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Explicit and Implicit Nonsuicidal Self-Injury in Young Adults

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EXPLICIT AND IMPLICIT NONSUICIDAL SELF-INJURY IN YOUNG ADULTS

A Thesis Presented to
The Faculty of the Department of Psychological Sciences
Western Kentucky University
Bowling Green, Kentucky

In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By
Jeffrey Thomas Powers

August 2019

EXPLICIT AND IMPLICIT NONSUICIDAL SELF-INJURY IN YOUNG ADULTS

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Directed by: Amy Brausch, Jenni Teeters, and Matt Woodward

Department of Psychological Sciences

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Suicide was the 18th leading cause of death, and the 2nd leading cause of death for 15-29 year old's worldwide in 2016 (WHO, 2018). Suicide is the 10th leading cause of death in the United States (CDC, 2018). One risk factor that is often above and beyond other risk factors (Asarnow et al., 2011; Guan, Fox, & Prinstein, 2012) is nonsuicidal self-injury (NSSI). NSSI is intentional self-inflicted damage to the surface of the body in the absence of lethal intent (Nock, 2010a), such as cutting or burning of the skin. The relationship between self-reported or explicit, NSSI behavior and implicit identification with NSSI in young adults is vastly important to understand, considering the under-reported nature of NSSI and the subsequent elevated risk of more severe NSSI, which can ultimately increase risk for future suicidal thoughts or behaviors. Therefore, fully understanding how best to assess NSSI and how implicit association with NSSI may relate to its severity is of vital clinical importance. In the total baseline sample, data were collected from 421 young adults; of those 324 completed Time 2 data collections.

Participants attended two different public universities: one in the south central and one in the midwestern region of the United States. Results indicated that baseline implicit SI-IAT scores significantly predicted both past year NSSI frequency and versatility (number of methods) in this sample. It was expected that baseline SI-IAT *d*-scores would predict NSSI frequency and versatility 6-months in the future, and that SI-IAT *d*-scores would be a stronger predictor of future NSSI engagement than participants' self-reported likelihood

of future NSSI engagement, and these hypotheses were not supported. Lastly, it was expected that individuals' baseline SI-IAT *d*-scores would be significantly associated with their 6-month follow up SI-IAT *d*-scores, and this hypothesis was supported. These findings suggest that although implicit identification with oneself and self-harm is important for to understand, there are limitations regarding the possible utility of the SI-IAT in predicting future NSSI engagement and further research is needed to fully understand why NSSI continues to be such a strong predictor of future NSSI behavior, suicidal ideation and behavior.

Introduction

Suicide was the 18th leading cause of death overall, and the 2nd leading cause of death for 15-29 year olds worldwide in 2016 (WHO, 2018). Suicide is the 10th leading cause of death in the United States (Centers for Disease Control and Prevention [CDC], 2018). Suicide attempts and suicidal ideation are therefore important behaviors to thoroughly understand, particularly in order to better predict and prevent such behavior. One risk factor that increases the likelihood of future suicidal ideation or behavior is nonsuicidal self-injury (NSSI). NSSI is intentional self-inflicted damage to the surface of the body in the absence of lethal intent (Nock, 2010a), such as cutting or burning of the skin. Research over the past decade has identified the increased presence of NSSI in adolescents and young adults, (Mercado, Holland, Leemis, Stone, & Wang, 2017) and it typically begins during adolescence (Nock, 2009; Klonsky, 2011). Lifetime prevalence rates of NSSI vary depending on sample type, but are typically lower in community samples, (7.5% Hilt et al., 2008) with higher estimates in psychiatric inpatient samples (Jacobson et al., 2008). Prevalence rates vary across gender and by state, but averages between 10-20% (Martin, Mcree, & Deryck, 2018). Lifetime prevalence rates of NSSI have averaged 20% in community adolescent samples (Muehlenkamp, Peat, Claes, & Smits, 2012), with inpatient rates up to 61% according to Franklin and colleagues (2012). A systematic global study that recently examined rates of NSSI and Deliberate Self Harm (DSH; with and without suicidal intention) found comparable prevalence despite differing nomenclature, 18% and 16.1%, respectively (Muehlenkamp, Claes, Havertape & Plener, 2012). Relatively high occurrences of NSSI behavior in both clinical and community samples led to NSSI Disorder being introduced in the *Diagnostic and*

Statistical Manual of Mental Disorders (5th ed; *DSM-5*) as a disorder for further study (APA, 2013). The inclusion was based on evidence that NSSI is possibly a distinct psychiatric disorder (Muehlenkamp, 2005). Clinicians and researchers often rely on explicit self-report measures to gauge both the features and functions of NSSI, but these disclosures are fraught with problems such as accuracy, or fear of social stigmatization. Self-report NSSI measures could be supplemented with more objective based behavioral tasks, such as an unconscious or implicit association test that begins to quantify the relationship with oneself and self-harm. Therefore, it is crucial to assess individuals' explicit and implicit identification with NSSI to improve identification of those at high risk of self-harm. Implicit identification with NSSI could be utilized to supplement self-report measures, particularly with adolescences and young adults who may deny such behaviors. Although NSSI is a strong predictor of future NSSI and suicide risk, some features of NSSI are more robustly related to suicidal ideation and behavior than others, such as frequency of NSSI and number of NSSI methods endorsed (known as versatility). Brausch and Boone (2015) demonstrated that more frequent NSSI was associated with more frequent suicide attempts, and adolescents with higher NSSI frequency were also more likely to report co-occurring risk behaviors such as alcohol and drug use and disordered eating. In summary, adolescents and young adults in both clinical and community samples have shown elevated levels of NSSI behavior over the past decade, so much so that NSSI may be recognized as a distinct psychiatric disorder. Therefore, fully understanding the explicit and implicit features of NSSI is of vital clinical importance.

Although NSSI and suicidal behaviors are divergent in many ways, there is a strong relationship between the two because of shared psychopathology. Some of the risk factors for suicide are present in NSSI as well. Numerous risk factors that are associated with NSSI include depression (Chartrand, Sareen, Toews, & Bolton, 2012; Marshall, Tilton-Weaver, & Stattin, 2013; Peterson, Davis-Becker, & Fischer, 2014), past sexual abuse (Gratz, 2003), identifying as a sexual minority (Brunner, Kaess, & Wasserman, 2014), cigarette and/or drug usage (Guvendeger, Zahmacioglu, Ciftci, Kocaman, & Erodgan, 2017; Madge, Hawton, & Arensman, 2011), and emotion dysregulation (Anestis, Pennings, Lavender, Tull, & Gratz, 2013; Brausch & Woods, 2019). NSSI severity is typically conceptualized as NSSI frequency, either lifetime occurrences or within a specific time frame (such as past 12 months for DSM as outline in DSM-5 proposed criteria), and versatility (total number of different NSSI methods used). These two markers of NSSI severity have been found to be associated with a number of other NSSI and suicide outcomes. Individuals who engage in NSSI typically endorse a variety of reasons for their behavior, with the vast majority acknowledging being motivated by emotions (Heath, Ross, Toste, Charlebois, & Nedecheva, 2009). Research into NSSI and emotion regulation within NSSI often examines both poor emotional regulation in regards to the engagement of NSSI, and NSSI as an emotion regulation strategy. Midkiff, Lindsey, and Meadows (2018) demonstrated that greater difficulty regulating emotions in individuals was predictive of increased frequency of NSSI engagement. Emotion dysregulation has also been associated with both NSSI and suicidal behavior (Rajappa, Gallagher, & Miranda, 2012). Past studies have also found greater emotion dysregulation in individuals with multiple suicide attempts compared to those with a single attempt

(Esposito, Spirito, Boergers, & Donaldson, 2003). Robertson, Miskey, Mitchell, and Nelson-Gray (2013) examined the relationship between specific personality traits, functions of NSSI such as negative reinforcement, and psychopathologies, finding that all were closely related to NSSI versatility. It was noted that NSSI versatility was positively associated with Openness and negatively with Conscientiousness, such that being less conscientious and more open to new experiences facilitated a greater number of NSSI methods. NSSI versatility was also significantly and positively related to social and automatic negative reinforcement. These studies begin to highlight the critical importance of emotion regulation skills in the development of NSSI behavior.

