

# Impact of Non-Suicidal Self-Injury Scale: Initial Psychometric Validation

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**Abstract** The current study examined the psychometric properties of the impact of non-suicidal self-injury scale (INS), a scale developed to assess the social, behavioral, and emotional consequences of engaging in non-suicidal self-injury (NSSI). University students (N=128) who endorsed a history of NSSI were administered the INS, as well as measures of hypothesized convergent and divergent validity. Results suggested that the INS is best conceptualized as a one-factor scale, and internal consistency analyses indicated excellent reliability. The INS was significantly correlated with well-known measures of NSSI severity (i.e., NSSI frequency, NSSI recency), and measures of suicide attempt history and emotional reactivity. Logistic regression analyses indicated that the INS contributed unique variance to the prediction of physical disfigurement (i.e., NSSI scarring) and clinically significant social anxiety, even after taking into account NSSI frequency. Furthermore, the INS demonstrated divergent validity. Implications for research on NSSI disorder and clinical practice are discussed.

**Keywords** Non-suicidal self-injury · Impairment · NSSI disorder · Severity

Non-suicidal self-injury (NSSI), the direct intentional destruction of one's own body tissue without the intent to die (Klonsky and Muehlenkamp 2007; Nock 2009), is a prevalent and concerning behavior. Among inpatient samples, rates of NSSI have ranged from 40 to 61 %

(Darche 1990; DiClemente et al. 1991). Further, in community samples, this behavior occurs in 4–6 % of adults (Jacobson and Gould 2007; Klonsky 2011; Swannell et al. 2014) and 12–18 % of adolescents and young adults (Claes et al. 2014; Kuentzel et al. 2012; Muehlenkamp et al. 2012; Taliaferro and Muehlenkamp 2015; Whitlock et al. 2006). Given these high prevalence rates, and the association with several adverse effects, including an increased risk for suicide (Klonsky et al. 2013; Whitlock et al. 2013), research on NSSI has proliferated in recent years. In fact, this growing body of literature has suggested that NSSI may represent a distinct psychological disorder (Selby et al. 2012) and has spurred the inclusion of NSSI disorder for future research in the DSM-5 (American Psychological Association [APA] 2013).

Despite this increased focus on NSSI, and the potential characterization of NSSI as a distinct disorder, no measure has been developed to assess the impact that NSSI may have on those who engage in the behavior. This gap in the literature has become particularly evident in the assessment of NSSI disorder, which includes a diagnostic criterion requiring distress and impairment due to NSSI (NSSI disorder - Criterion E; APA 2013). To inform this diagnostic criterion, researchers have used a range of measures. For example, in a subset of studies examining NSSI disorder, distress and impairment have been assessed through asking a limited number of questions, either in interview or self-report format (e.g., 1–4 questions; Andover 2014; In-Albon et al. 2013; Gratz et al. 2015; Zetterqvist et al. 2013). Examples of questions include, “If you have purposely hurt yourself without wanting to die, has the self-injurious behavior caused you distress?” and “If you have purposely hurt yourself without wanting to die, has the self-injurious behavior affected your schooling/interpersonal relationships/leisure time?” (Zetterqvist et al. 2013). Another

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study assessed Criterion E of NSSI disorder with a different set of similar questions and by asking participants whether they wanted to stop engaging in NSSI (Andover 2014). Still other studies have used a global assessment of functioning (GAF) score, a clinician assessment of overall social, occupational, and psychological functioning, as a proxy for NSSI disorder-related impairment (Washburn et al. 2015). In addition to not being standardized across studies, these methods have produced varying findings. In inpatient samples, the use of individual questions to ask specifically about the distress/impairment criterion demonstrated that 69 % of participants reported distress and approximately 25–30 % reported impairment (In-Albon et al. 2013), whereas 98 % were found to meet a GAF threshold indicative of sufficient distress/impairment in another study (i.e., GAF less than 50; Washburn et al. 2015). Similar discrepant findings were demonstrated in community samples despite both studies utilizing individual questions to assess the criterion; one study found 77 % of participants reported distress and 92 % reported impairment (Zetterqvist et al. 2013), whereas another found 65 % reported distress or impairment (Andover 2014). Such inconsistencies in these findings highlight the need for a standardized measure to assess the impact, or distress and impairment, perceived to be caused *specifically* by engaging in NSSI.

