studies may consider structured diagnostic interviews to diagnose BPD, allowing for additional examination of group differences by BPD symptoms and/or severity. Second, we may have been slightly underpowered due to sample size, particularly with our exploratory look at BPD symptom counts across three groups (Aim 3). Power analyses were conducted for an associated parent study; we were underpowered for two of three study aims. Results should be examined in future studies in a larger sample to determine if they are replicable, to examine effect sizes in other samples, and to further understand how BPD symptomology impacts scores on the SI-IAT at different time points and over time. Third, the study was cross-sectional in nature. Fourth, the sample was predominantly white and educated, and all participants were in treatment; results should be replicated and tested to determine generalizability. Similar to studies that have examined the predictive validity of the SI-IAT for future occurrence of NSSI among individuals with current/past NSSI (e.g., Cha et al., 2016), an interesting future study in this area might examine whether the SI-IAT (i.e., implicit identification with NSSI) predicts actual NSSI behavior among participants with BPD. Further, although we identified significant cross-sectional relationships between BPD and SI-IAT scores, prospective findings were not significant in this sample with the addition of the T1 SI-IAT scores

as a covariate. Additional research is needed to further examine the relationship between BPD and SI-IAT across assessment points to understand the discrepancies in the current study for relations from T1 to T2. These findings should be tested in additional samples to determine whether and how implicit associations may relate to and prospectively predict NSSI among patients with BPD symptoms/diagnosis, and to further explore whether significant findings are replicated.

Clinical Implications & Conclusions

Despite interest in NSSI research over the last 20 years, we continue to fall short of being able to reliably predict and prevent NSSI (Franklin, Puzia, et al., 2014). Implicit assessments may be of interest to both researchers and clinicians, as they may offer an additional assessment point that may capture associations outside of conscious awareness (Nock & Banaji, 2007). The current study offers a preliminary exploration of relations between BPD symptomatology and implicit identification with NSSI, suggesting that there are expected meaningful cross-sectional, and possibly prospective, relations between these constructs. Further exploration of the SI-IAT with individuals with BPD symptoms has the potential to offer additional insight into use of IATs in a patient population at high risk for repeated NSSI (Brickman et al., 2014). Prior research has shown the short-term predictive utility of the SI-IAT among individuals with NSSI (Cha et al., 2016); future work in this exciting area of research on the SI-IAT has the potential to improve clinical assessment of a behavior that is otherwise quite difficult to predict (Franklin, Puzia, et al., 2014) with specific patient populations at highest risk for NSSI.

References

American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). https://doi.org/10.1176/appi.books.9780890425787

Andover, M. S., & Gibb, B. E. (2010). Non-suicidal self-injury, attempted suicide, and suicidal intent among psychiatric inpatients. *Psychiatry Research*, *178*(1), 101–105. https://doi.org/10.1016/j.psychres.2010.03.019

Andover, M. S., Pepper, C. M., Ryabchenko, K. A., Orrico, E. G. and Gibb, B. E. (2005), Self-mutilation and symptoms of depression, anxiety, and borderline personality disorder. *Suicide and Life-Threatening Behavior*, *35* (5), 581-591. https://doi.org/10.1521/suli.2005.35.5.581

Bentley, K. H., Nock, M. K., Sauer-Zavala, S., Gorman, B. S., & Barlow, D. H. (2017). A functional analysis of two transdiagnostic, emotion-focused interventions on nonsuicidal self-injury. *Journal of Consulting & Clinical Psychology*, *85*(6), 632–646. https://doi.org/10.1037/ccp0000205

Brickman, L. J., Ammerman, B. A., Look, A. E., Berman, M. E., & McCloskey, M. S. (2014). *Borderline Personality Disorder and Emotion Dysregulation, 1*(14), 1-8. doi: 10.1186/2051-6673-1-14

Carpenter, T., Pogacar, R., Pullig, C., Kouril, M., Aguilar, S., LaBouff, J. P., Isenberg., N., & Chakroff, A. (2019). Survey-software Implicit Association Tests: A methodological and empirical analysis. *Behavior Research Methods*, *51*(5), 2194-2208. DOI: 10.3758/s13428-019-01293-3

Cha, C. B., Augenstein, T. M., Frost, K. H., Gallagher, K., D'Angelo, E. J., & Nock, M. K. (2016).