Although the intent behind NSSI and suicide are different, there are some overlapping features. Most individuals who engage in NSSI never attempt suicide, but most individuals who attempt or die by suicide have a history of NSSI (Brausch, Williams, & Cox, 2016). As previously stated, NSSI is a risk factor for future suicide ideation and attempts, but the transition from non-lethal to lethal intent remains unclear. It was recently suggested (Klonsky, May, & Glenn, 2013) that NSSI is a unique risk factor for suicide because of desire and capability, which are both present in NSSI behavior. The desire to alleviate pain or suffering can often increase the frequency of NSSI, which can intensify lethal intent as one becomes more habituated to painful and provocative events, thus increasing capability of potential lethal self-harm in the future. Anestis, Knorr, Tull, Lavender, and Gratz (2013) demonstrated this notion, finding that lifetime number of NSSI episodes predicted higher lethal intent during a suicide attempt. It was recently demonstrated that frequency of NSSI was significantly associated with suicidal behavior and that the relationship was strengthened when a wider variety of

NSSI methods (versatility) were used (Anestis, Khazem, & Law, 2015). It was proposed this increase was possibly due to amplified comfort with the concept of self-inflicted damage to one's own body resulting from diverse NSSI methods. Additionally, individuals with an earlier age of NSSI onset (before 12 years old) reported greater NSSI frequency, versatility, and hospital related NSSI visits (Ammerman, Jacobucci, Kleiman, Uyeji, & McCloskey, 2018). A community sample of Australian adolescents were examined over one year and found that NSSI frequency, potential lethality, and versatility increased among the adolescents who continued to self-injure (Andrews, Martin, Hasking, & Page, 2013), adding to the literature that higher past-year frequency may increase comfort with the concept of self-inflicted harm. Turner, Layden, Butler, and Chapman (2013) found that NSSI versatility, rather than frequency, was most robustly associated with future suicide risk, and that those individuals who scored highest on depression and versatility were at the most elevated risk of suicide at 3-month follow-up. Muehlenkamp, Brausch, and Washburn (2017) identified significant group differentiation based on past year NSSI frequency between individuals who engaged in NSSI 25 days or more (high), 5-24 days (moderate), and 1-4 days (low), reporting that those individuals in the high NSSI group had more severe levels of depression, borderline personality-disorder features, substance use, suicidal ideation, and suicide plans, than the moderate and low NSSI groups. Lastly, Victor and Klonsky (2014) performed a meta-analysis finding that the strongest predictor of suicide attempt history was suicidal ideation, followed by NSSI frequency, NSSI versatility, and hopelessness. Although correlation does not equal causation, it is important to better understand strong predictors of suicide attempts. Thus, the relationship between NSSI frequency and versatility is vastly

important to understand considering the relationship between NSSI severity and suicide risk. Furthermore, it is important to know how current NSSI is associated with future NSSI and its severity as NSSI engagement has been shown to predict increased suicide attempt frequency (Turner, Layden, Butler, & Chapman, 2013). Unfortunately, many previous studies have assessed NSSI frequency and versatility using lifetime NSSI. Although lifetime history of NSSI is important, few studies have used more specific timelines and almost all are cross-sectional rather than longitudinal. There could be inherent differences between individuals that engaged in NSSI years ago and stopped compared to individuals that have recently engaged or currently engage in NSSI. Therefore, past year NSSI engagement is a more accurate representation of NSSI behavior compared to lifetime NSSI engagement. Cross-sectional studies are essentially a snap shot of NSSI behavior and can only give insight into that very specific moment in time. Thus, more temporal studies are needed to examine NSSI behavior over duration of time. These temporal associations are especially pertinent in adolescents and young adults considering the onset of NSSI typically begins in this time period. Lastly, many of the previous studies had smaller sample sizes that limit the generalizability of their findings. There is a gap in the literature in which larger sample sizes and temporal associations of NSSI behaviors could add to the work about implicit and explicit NSSI in young adults.

People have tried to measure and understand the suicidal mind for centuries, which is inherently difficult due to reliance on self-report measures. Understanding can also be limited by the lack of insight people have into their own minds, or their reluctance to explicitly acknowledge suicidal thoughts, due to stigmatization, or fear of

hospitalization. This notion was captured by a study that found 78% of patients who die by suicide explicitly denied suicidal thoughts in their last communication before killing themselves (Busch, Fawcett, & Jacobs, 2003). People are often unwilling or unable to report such intentions, and according to the Diagnostic and Statistical Manual (DSM-5; APA, 2013), vast majorities of people who engage in NSSI do not seek clinical treatment. Disclosure data are similar for NSSI; Armiento, Hamza, and Willoughby (2014) found that of 268 self-injuring undergraduates, 57% had never disclosed their NSSI behavior to anyone. Their findings also suggested that individuals with severe NSSI and suicidal ideation may be more likely to disclose their behavior, but only to peers or romantic partners. The lack of self-reporting of NSSI and suicidal thoughts led some scientists to utilize more objective behavioral markers of NSSI and suicide risk in an effort to improve assessment for better prediction and prevention of such behaviors.

Although much of psychological research has relied on self-report measures, there have been an increased number of researchers examining the validity, reliability, and feasibility of implicit associations with numerous psychological traits and biases. Implicit testing uses computerized behavioral tasks such as the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) to gauge performance on reaction-time latency, post stimulus. The test was utilized previously to examine nonclinical constructs such as gender (Nosek, Banaji, & Greenwald, 2002) and racial stereotypes (Olsson, Ebert, Banaji, & Phelps, 2005). The IAT has been shown to have strong reliability (Cunningham, Preacher, & Banaji, 2001), construct validity (Lane, Banaji, Nosek, & Greenwald, 2007), sensitivity to clinical change (Teachman & Woody, 2003), and detection of attempts to “fake good” (Banse, Siese, & Zerbes, 2001). Individuals who

repeatedly perform specific behavioral tasks have physiological changes in neural activity that promotes more neural activity in response to the habitual behavior and therefore that individual should have stronger attentional bias towards that certain stimuli (e.g., death, self-harm) and will hold stronger mental associations regarding their implicit association with the construct being measured in the IAT. Responses are speeded when the combined categories are strongly associated in memory (Nock et al., 2010b).