Extant literature indicates that there are a host of negative psychosocial consequences resulting specifically from engagement in NSSI. Indeed, shame and guilt are often experienced after engagement in NSSI (Briere and Gil 1998; Leibenluft et al. 1987; Schwartz et al. 1989). In turn, researchers have hypothesized that this shame and guilt may lead self-injurers to isolate themselves, exacerbating their psychological state and impairing their social relationships (Gratz 2003; Favazza 1989). In line with these conjectures, in addition to the negative psychological sequelae of NSSI, engagement in NSSI also has been linked to interpersonal difficulties (Adrian et al. 2011; Tatnell et al. 2014). Evidence suggests that NSSI may predict relationship problems, specifically among females (Burke et al. 2015; Lundh et al. 2011). Consistent with these findings, many engaging in NSSI report that their self-injury often upsets family and friends, with a subset of self-injurers reporting that the negative effect their self-injury has on others is motivation to cease NSSI (Deliberto and Nock 2008; Turner et al. 2014; Young et al. 2007).

Likely compounding the psychosocial impairment related to NSSI is that the behavior often leads to significant physical consequences. Indeed, approximately 50 % of those reporting a history of NSSI endorse bearing at least one scar from the behavior (Burke et al. 2015). Given that scarring from self-inflicted injury may serve as tangible evidence of mental health issues, which remain highly

stigmatizing in the United States and in many parts of the world (Hinshaw and Stier 2008), it is unsurprising that scarring secondary to NSSI is a concern for many self-injurers (Bachtelle and Pepper 2015; Lewis and Mehrabkhani 2016). Moreover, literature suggests that NSSI is generally perceived by the public as a manipulative and attention-seeking behavior (Gratz 2003). In line with this literature, Bachtelle and Pepper (2015) found that over 60 % of individuals bearing NSSI scarring perceive their scars as a “marker of stigma or shame.” Clinical case reports and studies examining NSSI online discussion board themes have suggested that many individuals with a history of NSSI are concerned with the physical remnants of the behavior (Chandler 2014; Hodgson 2004). Specifically, many self-injurers report worrying about how to best conceal their scarring from others due to fears of judgment and other negative interpersonal repercussions (Chandler 2014; Hodgson 2004; Lewis and Baker 2011; Whitlock et al. 2006).

Engagement in NSSI not only may be associated with global impairment in functioning (based on the factors that put an individual at risk for engaging in this behavior), but also is likely responsible for NSSI-specific psychosocial consequences. Notably, although the psychosocial consequences of NSSI have been documented in clinical samples and in empirical literature, these consequences have not yet been assessed in a valid or reliable way. In order to fully comprehend the psychosocial impairment associated with NSSI, it is necessary to develop and begin to utilize an empirically validated measure. Importantly, a validated assessment of psychosocial impairment due to NSSI may help to inform the impairment and distress criterion of the proposed NSSI disorder (APA 2013).

## Current Study

The current study aims to examine the psychometric properties of the Impact of NSSI Scale (INS). This scale was adapted from the Skin Picking Impact Scale (SPIS; Keuthen et al. 2001), which was designed to reliably and validly measure the impairment and distress associated with clinically significant repetitive skin picking resulting in skin lesions. Similar to skin-picking, NSSI is self-injurious and repetitive in nature and is often associated with immediate tissue damage, as well as permanent scarring and physical disfigurement (Burke et al. 2015). Given these similarities, we hypothesized that the items from the SPIS also would characterize psychosocial impairment associated with NSSI. We hypothesized that the INS would exhibit good reliability through evidencing high internal consistency in a sample of individuals with a history of NSSI (Fig. 1). Second, we hypothesized that the INS would

demonstrate convergent validity with high correlations between the scale and measures of NSSI severity (i.e., NSSI lifetime and past year frequency, recency, number of methods), as well as with measures correlated with severity of NSSI (i.e., suicide attempt history, emotional reactivity, depressive symptoms). Third, we hypothesized that a measure of the psychosocial impact of NSSI that has adequate construct validity would be able to differentiate between those with and without disfigurement secondary to NSSI, as well as between those who do and do not meet for clinically significant levels of social anxiety and depression (based on NSSI's hypothesized interpersonally-relevant negative effects, including stigma, social isolation, and interpersonal conflict; Bachtelle and Pepper 2015, Gratz 2003; Favazza 1989). We expected that these relationships would be significant beyond the effects of NSSI frequency.