Using implicit and explicit measures to predict nonsuicidal self-injury among adolescent inpatients. *Journal of the American Academy of Child & Adolescent Psychiatry, 55*(1), 62-68. https://doi.org/10.1016/j.jaac.2015.10.008

Dickstein, D. P., Puzia, M. E., Cushman, G. K., Weissman, A. B., Wegbreit, E., Kim, K. L., Nock, M. K., & Spirito, A. (2015). Self-injurious implicit attitudes among adolescent suicide attempters versus those engaged in nonsuicidal self-injury. *Journal of Child Psychology & Psychiatry, 56*(10), 1127–1136. https://doi.org/10.1111/jcpp.12385

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

Favazza, A. R. (2011). *Bodies under siege : self-mutilation, nonsuicidal self-injury, and body modification in culture and psychiatry* (Third edition.). Johns Hopkins University Press.

Franklin, J. C., Lee, K. M., Puzia, M. E., & Prinstein, M. J. (2014). Recent and frequent nonsuicidal self-injury is associated with diminished implicit and explicit aversion toward self-cutting stimuli. *Clinical Psychological Science, 2*(3), 306-318. https://doi.org/10.1177/2167702613503140

Franklin, J. C., Puzia, M. E., Lee, K. M., & Prinstein, M. J. (2014). Low implicit and explicit aversion toward self-cutting stimuli longitudinally predict nonsuicidal self-injury. *Journal of Abnormal Psychology, 123*(2), 463–469. https://doi.org/10.1037/a0036436

Glenn, C. R., Kleiman, E. M., Cha, C. B., Nock, M. K., & Prinstein, M. J. (2016). Implicit cognition about self-injury predicts actual self-injurious behavior: Results from a longitudinal study of adolescents. *Journal of Child Psychology and Psychiatry, 57*(7), 805–813. https://doi.org/10.1111/jcpp.12500

Glenn, J. J., Werntz, A. J., Slama, S. J. K., Steinman, S. A., Teachman, B. A., & Nock, M. K. (2017). Suicide and self-injury-related implicit cognition: A large-scale examination and replication. *Journal of Abnormal Psychology*, *126*(2), 199–211. https://doi.org/10.1037/abn0000230

Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, *85*(2), 197–216. https://doi.org/10.1037/0022-3514.85.2.197

Greenwald, A. G., Brendl, M., Cai, H., Cvencek, D., Dovidio, J. F., Friese, M., Hahn, A., Hehman, E., Hofmann, W., Hughes, S., Hussey, I., Jordan, C., Kirby, T. A., Lai, C. K., Lang, J. W. B., Lindgren, K. P., Maison, D., Ostafin, B. D., Rae, J. R., & Ratliff, K. A. (2022). Best research practices for using the Implicit Association Test. *Behavior Research Methods*, *54*(3), 1161–1180. https://doi.org/10.3758/s13428-021-01624-3

Hamza, C. A., Stewart, S. L., & Willoughby, T. (2012). Examining the link between nonsuicidal self-injury and suicidal behavior: A review of the literature and an integrated model. *Clinical Psychology Review*, *32*(6), 482–495. https://doi.org/10.1016/j.cpr.2012.05.003

Klonsky, E. D., & Olino, T. M. (2008). Identifying clinically distinct subgroups of self-injurers among young adults: A latent class analysis. *Journal of Consulting and Clinical Psychology*, *76*(1), 22–27. https://doi.org/10.1037/0022-006X.76.1.22

Klonsky, E. D., Victor, S. E., & Saffer, B. Y. (2014). Nonsuicidal self-injury: What we know, and what we need to know. *CANADIAN JOURNAL OF PSYCHIATRY-REVUE CANADIENNE DE PSYCHIATRIE*, *59*(11), 565–568. https://doi.org/10.1177/070674371405901101

Linehan, M. M. (2015). *DBT® skills training manual* (2nd ed.). Guilford Press.

Lovibond, P. F., Lovibond, S. H., Lovibond, P. F., & Lovibond, S. H. (1995). Depression Anxiety Stress Scales--21. *Behaviour Research and Therapy*, *33*(3), 335–343. https://doi.org/10.1037/t01004-000

Ng, F., Trauer, T., Dodd, S., Callaly, T., Campbell, S., & Berk, M. (2007). The validity of the 21-item version of the Depression Anxiety Stress Scales as a routine clinical outcome measure. *Acta Neuropsychiatrica*, *19*(5), 304–310. https://doi.org/10.1111/j.1601-5215.2007.00217.x

Nock, M. K. (2009). Why do people hurt themselves? New insights into the nature and functions of self-injury. *Current Directions in Psychological Science*, *18*(2), 78–83. https://doi.org/10.1111/j.1467-8721.2009.01613.x