The implicit assessment of suicide risk that has been recently used and studied is the death/suicide IAT (d/s-IAT; Nock et al., 2010b). The d/s-IAT is a computer-based categorization task that assesses individuals' automatic mental associations they hold about death/suicide and life. The task measures how long it takes an individual to categorize words associated with each of the following four categories: *death/suicide*, *life*, *me*, and *not me*. The categorization task is completed under two conditions. In the first condition, words representing *death/suicide* and *me* are categorized using the same response key, and words representing *life* and *not me* are categorized using an alternative response key. In the second condition, words representing *death/suicide* and *not me* are categorized using the same response key, and *life* and *me* are categorized using an alternative response key. All participants complete both condition blocks and the order of presentation is counterbalanced. A *d*-score is an indication of the relationship between the SI-IAT blocks. Positive scores indicate individuals responded faster when *death/suicide* and *me* are paired together and have a stronger association of self with *death/suicide* relative to *life*. Negative scores indicate individuals responded faster when *life* and *me* are paired together and have a stronger association of self with *life* relative to *death/suicide*. The participant is instructed to sort the words as quickly and accurately as possible, while

making as few mistakes as possible. The participants' *d*-scores are calculated in the same manner and represent the same implicit associations to oneself and suicide, or oneself and life.

Nock and colleagues (et al., 2010b) measured implicit associations to death/suicide in patients in emergency psychiatric departments who had a suicide attempt or not in the previous week. They found that individuals with a recent suicide attempt held significantly stronger implicit associations between death/suicide and self than individuals in the psychiatric department who had no suicide attempt. Additionally, the implicit association with death/suicide and self was associated with a nearly 6-fold increase in odds of a suicide attempt in the following 6 months, which exceeded the patient and clinicians' predictions. Another study using a Canadian sample found that the d/s-IAT was the only implicit measure (out of 5) to significantly predict NSSI and suicidal self-harm during the 3-month follow up (Randall, Rowe, Dong, Nock, & Colman, 2013). Taken together, the previous studies begin to highlight the clinical utility and validity of measuring ones' implicit association of suicide and self-injury in addition to self-report measures.

Recently, an IAT was created to measure implicit associations of NSSI. This behavioral task is relatively similar to the d/s-IAT, predicated on the notion that responses are speeded when the combined categories are strongly associated in memory. Although they are similar, there are differences that should be noted. The major difference is that the Self-Injury-IAT (SI-IAT; Nock & Banaji, 2007a) uses images and words, rather than solely using words as in the d/s-IAT. The SI-IAT task procedures are very similar to the d/s-IAT. Participants sit alone at a computer and are instructed to

classify stimuli that appear in the middle of the screen as quickly as possible by pressing the “e” key to sort words into the category on the left side, and the “i” key for words to be classified on the right side. Once again, the IAT is predicated on the assumption that it should be easier to perform the same behavioral response (i.e., press a key) to concepts that are more strongly associated opposed to concepts that are weakly associated. The SI-IAT presents participants with a series of images that are either related to self-injury (i.e., pictures of skin that has been cut) or neutral (i.e., pictures of uncut skin) and asks participants to classify these concepts “cutting” or “no cutting.” Although these cutting stimuli may only be salient to those individuals whose primary method of NSSI is cutting, most individuals with NSSI injury report cutting as a primary method (Nock, 2010a). Participants are then presented with words that are self-relevant (e.g., *I, Mine*) or other-relevant (e.g., *They, Them*) and directed to classify these words as quickly as possible in groups representing “me” or “not me.” If the stimuli is classified correctly the next stimuli is presented and incorrect classifications are followed by a red “X” which remains until the correct key press is made.

The SI-IAT task measures how long it takes an individual to categorize words associated with each of the following four categories: *cutting, no cutting, me, and not me*. The categorization task is completed under two conditions. In the first condition, words representing *cutting* and *me* are categorized using the same response key, and words representing *no cutting* and *not me* are categorized using an alternative response key. In the second condition opposite sorting is performed where words representing *cutting* and *not me* are categorized using the same response key, and *not cutting* and *me* are categorized using an alternative response key. All participants complete both conditions.

Participants' response latencies in both blocks are recorded and analyzed with the IAT scoring algorithm (Greenwald et al., 2003). This algorithm generates the participants' *d*-score, which shows the relative strength of association between self-injury and oneself. The score is calculated for each participant by subtracting the average response latency of the "cutting/me" test block from the average response latency of the "cutting/not me" block and dividing by the standard deviation of response latency for all trials. Hence, a positive *d*-score represents moderately faster responding or stronger associations when self-injury and oneself are paired, however negative *d*-scores represent relatively slower responding or weaker associations when self-injury and oneself are paired.

In a landmark study Nock and Banaji (2007a) examined adolescents who were nonsuicidal, suicide ideators, or recent suicide attempters and noticed large group differences on their respective SI-IAT scores. As well as large group differences, this study also demonstrated that the SI-IAT accurately predicted current suicidal ideation and attempt status. The SI-IAT was also able to predict future suicidal ideation at 6-month follow-up. Another study (Nock & Banaji, 2007b) examined adolescents who had engaged in NSSI in the previous year along with a noninjurious comparison group to measure one's automatic, implicit association of self-injury to oneself and found large, statistically significant group differences on SI-IAT scores between self-injurer and noninjurers. Dickstein and colleagues (2015) used the SI-IAT for three particular groups of adolescents, those who had made a suicide attempt without previous NSSI, those who engaged in NSSI but had never attempted suicide, and a control group without history of psychiatric problems. Participants with NSSI and no previous suicide attempt had stronger associations between NSSI and self, compared to both the control and suicide

attempters without NSSI history groups. Kene and colleagues (2017) recently found that in a psychiatric inpatient sample of 100 participants, suicide attempters and non-attempters did not significantly differ with respect to implicit identification with self-injury. The study also noted that most participants did not endorse cutting as their primary method of self-harm, so the SI-IAT might have not been the most salient stimuli for these participants to identify with. Additionally, the authors acknowledged the relative severity of participants' mental health, with a number of participants being either unable or unwilling to complete the task. Another inpatient study examined implicit self-harm in a sample of adolescents and found that SI-IAT scores predicted patient's subsequent engagement in NSSI during their hospital stay (Cha et al., 2016), while their explicit self-reports predicted both hospital-based and post discharge NSSI engagement. It was recently shown that adolescents who engaged in NSSI exhibited stronger self-identification with NSSI than adolescents who did not engage in NSSI, and stronger implicit identification with NSSI uniquely and prospectively predicted NSSI engagement over the subsequent year (Glenn, Kleiman, Cha, Nock, and Prinstein, 2016). Franklin, Puzia, Lee, and Prinstein (2014) found that low implicit and explicit aversion to self-cutting stimuli were significantly associated with future NSSI engagement, and both NSSI frequency and versatility were strong predictors of future NSSI. The authors questioned if implicit identification with NSSI played an active role in maintaining NSSI behavior. Although most studies have inherent limitations, it is important to elucidate the limitations of the SI-IAT across numerous settings, populations, and demographic characteristics. Larger sample sizes are needed to generalize results, and studies need to use specific, more recent time frames of NSSI engagement rather than only lifetime rates.

Considering the growing prevalence of implicit self-harm testing in psychology, the question should also be asked; what happens to implicit *d*- scores over varying lags of time? Are these scores relatively stable, or are they fluid and dynamic in nature over a given period of time? Additionally, studies are needed in both clinical and community samples. In an attempt to increase generalizability, the current study will utilize a larger sample size than previous studies. The study will focus on past-year NSSI engagement as opposed to lifetime NSSI engagement, which is a more accurate representation of NSSI behavior. Finally, the study will also assess the individuals NSSI engagement at a 6-month follow-up, which establishes a temporal precedent that is important in research regarding NSSI behavior in young adults and underrepresented in the current literature.