Finally, we hypothesized that the INS would demonstrate divergent validity, evidencing non-significant correlations with unrelated constructs (e.g., co-rumination, insomnia).

## Method

### Participants and Procedures

Participants (N = 128) included undergraduates enrolled in a psychology course at Temple University (TU) who completed an online research study examining psychosocial risk factors for self-destructive behaviors and stressful life events. Individuals were recruited via advertisement through class announcements and flyers. To enroll in the research study, interested individuals were instructed to

The following questions are referring to intentional self-harming behaviors carried out without any suicidal intent.

Instructions: Make a check mark next to any statements which you have found to be true for you. For true statements, please indicate degree of severity (0-5) over the PRECEDING WEEK.

**For each statement below, please indicate degree of severity (0-5) over the preceding week.**

	None	Mild	Severe			
1. I don't look people in the eye because of my self-harming.	0	1	2	3	4	5
2. I think my social life would be better if I didn't self-harm.	0	1	2	3	4	5
3. I hate the way I look because of my self-harming.	0	1	2	3	4	5
4. It takes me longer to go out because of my self-harming.	0	1	2	3	4	5
5. I feel embarrassed because of my self-harming.	0	1	2	3	4	5
6. There are some things I can't do because of my self-harming.	0	1	2	3	4	5
7. I feel unattractive because of my self-harming.	0	1	2	3	4	5
8. It takes me longer than others to get ready in the morning because of my self-harming.	0	1	2	3	4	5
9. I don't like people looking at me because of my self-harming.	0	1	2	3	4	5
10. My relationships have suffered because of my self-harming.	0	1	2	3	4	5

Scoring Instructions: Add scores from all endorsed items #1-10.

**Fig. 1** Impact of non-suicidal self-injury scale (INS)

sign into the TU online research system to consent to the study procedures and complete the online questionnaires. Upon consenting to the study, participants were considered enrolled in the research study and completed the online questionnaires hosted by a secure online survey system, Fluid Surveys. All questionnaires were completed at the same time. Study procedures were approved by the TU Institutional Review Board. Informed consent was obtained from all individual participants included in the study.

Although 469 individuals completed the online survey, the current study sample only included individuals ( $N = 128$ ; 27.29 %) who endorsed a positive lifetime history of NSSI and completed all items of the INS. An additional eight participants endorsed NSSI, but did not complete the full INS and, therefore, were not included in the present study. The final study sample was 20.71 years old on average ( $SD = 3.82$  years) and 80.5 % female. In addition, our sample was 65.6 % Caucasian, 11.7 % African American, 8.6 % Asian, 10.2 % Biracial, and 3.9 % other racial background. Compared to individuals in the full sample, participants included in the present study were more likely to be Caucasian ( $\chi^2 = 4.11$ ,  $p = .04$ ), but there were no other demographic differences between samples. In addition, given that participants included in the current sample endorsed NSSI, these individuals also were more likely than the full sample to endorse symptoms of depression ( $t = 7.23$ ,  $p < .001$ ) and social anxiety ( $t = 5.11$ ,  $p < .001$ ), as well as emotional reactivity ( $t = 5.59$ ,  $p < .001$ ), and sleep difficulty ( $t = 4.58$ ,  $p < .001$ ). There were no significant differences between those who did and did not complete the full INS on any demographic or primary study variables.

## Measures

### *Impact of NSSI*

The Impact of NSSI Scale (INS) was developed for the purposes of the current study to assess the potential psychosocial impact of engaging in NSSI. This scale was adapted from the original 10-item Skin Picking Impact Scale (SPIS; Keuthen et al. 2001). The SPIS assesses the psychosocial consequences of repetitive skin picking and was modified to assess the psychosocial consequences of engagement in NSSI by replacing the term “skin-picking” with “self-harming.” Instructions read, “The following questions are referring to intentional self-harming behaviors carried out without any suicidal intent.” Sample items of the INS include, “My relationships have suffered because of my self-harming” and “There are some things I can’t do because of my self-harming.” Participants are instructed to answer each item as it pertains to their experience over the preceding week. There are a total of 10

items, and items are scored on a 6-point Likert scale ranging from 0 (“Never”) to 5 (“Severe”). Items are summed for a composite score ranging from 0 to 50, with greater scores indicating greater psychosocial impact of NSSI.