Nock, M. K., & Banaji, M. R. (2007). Assessment of self-injurious thoughts using a behavioral test. *American Journal of Psychiatry: Official Journal of the American Psychiatric Association*, *164*(5), 820–823. https://doi.org/10.1176/ajp.2007.164.5.820

Paris, J. (2019). Suicidality in borderline personality disorder. *Medicina (Kaunas, Lithuania)*, *55*(6). https://doi.org/10.3390/medicina55060223

Peterson, C. M., Davis-Becker, K., & Fischer, S. (2014). Interactive role of depression, distress tolerance and negative urgency on non-suicidal self-injury. *Personality and Mental Health*, *8*, 151– 160. https://doi.org/10.1002/pmh.1256

Powers, J. T., Brausch, A. M., & Muehlenkamp, J. J. (2021). Explicit and implicit measurement of nonsuicidal self-injury in the prediction of concurrent and prospective self-injury. *Suicide and Life-Threatening Behavior*, *51*(4), 665–672. https://doi.org/10.1111/sltb.12734

Reichl, C., & Kaess, M. (2021). Self-harm in the context of borderline personality disorder. *Current Opinion in Psychology*, *37*, 139–144. https://doi.org/10.1016/j.copsyc.2020.12.007

Scheunemann, J., Kühn, S., Biedermann, S. V., Lipp, M., Peth, J., Gallinat, J., & Jelinek, L. (2023). Implicit cognitions on self-injurious and suicidal behavior in borderline personality disorder. *Journal of Behavior Therapy and Experimental Psychiatry*, *79*. https://doi.org/10.1016/j.jbtep.2023.101836

Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *The Journal of clinical psychiatry, 59 Suppl 20*, 22–57.

Simone, A. C., & Hamza, C. A. (2020). Examining the disclosure of nonsuicidal self-injury to informal and formal sources: A review of the literature. *Clinical Psychology Review, 82*(101907), 1-15. https://doi.org/10.1016/j.cpr.2020.101907

Steele, S. J., Furbish, K., Björgvinsson, T., & Swenson, L. P. (2020). An exploratory mixed methods approach to implicit and explicit identification with non-suicidal self-injury. *Journal of Behavior Therapy and Experimental Psychiatry, 69*. https://doi.org/10.1016/j.jbtep.2020.101594

Tuisku, V., Kiviruusu, O., Pelkonen, M., Karlsson, L., Strandholm, T., & Marttunen, M. (2014). Depressed adolescents as young adults–predictors of suicide attempt and non-suicidal self-injury during an 8-year follow-up. *Journal of Affective Disorders*, *152-154*, 313-319. https://doi-org.libproxy.smith.edu/10.1016/j.jad.2013.09.031

Weintraub, M. J., Van de Loo, M. M., Gitlin, M. J., & Miklowitz, D. J. (2017). Self-harm, affective traits, and psychosocial functioning in adults with depressive and bipolar disorders. *The Journal of Nervous and Mental Disease, 205*(11), 896-899. https://doi.org/10.1097/nmd.0000000000000744

Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., & O'Grady, K. E. (2012). Longitudinal predictors of past-year non-suicidal self-injury and motives among college students. *Psychological Medicine, 42*(4), 717-26. https://doi.org/10.1017%2FS0033291711001814

Zanarini, M. C., Vujanovic, A. A., Parachini, E. A., Boulanger, J. L., Frankenburg, F. R., Hennen, J., Zanarini, M. C., Vujanovic, A. A., Parachini, E. A., Boulanger, J. L., Frankenburg, F. R., & Hennen, J. (2003). McLean Screening Instrument for Borderline Personality Disorder. *Journal of Personality Disorders*, *17*(6), 568–573. https://doi.org/10.1521/pedi.17.6.568.25355

Zanarini, M. C., Frankenburg, F. R., Reich, D. B., Fitzmaurice, G., Weinberg, I., & Gunderson, J. G. (2008). The 10-year course of physically self-destructive acts reported by borderline patients and axis II comparison subjects. *Acta Psychiatrica Scandinavica*, *117*(3), 177–184. https://doi.org/10.1111/j.1600-0447.2008.01155.x

Zielinski, M. J., Veilleux, J. C., Winer, E. S., & Nadorff, M. R. (2017). A short-term longitudinal examination of the relations between depression, anhedonia, and self-injurious thoughts and behaviors in adults with a history of self-injury. *Comprehensive Psychiatry*, *73*, 187-195. https://doi-org.libproxy.smith.edu/10.1016/j.comppsych.2016.11.013