There are many possible factors that could drive the relationship between NSSI and its' severity, as well as likelihood of continued NSSI over time. NSSI and the nature of its onset, or subsequent promotion or inhibition, are not thoroughly understood. The relationship between self-reported, or explicit, NSSI behavior and implicit identification with NSSI in young adults is vastly important to understand, considering the under-reported nature of NSSI and the subsequent elevated risk of more severe NSSI, which can ultimately increase risk for future suicidal thoughts or behaviors. It has been shown that NSSI is associated with both suicidal ideation (Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007), and future suicide attempts (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). Therefore, fully understanding how best to assess NSSI and how implicit association with NSSI may relate to its' severity is of vital clinical importance.

The goal of the present study was to examine the relationship between implicit identification with NSSI, as measured by the Self-Injury Implicit Association Test (SI-

IAT), and NSSI frequency and versatility in a sample of young adults with recent NSSI. It was hypothesized that baseline scores of SI-IAT would be significantly associated with NSSI frequency and versatility in the past year (also assessed at baseline), such that stronger implicit identification with NSSI would associate with greater frequency and versatility. It was also hypothesized that baseline SI-IAT scores would be significantly associated with NSSI frequency and versatility at 6-month follow-up, and that they would be stronger predictors than self-reported likelihood of future NSSI. It was further hypothesized that SI-IAT scores would be a stronger predictor of any NSSI engagement at 6-month follow-up (yes/no) than participants' self-reported likelihood of future NSSI engagement. Lastly, it was hypothesized that individuals' baseline SI-IAT *d*-scores would be significantly associate with their 6-month follow up SI-IAT *d*-scores.

Method

Participants

In the total baseline sample, data were collected from 421 young adults; of those 324 completed Time 2 data collections (retention rate = 77%). All individuals who completed the study were included in the data analysis, the discrepancy in numbers is due to attrition. The inclusion criterion for the study was NSSI in the past 12 months. Participants attended two different public universities: one in the south central and one in the midwestern region of the United States. The baseline sample included 348 females, 50 males, and 23 individuals who did not identify as either female or male. The mean age of the sample was 18.92 ($SD=1.38$) with a range of 18-30; the majority were female (82.7%), Caucasian (87.2%), and Heterosexual (63.4%). The remaining participants identified as Black/African (2.6%), Hispanic (1.7%), Asian/Pacific Islander (2.1%),

Multi-Ethnic (1.0%), and 0.5% identified it as “other.” The majority of the sample were 1st year college students (60.1%). The remaining were 2nd year students (28.7%), 3rd year students (9.3%), 4th year students (1.2%), and 5th year students (.2%). The majority of participants (62.2%) were not currently in therapy or seeing a counselor. Of the baseline sample, 316 (77.7%) had endorsed NSSI engagement in the past year; the remaining had NSSI within the past two years. The past-year NSSI frequency mean was 8.26 ($SD = 15.82$), with a range from 1-94. Baseline NSSI versatility mean was 3.70 ($SD = 1.96$) methods, and a maximum of 9 methods endorsed. Of those with past-year NSSI, cutting was endorsed by 80.8% of the sample. Of the 324 participants that completed data collection at the 6-month follow-up, 45.1% ($n=190$) reported no NSSI engagement in the past 6 months, and those with NSSI engagement in the past 6 months accounted for 44.8% ($n=189$), with a range of NSSI engagement frequency of 1-50, mean of 4.21 and 10% ($n=42$) missing NSSI engagement data.

Procedure

Screening Survey

Participants were screened for eligibility via an on-line screening survey that asked about lifetime nonsuicidal self-injury engagement. Individuals with self-reported nonsuicidal self-injury in the past 12 months were then offered the opportunity to participate in the longitudinal study.

NSSI Study

Data were collected from two different American universities and the procedure was identical at both locations. Participants completed informed consent paperwork initially and additional informed consents for each subsequent visit to the campus

research labs at both universities. Participants were screened pre/post study with a modified version of the University of Washington Risk Assessment Protocol (UWRAP; Linehan, Comtois, & Ward-Ciesielski, 2012) to assess distress and suicide risk. If a participant reached the predetermined threshold of risk, additional screening and referral protocols to assess imminent risk for suicide were initiated. Five baseline participants were assessed for imminent risk, and two participants were assessed at 6-month follow-up. After pre-assessment risk was assessed, participants completed a series of self-report and behavioral tasks on a laptop computer in the research laboratory that typically took 30-45 minutes to complete. After task completion and the subsequent post-assessment UWRAP evaluation, the participant was paid \$20 for their participation. Upon signing payment receipt the participant was then debriefed about the study, which included a discussion about student mental health resources and additional community-based resources that are available to them. Participants were contacted six months after the baseline assessment and given the opportunity to participate in the study again, and of the original 421 participants, 324 completed data collection at the 6-month follow up, giving a retention rate of 77%. At the 6-month follow-up, participants completed the same research protocol, except their NSSI behavior in the past 6 months was assessed, as opposed to the lifetime and past-year history that was collected at baseline assessment.

Measures

Demographics

Demographics were assessed in a questionnaire with open-ended questions asking the participants' age, gender, sexual orientation, ethnicity, year in school, and if they were currently in therapy or seeing a counselor. Table 1.

Implicit Association Test: Self-Injury (SI-IAT)

The Self-Injury Implicit Association Test (SI-IAT) is a computerized test that measures participants' implicit associations based on categorization of stimuli into groups, based on their reaction time or latency (Nock & Banaji, 2007a). This testing is predicated on the notion that one should identify with concepts more strongly associated with oneself than concepts that are weakly associated with oneself (Nock et al., 2010b). The IAT is administered via computer. Participants sat at a desk and read instructions that indicate stimuli will appear in the middle of the screen and should be sorted into their corresponding categories as fast as possible. The “e” key is pressed for stimuli belonging to the category on the left, or the “i” key for the category on the right. The tests occur over two blocks, the first trial block consists of participants sorting words pertaining to “me” (e.g., *I, Mine*) and “other” (e.g., *They, Them*); essentially, “me” and “not me” categories. Correct classification of stimuli results in presentation of the next stimuli, and a red “X,” which remains in the middle of the screen until the correct key is pressed follows incorrect pairings. The SI-IAT assesses implicit association with self-injury stimuli (images) that depict cutting. The first block pairs “cutting” and “me” stimuli, and “no cutting” and “not me” stimuli together. The second block of trials presents opposite responses, with pairing of “cutting” and “not me” and “no cutting” and “me.” The participant sorts all words for each block, with each block containing two trials for a total of four trials. Upon task completion, the response latencies from both blocks are recorded and algorithmically scored prescribing to Greenwald, Nosek, and Banaji (2003) scoring. The subsequent score indicates the relative strength of association between self-injury and oneself, referred to as the participants' *d*-score. To calculate the *d*-score, the average

response latency of the “cutting” and “me” block is subtracted from the average latency of “cutting” and “not me” block and is divided by the standard deviation from responses across all trials. A positive d -score occurs when participants respond comparatively faster when self-injury and oneself are paired. A negative d -score is the converse, a weaker association when oneself is paired with self-injury (Nock et al., 2007). All participants complete both condition blocks and are randomized to which categorization of words the individual views first. A meta-analysis of IAT predictive validity (Greenwald, Poehlman, Uhlmann, & Banaji, 2009) found the IAT has predictive validity that significantly exceeded predictive validity of self-report measures, but only in domains regarding high social sensitivity, such as self-harm behavior. Test-retest reliability of IAT measures was reported to have a median value of $r = .56$ across nine available reports (Nosek, Greenwald, & Banaji, 2007).