### *Non-suicidal Self-Injury*

Participants completed the deliberate self harm inventory (DSHI; Gratz 2001) to assess the frequency, type, and number of methods of NSSI behaviors (e.g., cutting, carving, burning, biting, head-banging). Specifically, the DSHI asks the participant to report how often he/she has engaged in each of 16 types of NSSI behaviors with the prompt, “Have you ever intentionally (i.e., on purpose) \_\_\_\_\_?” as well as one additional prompt asking the frequency of NSSI methods not explicitly listed. To specify that these behaviors were intended to be without suicidal intent, we modified the DSHI to add the clause, “without intending to kill yourself” to each of the 17 questions. Participants are then asked to report the frequency of each endorsed NSSI behavior. Because there is a large range in reported frequency, the variability of NSSI frequency was minimized by classifying NSSI into categories based on frequency in the past year and lifetime (1, 2–5, 6–20, 21–50, and 51+ NSSI acts; Burke et al. 2015; Cohen et al. 2015; Whitlock et al. 2013). For the present study, we also calculated the number of different NSSI methods by summing each endorsed NSSI method (ranging from 0 to 17). Thus, we used the following variables in the present study: lifetime NSSI frequency, NSSI recency (whether NSSI has been engaged in during the prior year), past year NSSI frequency, and number of NSSI methods employed over one’s lifetime. The DSHI has demonstrated adequate test–retest reliability, as well as construct, discriminant, and convergent validity in a university-student sample (Gratz 2001).

### *Presence and Number of NSSI Scars*

To assess the presence and number of scars resulting from NSSI, participants completed additional questions that were added to the modified DSHI. Specifically, the DSHI was modified to inquire about whether any of the 17 possible methods of NSSI endorsed by the participant ever resulted in a scar or permanent mark. If endorsed, participants were then prompted to answer an additional question about the number of scars. Similar to the NSSI frequency variable, we categorized the number of scars into six categories (0, 1, 2–5, 6–20, 21–50, and 51+ NSSI scars). Thus, the present study included the presence and number of NSSI scars (using scar categories).

### *Suicidal Behavior*

Participants were asked to report whether they had a history of a suicide attempt in their lifetime by responding to the question, “Have you ever attempted to kill yourself?” Suicide attempt history was dichotomized as the presence (1) or absence (0) of a suicide attempt over the course of their lifetime.

### *Emotional Reactivity*

The Emotion Reactivity Scale (ERS; Nock et al. 2008) is a 21-item measure that assesses emotional sensitivity (e.g., “I tend to get emotional very easily”), intensity (e.g., “I experience emotions very strongly”), and persistence (e.g., “When I am angry/upset, it takes me longer than most people to calm down”). Participants report the extent to which each item reflects their emotional experience using a 5-point Likert scale ranging from 0 (“*not at all like me*”) to 4 (“*completely like me*”). Items are summed to create a total score of emotional reactivity, with scores ranging from 0 to 84. The ERS has demonstrated excellent internal consistency and validity (Nock et al. 2008). The ERS exhibited excellent internal consistency in the present study ( $\alpha = .94$ ).

### *Social Anxiety Symptoms*

The social interaction anxiety scale (SIAS; Mattick and Clarke 1998) is a 20-item self-report questionnaire that assesses the extent to which individuals experience anxiety related to general social interactions. Participants are asked to rate each item on a 5-point Likert scale ranging from 0 (“*Not at all characteristic of me*”) to 4 (“*Extremely characteristic of me*”). Reverse-scored items were not included in the total score, given research indicating that these may reduce the measure’s validity (Rodebaugh et al. 2011; Rodebaugh et al. 2007). Thus, a total of 17 items were summed to create a total score of social anxiety symptoms, with higher scores indicating greater anxiety in social interactions. For the purposes of the current study, we employed a cutoff score of 34 to represent clinically significant social anxiety. Prior research has shown that this cutoff score discriminates between individuals with social anxiety disorder and those without Axis I disorders (Heminger et al. 1992; Brown et al. 1997). Prior research indicates that the SIAS has good reliability and validity and is commonly used to assess symptoms of social anxiety (Brown et al. 1997; Rodebaugh et al. 2006; Safren et al. 1998). In the present study, the SIAS had excellent internal consistency ( $\alpha = .94$ ).