Self-Injurious Thoughts and Behaviors Interview (SITBI)-Short Form

The Self-Injurious Thoughts and Behaviors Interview (SITBI) short form (Appendix A) is a self-report 72-item questionnaire about past occurrences and characteristics of suicidal ideation, gestures, plans, and attempts (Nock, Holmberg, Photos, & Michel, 2007). There are also items that pertain to NSSI behaviors, with onset, methods, and severity captured. NSSI versatility (total number of NSSI methods used, such as cutting, burning, or carving) is also captured. Additionally, the last SITBI item asks participants to rate their future likelihood of engaging in NSSI on a scale of 0-4 (0 being low/little and 4 being very much). The SITBI has strong interrater reliability (average $\kappa = .99$, $r = 1.0$) and test-retest reliability (average $\kappa = .70$, intraclass correlation coefficient = .44) over a 6-month period. Concurrent validity for the SITBI was shown

via strong agreement between the SITBI and other measures of suicidal ideation (average $\kappa = .54$), suicide attempts (average $\kappa = .65$), and NSSI (average $\kappa = .87$). Participants at 6-month follow-up completed SITBI information that only pertained to the previous 6-months of self-harm behavior, opposed to last year and lifetime self-harm history during their initial participation in the study. The SITBI-short form items that were utilized for data analysis were questions 62-72.

Data Analysis Plan

Descriptive characteristics of the overall sample were conducted, including demographic information (gender, age, race/ethnicity, sexual orientation) as well as the means and standard deviations for the primary outcome variables (SI-IAT *d*-score, NSSI versatility, NSSI frequency) Additionally, *t*-tests and chi square analyses were performed to determine whether or not the separate university samples were significantly different at baseline on any demographic or self-harm related variables (Table 1). The first hypothesis was that baseline SI-IAT scores would be a predictor of past year NSSI frequency and versatility. Versatility was calculated by summing all methods of NSSI endorsed, including cutting, hitting yourself on purpose, gave yourself a tattoo, wound picking, burning your skin, inserting objects under your nails or skin, biting yourself, picked areas of your body to the point of drawing blood, scraping your skin, “erasing” your skin to the point of drawing blood, and “other” please specify. Hair pulling was excluded since it does not meet the definition of NSSI behavior and is the key behavior associated with Trichotillomania. To test the hypothesis that baseline scores of SI-IAT would be significantly associated with past-year NSSI frequency and versatility, two linear regressions were used. One simple linear regression included baseline score of the

SI-IAT as the independent variable and past-year NSSI frequency as the dependent variable.

Results

Demographics Statistics

Chi-square analysis and *t*-test analyses were conducted to determine if participants varied across university samples based on measures of gender, race, age, and school year prior to testing study hypothesis. Chi-square analyses found proportions of year in school and gender to be similar across university samples, $\chi^2(4) = 2.69, p = 0.61$, and $\chi^2(5) = 5.104, p = 0.40$, respectively. The southcentral university sample had significantly greater proportions of sexually diverse individuals identifying as bisexual and gay/lesbian and fewer individuals identifying as heterosexual than the midwestern university, $\chi^2(5) = 14.20, p = .014$. The southcentral university also had greater diversity regarding race/ethnicity than the midwestern university (greater proportions of all non-Hispanic white minorities), $\chi^2(5) = 13.87, p = .016$. The samples did not differ on mean age, $t(417) = 0.78, p = 0.43$.

Table 1.
Demographic Questionnaire & Characteristics of the Study Participants

Characteristic	Time 1 (n=421) M/%	Time 2 (n=324) M/%
Mean age	18.92	18.98
Range	18-30	18-30
Gender		
Female	82.7	82.1
Male	11.9	12.0
Transgender, M-to-F	1.7	1.9
Transgender, F-to-M	0.0	0.0
Not Sure	1.0	0.9
I prefer not to answer	0.7	0.9
Other please specify	0.2	0.3
Missing	1.4	1.2
Race/Ethnicity		
White/Caucasian	87.2	88.3
Black/African American	2.6	2.5
Hispanic/Latino a	1.7	1.2
Asian/Pacific Islander	2.1	1.9
Multi-Ethnic	1.0	0.9
Other please specify	0.5	0.6
Missing	5.0	4.6
Sexual Orientation		
Heterosexual/Straight	63.4	65.1
Bisexual	22.3	20.7
Homosexual/Lesbian/Gay	4.3	4.0
Not Sure	3.6	3.7
I prefer not to answer	0.2	0.3
Other please specify*	5.7	5.9
Missing	0.5	0.3
School Year		
1 st year	60.1	58.6
2 nd year	28.7	29.9
3 rd year	9.3	9.6
4 th year	1.2	1.2
5 th year	0.2	0.3
Missing	0.5	0.3
Currently in Therapy		
No	62.2	64.2
Yes	35.9	34.6
Missing	1.9	1.2
*(Asexual, Demisexual, Pansexual, Queer)		

Hypothesis Testing

Analysis revealed baseline SI-IAT scores significantly predicted past year NSSI frequency ($\beta = 3.63, p < .015$). The overall model was significant, ($F(1,406) = 5.938, p < .001$), and $R^2 = .014$ (Tables 2 & 3).

Table 2.

Linear Regression results for SI-IAT predicting baseline past-year NSSI frequency

	B	S.E.	β	t	Sig
SI-IAT <i>d-score</i>	3.63	1.49	.120	2.437	.015

Next, the other simple linear regression included baseline scores of the SI-IAT as the independent variable and past-year NSSI versatility as the dependent variable.

Table 3.

Linear Regression results for SI-IAT predicting baseline past-year NSSI versatility

	B	S.E.	β	t	Sig
SI-IAT <i>d-score</i>	.792	.179	.213	4.431	<.001

Analysis revealed baseline SI-IAT scores significantly predicted past year NSSI versatility ($\beta = .792, p < .001$). The overall model was significant, ($F(1,415) = 19.635, p < .001$), and $R^2 = .045$. Greater implicit identification with NSSI at baseline was associated with greater past-year NSSI frequency and versatility reported at baseline.

To test the hypothesis that baseline SI-IAT scores would predict NSSI frequency and versatility at a 6-month follow up and that it would be a stronger predictor of self-reported future likelihood of NSSI, two linear regressions were used. Models were initially run with only the SI-IAT *d-score* as the predictor and were not statistically

significant. The models were then re-run with both predictors; the SI-IAT scores and the self-reported likelihood rating. The first regression included baseline SI-IAT scores and self-reported future likelihood ratings as the independent variables and NSSI frequency at 6-month follow-up as the dependent variable. The overall regression model was statistically significant, ($F(2,367) = 13.529, p < .001$), with $R^2 = .069$. Contrary to the expected results, baseline SI-IAT scores did not predict NSSI frequency at 6-month follow-up ($\beta = -.014, p = .784$), but self-reported likelihood was a significant predictor, ($\beta = .265, p < .001$).

Table. 4

Linear Regression results for SI-IAT and self-report predicting 6-month NSSI frequency

	B	S.E.	β	t	Sig
SI-IAT <i>d</i> -score	-.228	.831	-.014	-.275	.784
Self-reported Likelihood of Future NSSI	1.648	.321	.265	5.126	<.001

The second regression included baseline SI-IAT scores and self-reported future likelihood ratings as the independent variables and NSSI versatility at 6-month follow-up as the dependent variable. The overall model was statistically significant, ($F(2,279) = 29.961, p < .001$), with $R^2 = .177$. Similar to the previous analysis, SI-IAT scores did not significantly predict NSSI versatility at 6-month follow-up ($\beta = -.035, p = .538$). However, self-reported likelihood of future NSSI was a significant predictor of NSSI versatility at 6-month follow-up, ($\beta = -.428, p < .001$).