### *Depressive Symptoms*

The Beck Depression Inventory-II (BDI-II; Beck et al. 1996) is a 21-item self-report questionnaire that assesses the severity of cognitive, affective, and somatic symptoms of depression that occurred during the past two weeks. Items are scored from 0 to 3, with higher scores (ranging from 0 to 63) indicative of greater depressive symptoms. For the purposes of the current study, we examined the BDI-II as a continuous measure and as a measure to determine clinically significant depressive symptoms (cutoff score of 21; Kumar et al. 2002). Research has demonstrated that the BDI-II has strong reliability and validity in psychometric studies (Beck et al. 1996) and in undergraduate samples (Storch et al. 2004). In the current sample, the BDI-II exhibited excellent internal consistency ( $\alpha = .94$ ).

### *Insomnia*

The Insomnia Severity Index (ISI; Bastien et al. 2001) is a 7-item self-report measure that assesses symptoms of insomnia experienced during the past two weeks. Each item is scored on a 0–4 scale with greater scores indicating greater severity of insomnia symptoms. The ISI has demonstrated test-retest reliability over a period of three months, as well as concurrent validity (Bastien et al. 2001). In the current sample, the ISI demonstrated good internal consistency ( $\alpha = .88$ ).

### *Co-rumination*

The Co-Rumination Questionnaire (CRQ; Rose 2002) measures the extent to which individuals typically co-ruminate with same-sex friends and was adapted from the original measure of co-rumination developed by Rose (2002). The original co-rumination questionnaire included 27 items, including items such as discussing problems rather than doing activities, frequently discussing problems, speculating on the causes of problems, and focusing on negative affective problems. The 9-item version of this questionnaire was employed in the present study, which includes only one item for each content area. Examples of these items include, “When we talk about a problem that one of us has we try to figure out every one of the bad things that might happen because of the problem” and “When we talk about a problem that one of us has we talk a lot about how bad the person with the problem feels.” Prior research has demonstrated that the 9-item measure has excellent internal consistency and validity (Hankin et al. 2010). The internal consistency in the current sample was good ( $\alpha = .84$ ).

## Data Analytic Method

In order to examine the factor structure of the INS, we employed exploratory factor analysis (EFA) using principal axis extraction in the statistical package, SPSS. Given that this is the primary stage of development for the INS, we chose to conduct an EFA rather than a confirmatory factor analysis, in line with recommendations for initial scale development (Floyd and Widaman 1995; Tabachnick and Fidell 2007). Further, principal axis extraction was utilized to allow for the non-normal distribution of our scale items (Fabrigar et al. 1999). We employed oblique promax rotation in conducting the EFA, which allows potential factors to correlate with one another, which we would expect, given the related content of our items (Floyd and Widaman 1995). In order to determine if the data were suitable for factor analysis, the Kaiser-Meyer-Olkin measure of sampling adequacy and the Bartlett's test of sphericity were examined. We employed a cutoff of .40 as a minimum factor loading to retain items, as EFA guidelines often recommend (Tabachnick and Fidell 2007). In order to determine the number of factors to retain, we considered multiple indices. We considered the size of eigenvalues, the scree plot, the degree of variance explained by each factor, and the degree to which the factor was interpretable. Additionally, parallel analysis was employed to compare eigenvalues of the actual data to eigenvalues of randomly ordered data (O'Connor 2000). Factors were eligible to be retained when the eigenvalues for the actual data surpassed those for the randomly ordered data (O'Connor 2000).

Reliability was calculated by measuring Cronbach's alpha for internal consistency. Convergent and divergent validities were assessed by conducting bivariate correlations. Logistic regression analyses were performed to examine whether the INS would add unique variance in differentiating between those with and without disfigurement secondary to NSSI as well as between those who do and do not meet for clinically significant social anxiety and depression after controlling for NSSI frequency (lifetime and past year). Although data were collected in a cross-sectional design, given that lifetime and past year frequency of NSSI are likely correlated with NSSI-related psychosocial impairment as well as with NSSI disfigurement, social anxiety, and depression, we utilized a logistic regression to control for these variables in analyses.