Table. 5

Linear Regression results for SI-IAT and self-report predicting 6-month NSSI versatility

	B	S.E.	β	t	Sig
SI-IAT <i>d</i> -score	-.126	.204	-.035	-.616	.538
Self-reported Likelihood of Future NSSI	.604	.079	.428	7.636	<.001

To test the next hypothesis that baseline SI-IAT scores would be a stronger predictor of any NSSI engagement at 6-month follow-up (yes/no) than participants' self-reported likelihood of future NSSI engagement, a binomial logistic regression was used. Baseline SI-IAT scores and the self-reported likelihood of future NSSI engagement were used as the independent variables and reported dichotomous NSSI engagement (yes/no) at 6-month follow-up was used as the dependent variable. The overall logistic regression model was statistically significant, $\chi^2(2) = 52.61, p < .001$, Nagelkerke $R^2 = .212$.

Table. 6

Logistic Regression – SI-IAT and self-report predicting 6-month NSSI engagement (yes/no)

	B	S.E.	Wald	df	Sig	Odds Ratio (95% CI)
SI-IAT <i>d</i> -score	.130	.251	.267	1	.605	1.14
Self-reported Likelihood of Future NSSI	.658	.102	41.355	1	<.001	1.93

The self-reported rating for the likelihood of future NSSI engagement was a significant and stronger predictor of future NSSI engagement (OR = 1.93, $p < .001$) compared to implicit SI-IAT d -scores (OR = 1.14, $p = .61$), which was not significant.¹

The final hypothesis was that individual baseline SI-IAT d -scores would positively and significantly associate with 6-month follow up SI-IAT d -scores. Bivariate correlations were run to see if baseline SI-IAT scores were significantly correlated with 6-month follow up SI-IAT d -scores.

Table 7.

SI-IAT time lag correlations

	SI-IAT d -score (Time 1)	SI-IAT d -score (Time 2)
N	418	317
Pearson Correlation	1	.445**
Sig. (2-tailed)		<.001
Mean	.084	-.019
Median	.062	-.032
S.D.	.527	.468

** Correlation is significant at the 0.01 level (2-tailed)

Table 8.

Baseline SI-IAT and 6-month NSSI frequency, versatility correlation matrix

		SI-IAT <i>d</i> - score (Time 1)	NSSI Frequency (Time 2)	NSSI Versatility (Time 2)
SI-IAT <i>d</i> -score (Time 1)	N	418	376	285
	Pearson Correlation	1	.014	.066
	Sig. (2-tailed)		.792	.264
NSSI Frequency (Time 2)	Pearson Correlation		1	.486**
	Sig. (2-tailed)			<.001

** Correlation is significant at the 0.01 level (2-tailed).

Discussion

Over recent years there has been extensive research into suicidal ideation and behavior in an attempt to stall or reverse the current upward trend of deaths from suicide. This research has encompassed many overarching theories as well as risk and protective factors associated with suicidal thoughts and behaviors. Although NSSI engagement has been repeatedly shown to increase the future risk of suicide, less is known about its onset, and subsequent promotion or inhibition. The goal of the current study was to examine how explicit and implicit identification with NSSI associates with concurrent and future NSSI in a sample of young adults with recent NSSI. SI-IAT *d*-scores were tested as predictors of past year NSSI frequency and versatility. Baseline NSSI frequency and versatility were controlled for while running initial analysis. It was expected that baseline

implicit SI-IAT scores would significantly predict both past year NSSI frequency and versatility in this sample; this hypothesis was supported. More positive *d*-scores at baseline, implying greater identification with self-injury and oneself, were associated with greater past-year NSSI frequency and versatility. Implicit NSSI association may be related to increased NSSI frequency and versatility because it is larger part of the individual's schema. When someone engages in NSSI more frequently and with a higher number of methods it is likely that they see themselves more strongly as an individual who self-harms. The converse of this could also be true; as one engages less frequently in NSSI, or with fewer methods, then one may begin to associate oneself less and less with NSSI as the behavior diminishes over time. It is important for both clinicians and researchers alike to understand that implicit bias towards self-injury seems to associate with greater NSSI frequency and versatility within the past year in young adults. The previously mentioned stigma and frequent non-disclosure of NSSI endorsement among this age group is problematic for mental health providers and researchers. The SI-IAT was significantly associated with past-year NSSI frequency and versatility in this sample and therefore could be a supplemental option for researchers and clinicians to gain potential insight into research participants or patients' recent NSSI engagement and its severity without relying expressly on self-report.

It was also expected that baseline SI-IAT scores would be significantly associated with NSSI frequency and versatility at 6-month follow-up, and that they would be stronger predictor than self-reported likelihood of future NSSI, but this hypothesis was not supported. This result is in contrast with previous studies findings where the SI-IAT predicted subsequent NSSI engagement (Cha et al., 2016). There could be many reasons

why the SI-IAT was unable to accurately predict future NSSI engagement in this sample. The Cha and colleagues' sample was an inpatient hospital and therefore more clinically severe in nature, while this was a college sample. The sample in this study was specifically selected based on their lifetime history of NSSI behavior. Almost half (45%) of the participants' in this sample at the 6-month follow-up had not engaged in NSSI since their baseline assessment. There is a possibility that assessment reactivity has occurred. The SI-IAT was not able to predict future NSSI as in previous studies so there must be something else influencing this relationship. More research is needed to determine if the implicit association with oneself and self-harm could be more fluid and state dependent, as opposed to relatively stable in nature which was seen in this sample. If the implicit association with oneself and self-harm is relatively stable over time then it is reasonable to speculate that it should be able to predict future NSSI as it has in other samples (Cha et al., 2016; Glenn, Kleiman, Nock & Prinstein, 2016). Perhaps a study full of individuals with previous NSSI limits the ability of the SI-IAT, such that it does not have the ability to predict future NSSI frequency and versatility, regardless if shorter temporal assessments were made. Also, most of the sample (60%) were freshman in college and this timeframe is a considerable transition in young adults' lives where they could potentially utilize NSSI behavior initially as a coping mechanism to deal with the immense stress of beginning college but then stop engaging as they become accustomed to their new environment. They could also view college as the opportunity to develop a new self-schema, and leave the identity of a self-harmer in the past. Further research is needed to determine whether the SI-IAT is able to accurately predict future NSSI

behavior in a diverse sample of participants, or should not be utilized to try and predict such a complicated human behavior.

It was also hypothesized that SI-IAT scores would be a stronger predictor of any NSSI engagement at 6-month follow-up (yes/no) than participants' self-reported likelihood of future NSSI engagement, and this hypothesis was not supported. As self-reported rating for future likelihood of NSSI engagement increased, so did the odds of actual future NSSI engagement. Even after controlling for baseline NSSI frequency and versatility, the SI-IAT was not a predictor of future NSSI. Despite the previously mentioned limitations of explicit self-harm measures, these results imply that the participants' self-reported rating more accurately predicted their future engagement of NSSI behavior than their implicit bias of NSSI. Participants who self-reported higher likelihood to engage in NSSI in the future were in fact almost 2 times (O.R. [95% CI] 1.93) more likely to engage in NSSI than those who reported lower likelihoods of future engagement. This notion appears to be consistent with the participants' knowledge about why and when they self-harm, and if they plan on engaging in NSSI in the future. This finding augment previous literature that those individuals with higher severity will typically continue to engage in NSSI and other risk behaviors in the future (Brausch & Boone, 2015), compared to those individuals that report lower severity. If an individual has not been recently engaging in NSSI then the desire to engage in NSSI might appear as a less useful behavior to mitigate any undesired feelings or emotions that might have driven this behavior previously. Or the converse; if one actively engages in NSSI and finds it useful, then one could likely see oneself utilizing this behavior in the future due to its previously perceived effectiveness. The SI-IAT did not predict future NSSI compared

to self-reported likelihood in all models tested, but it was able to verify the participants' baseline self-reported self-harm. These findings imply that researchers and clinicians need to continue to rely primarily on self-report measures of NSSI engagement, but further research is needed to ascertain if implicit NSSI measures could help supplement self-report measures. Perhaps individuals would feel more comfortable answering questions about if they plan on engaging in NSSI in the future electronically, compared to verbally. Further research could assess participants' preferences comparing computerized NSSI assessment and a clinician's verbal assessment.

Lastly, it was expected that individuals' baseline SI-IAT *d*-scores would be significantly associated with their 6-month follow up SI-IAT *d*-scores, and this hypothesis was supported. Results from this sample indicate that most of the participants' implicit association with oneself and self-harm were relatively stable across the 6-month period between baseline assessment and follow-up. This is particularly interesting considering that these scores did not predict future NSSI behavior. One could have logically assumed that if the SI-IAT was relatively stable and able to predict previous NSSI than it could predict future NSSI as well, but this was not supported in the sample. Individuals with higher baseline positive *d*-scores had a similar *d*-score at follow-up assessment, but the SI-IAT was not able to predict future NSSI. This could imply that those who have recently engaged in NSSI have stronger and more deeply held schemas about themselves and self-harm, compared to those individuals who endorse lifetime NSSI engagement, but do not currently engage in NSSI behavior. The SI-IAT may not be fully conceptualizing the implicit association with oneself and self-harm with samples specifically recruited with lifetime and recent NSSI behavior and is therefore missing

important pieces of this self-harm schema. Previous studies have mostly utilized community samples with a non-NSSI group and have been able to predict future NSSI, but having an over represented NSSI sample with no non-NSSI group could inhibit the SI-IAT and its ability to accurately predict future NSSI and its severity. Correlational analysis of baseline SI-IAT scores and 6-month follow up NSSI frequency and versatility were assessed to try and help illuminate the relationship between the SI-IAT and recent NSSI frequency and versatility, the results are indicated in Table 8.

Further research could examine if participants' 6-month follow-up SI-IAT scores would map on to self-reported NSSI at 6-months, or if there are changes in scores. Researchers could also track implicit bias in groups of individuals' who have never engaged in NSSI, previously engaged in NSSI, and those who currently engage in NSSI to see if the identification with oneself and self-harm stays strong, or changes over time, and when this change occurs based on inherent group differences. If these scores do stay relatively stable over time, it implies that this implicit identification may be a distinct feature of NSSI behavior and could help augment the argument for the proposed NSSI disorder. To the researcher's knowledge, this is the first time SI-IAT *d*-scores have been compared temporally in a group of individuals with past year NSSI. This is an important step for implicit measures of self-harm if researchers continue to integrate implicit measures into clinical psychological research. The tests need to be accurate and reliable at identifying individuals who engage in self-harm behavior.

Limitations

There are limitations of this study that should be mentioned. The sample consists of primarily white, female, heterosexual, college students and might not be entirely

representative of the population of people who engage in NSSI behavior. Future research could begin to diversify the gap of gender, racial, and ethnic demography. Although NSSI frequency and versatility have been previously shown to be strong predictors of future NSSI and suicidal ideation and behavior, there are many explanations on why individuals persist in NSSI engagement. The implicit association between oneself and self-harm is highly unlikely to be the sole contributor to the promotion or cessation of NSSI behavior. It is potentially one piece to a much larger puzzle and should be viewed in larger, more holistic context. The SI-IAT only shows stimuli related to cutting, and a relatively small portion of the participants (14%) endorsed cutting as their only NSSI method. Overall, 12.65% of the sample did not endorse cutting as any of their methods utilized, therefore the stimuli could be less salient to these individuals and minimize their *d*-scores. The nature of the study had data collected at multiple time points to examine NSSI behavior temporally, but perhaps a 6-month time lag is too long, or too short, to capture the possible fluid relationship between implicit association with NSSI and actual NSSI behavior. Further research could begin to illuminate these temporal relationships by capturing data at varying time points, with groups of no NSSI, previous, but not current NSSI, and active NSSI engagement which could potentially help delineate implicit association in state or trait dispositions.

Conclusion

Overall, this study examined how explicit and implicit NSSI associates with actual NSSI behavior in young adults with recent NSSI behavior. The results show the importance of continuing to examine both the explicit and implicit features and functions of NSSI longitudinally in young adults. Earlier identification of individuals who currently

engage, or are at risk of NSSI behavior, is of vast clinical importance due to these individuals elevated risk of future suicidal ideation and behavior. Although the implicit measure at baseline was associated with higher past year NSSI frequency and versatility, it was unable to accurately predict which individuals would continue to engage in NSSI behavior at a 6-month follow-up, and was not a stronger predictor of NSSI behavior than the self-reports of participants. In fact, the IAT was the weaker predictor in all models compared to self-reported likelihood of future NSSI. Although previous studies have been able to utilize the SI-IAT to predict subsequent NSSI engagement, to our knowledge, none have compared implicit measures with self-reported likelihood of future NSSI engagement. The limitations and utility of implicit measures and tests need to be properly defined if they will continue to be used in clinical psychological research. This study adds new insight to the growing literature regarding the predictive and clinical utility of implicit and explicit measures in self-harm research. The SI-IAT has limitations in regards to clinical practice, but could be utilized to supplement self-report measures in research settings for individuals that either currently engage in NSSI, or have engaged in NSSI recently. SI-IAT scores may not be a reliable indicator for those who have lifetime engagement, compared to those with recent NSSI. There is still much unknown about the onset of NSSI and its subsequent promotion and inhibition, and further research is needed to fully understand why NSSI continues to be such a strong predictor of future NSSI behavior, suicidal ideation and behavior.

¹ After controlling for baseline NSSI frequency and versatility, the self-reported likelihood of future NSSI engagement was still a stronger predictor of future NSSI engagement and SI-IAT *d*-scores were non-significant.

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- | | | |
|---------------------------|----------------------|----------------------------|
| 2) illicit drugs (not rx) | 8) sharp object | 14) suffocation |
| 3) over-counter drugs | 9) auto exhaust | 15) other's rx drugs |
| 4) poison | 10) other gases | 16) other _____ |
| 5) firearms | 11) train/ car | 17) multiple methods _____ |
| 6) immolation | 12) jump from height | 88) not applicable |
| | | 99) unknown |

12) When you have thoughts of killing yourself, how long do they usually last?

- 12) _____
- | | |
|----------------------|-------------------------------------|
| 0) 0 seconds | 5) 1-2 days |
| 1) 1-60 seconds | 6) more than 2 days |
| 2) 2-15 minutes | 7) wide range (spans > 2 responses) |
| 3) 16-60 minutes | 88) not applicable |
| 4) less than one day | 99) unknown |

13) On the scale of 0 to 4, what is the likelihood that you will have thoughts of

13) _____ killing yourself in the future?

Suicide Plan

14) Have you ever actually made a plan to kill yourself?

- 14) _____
- | | |
|-------|--------|
| 0) no | 1) yes |
|-------|--------|

We will refer to this as a suicide plan.

15) How old were you the first time you made such a plan? (*age*)

15) _____

16) How old were you the last time? (*age*)

16) _____

17) During how many separate times in your life have you made a plan?

17) _____

18) How many separate times in the past year?

18) _____

19) How many separate times in the past month?

19) _____

20) How many separate times in the past week?

20) _____

- 21) On the scale of 0 to 4, at the worst point, how seriously did you consider
21) _____
acting on the plan?
- 22) On average, how seriously have you considered acting on them?
22) _____
- 23) When you've had a plan, what method did you think of using?
23) _____
- | | | |
|---------------------------|----------------------|----------------------------|
| 1) own prescription drugs | 7) hanging | 13) drowning |
| 2) illicit drugs (not rx) | 8) sharp object | 14) suffocation |
| 3) over-counter drugs | 9) auto exhaust | 15) other's rx drugs |
| 4) poison | 10) other gases | 16) other _____ |
| 5) firearms | 11) train/ car | 17) multiple methods _____ |
| 6) immolation | 12) jump from height | 88) not applicable |
| | | 99) unknown |
- 24) When you've had a plan, how long have you thought about it before either
24) _____
moving onto something else or acting on the plan?
- | | |
|----------------------|-------------------------------------|
| 0) 0 seconds | 5) 1-2 days |
| 1) 1-60 seconds | 6) more than 2 days |
| 2) 2-15 minutes | 7) wide range (spans > 2 responses) |
| 3) 16-60 minutes | 88) not applicable |
| 4) less than one day | 99) unknown |
- 25) On the scale of 0 to 4, what do you think the likelihood is that you will make
25) _____ a plan to kill yourself in the future?

Suicide Gesture

- 26) Have you ever done something to lead someone to believe that you wanted
26) _____
to kill yourself when you really had no intention of doing so?
- | | |
|-------|--------|
| 0) no | 1) yes |
|-------|--------|

*Only score if there was NO suicidal intent, and they wanted someone else to BELIEVE they wanted
to make a suicide attempt*

We will refer to this as a suicide gesture.

- 27) How old were you the first time you made a suicide gesture? (age)

37) How old were you the first time you made a suicide attempt? (*age*)

37)_____

38) When was the **most recent** attempt?

38)___/___/_____

39) *How many days was that from today?*

39)_____

88) *not applicable*

99) *time unknown*

40) How many suicide attempts have you made in your lifetime?

40)_____

41) How many have you made in the past year?

41)_____

42) How many have you made in the past month?

42)_____

43) How many have you made in the past week?

43)_____

44) What method did you use for your most recent attempt?

44)_____ 1) own prescription drugs 7) hanging 13)

drowning

2) illicit drugs (not rx)

8) sharp object

14) suffocation

3) over-counter drugs

9) auto exhaust

15) other's rx drugs

4) poison

10) other gases

16) other _____

5) firearms

11) train/ car

17) multiple methods _____

6) immolation

12) jump from height

88) not applicable

99) unknown

45) What were the circumstances that contributed most to your most recent attempt?

Put in order of importance.

1) job loss/ job stress/ academic failure

8) psychiatric symptoms

45a)_____ event

2) dispute with family or friends

9) humiliating

3) dispute with spouse/lover

10) other: _____

45b)_____

4) financial problems

11) refuses to answer

5) eviction

88) not applicable

45c) _____

6) health problems

7) death of another person

99) unknown

46) What kind of injuries did you have as a result of this attempt?

46) _____

Regarding the **most lethal** attempt:

47) When did it occur?

47) ___/___/___

48) What kind of injuries did you have as a result of this attempt?

48) _____

49) How long have you usually thought about suicide before making an attempt?

49) _____

0) 0 seconds

5) 1-2 days

1) 1-60 seconds

6) more than 2 days

2) 2-15 minutes

7) wide range (spans > 2 responses)

3) 16-60 minutes

88) not applicable

4) less than one day

99) unknown

50) On the scale of 0 to 4, what do you think the likelihood is that you will

50) _____

make a suicide attempt in the future?

Thoughts of Non-Suicidal Self-Injury

51) Have you ever had thoughts of purposely hurting yourself without

51) _____ wanting to die? (for example, cutting or burning)

0) no

1) yes

We will refer to this as non-suicidal self-injury.

52) How old were you the first time you thought about engaging in NSSI?(*age*)

52) _____

53) How old were you the last time? (*age*)

53) _____

54) During how many separate times in your life have you thought about

54) _____

engaging in NSSI?

- 55) How many separate times in the past year?
55)_____
- 56) How many separate times in the past month?
56)_____
- 57) How many separate times in the past week?
57)_____
- 58) On the scale of 0 to 4, at the worst point, how intense were your thoughts
58)_____ about engaging in NSSI?
- 59) On average, how intense were these thoughts?
59)_____
- 60) When you have had these thoughts, how long have they usually lasted?
60)_____
- | | |
|----------------------|-------------------------------------|
| 0) 0 seconds | 5) 1-2 days |
| 1) 1-60 seconds | 6) more than 2 days |
| 2) 2-15 minutes | 7) wide range (spans > 2 responses) |
| 3) 16-60 minutes | 88) not applicable |
| 4) less than one day | 99) unknown |
- 61) On the scale of 0 to 4, what do you think the likelihood is that you will have
61)_____ thoughts about engaging in NSSI in the future?

Non-Suicidal Self-Injury

- 62) Have you ever actually engaged in NSSI?
62)_____
- 0) no 1) yes
- 63) How old were you the first time? (*age*)
63)_____
- 64) How old were you the last time? (*age*)
64)_____
- 65) How many times in your life have you engaged in NSSI?
65)_____
- 66) How many times in the past year?
66)_____
- 67) How many times in the past month?

- 67) _____
- 68) How many times in the past week?
68) _____
- 69) Now I'm going to go through a list of things that people have done to harm themselves. Please let me know which of these you've done:
- 69a) _____
- 1) cut or carved skin
 - 2) hit yourself on purpose
- 69b) _____
- 3) pulled your hair out
 - 4) gave yourself a tattoo
- 69c) _____
- 5) picked at a wound
 - 6) burned your skin (i.e., with a cigarette, match or other hot object)
- 69d) _____
- 7) inserted objects under your nails or skin
 - 8) bit yourself (e.g., your mouth or lip)
- 69e) _____
- 9) picked areas of your body to the point of drawing blood
 - 10) scraped your skin
 - 11) "erased" your skin to the point of drawing blood
 - 12) other (specify): _____
 - 88) not applicable
 - 99) unknown
- 70) Have you ever received medical treatment for harm caused by NSSI?
70) _____
- | | |
|--------|--------------------|
| 0) no | 88) not applicable |
| 1) yes | 99) unknown |
- 71) On average, for how long have you thought about NSSI before engaging in it?
71) _____
- | | |
|----------------------|-------------------------------------|
| 0) 0 seconds | 5) 1-2 days |
| 1) 1-60 seconds | 6) more than 2 days |
| 2) 2-15 minutes | 7) wide range (spans > 2 responses) |
| 3) 16-60 minutes | 88) not applicable |
| 4) less than one day | 99) unknown |
- 72) On the scale of 0 to 4, what do you think the likelihood is that you will
72) _____ engage in NSSI in the future?

0

1

2

52

3

4

Low/little

Very much/ Severe