## Results

### Preliminary Analyses

Of the 128 participants ( $M = 20.71$  years,  $SD = 3.82$ ; 80.5 % female) included in the study analyses, lifetime

frequencies of NSSI were: 15.6 % ( $n = 20$ ) 1 act, 30.5 % ( $n = 39$ ) 2–5 acts, 20.3 % ( $n = 26$ ) 6–20 acts, 14.8 % ( $n = 19$ ) 21–50 acts, and 18.8 % ( $n = 24$ ) over 50 acts. In addition, 50.8 % reported engaging in NSSI over the previous year. Participants reported engaging in a mean of 1.77 ( $SD = 1.06$ ) different NSSI methods over their lifetimes. Participants varied widely in the presence and number of scars resulting from NSSI. Frequencies of scars were as follows: 43.8 % ( $n = 56$ ) 0 scars, 9.4 % ( $n = 12$ ) 1 scar, 24.2 % ( $n = 31$ ) 2–5 scars, 14.1 % ( $n = 18$ ) 6–20 scars, 3.1 % ( $n = 4$ ) 21–50 scars, and 0.8 % ( $n = 1$ ) over 50 scars. Six participants chose not to provide information regarding their number of NSSI scars. Further, 13.3 % ( $n = 17$ ) reported a lifetime history of a suicide attempt.

### Preliminary Descriptive Information

Individual item endorsements are presented in Table 1. Analysis of the scale total suggested that the mean score on the scale was 4.47 ( $SD = 7.91$ , Range 0–38). There was a wide distribution of scores on the total measure. Approximately 55 % ( $n = 71$ ) of the sample endorsed zero items on the measure (Total Score = 0). 23.4 % ( $n = 30$ ) of the sample endorsed experiencing greater than the mean score on the measure ( $M = 4.47$ ). Table 4 presents an inter-item correlation matrix for the ten INS items.

### Factor Analysis

Analyses revealed that the data met the Kaiser Meyer Olkin criteria for sampling adequacy (0.874). Furthermore, the Bartlett's test of sphericity was significant ( $\chi^2 (45) = 907.42$ ,  $p = .000$ ). Therefore, we concluded that applying factor analysis to the data was appropriate. The initial EFA resulted in two factors with eigenvalues above 1 (5.79, 1.04), which explained a total of 60.95 % of the variance. Furthermore, parallel analysis results confirmed that both factor 1's and factor 2's eigenvalues fell above the corresponding eigenvalue generated from the randomly ordered data (.547 and .394, respectively). However, the scree plot suggested that a one-factor model would be more appropriate, given that only the first factor "fell above the elbow" of the plot. Furthermore, results suggested that only three items fell on the second factor, all of which loaded highly onto the first factor. As a result, we ran a final EFA restricted to only one factor. In the one-factor solution, all ten items loaded on the first factor (correlations ranging from .459-.865).

Given the one-factor solution, the factor matrix of factor loadings (Table 1) was used to interpret the factor. This factor reflects the social, behavioral, and emotional consequences of engaging in NSSI. The INS total scale score was not correlated with age ( $r = .01$ ,  $p = .73$ ), nor was it

**Table 1** Factor matrix [restricted to 1 Factor] and item endorsement

Item	Factor 1	Item % endorsement
1. I don't look people in the eye because of my self-harming	0.607	14.1
2. I think my social life would be better if I didn't self-harm	0.459	23.4
3. I hate the way I look because of my self-harming	0.844	20.3
4. It takes me longer to go out because of my self-harming	0.840	13.1
5. I feel embarrassed because of my self-harming	0.738	31.2
6. There are some things I can't do because of my self-harming	0.864	12.5
7. I feel unattractive because of my self-harming	0.865	21.9
8. It takes me longer than others to get ready in the morning because of my self-harming	0.673	8.6
9. I don't like people looking at me because of my self-harming	0.807	15.6
10. My relationships have suffered because of my self-harming	0.501	21.1

related to gender ( $t = -0.90$ ,  $p = .37$ ) or ethnicity ( $\chi^2(1, N = 128) = 116.81$ ,  $p = .44$ ).

### Reliability

Given that all ten items analyzed fell onto the first factor with loadings greater than .40, item scores were summed to create a total scale score. Reliability analyses indicated that the INS exhibits excellent reliability ( $\alpha = .90$ ).

### Convergent Validity

Bivariate correlations were performed to examine the convergent validity of the INS. Results were, for the most part, in line with the study hypotheses. The INS total was positively and significantly correlated with lifetime NSSI frequency, NSSI recency, past year NSSI frequency, suicide attempt history, and emotional reactivity (Table 2). Contrary to study hypotheses, however, INS total was not correlated with number of NSSI methods nor with current depressive symptomatology (Table 2).

In line with our hypotheses, logistic regressions suggested that the INS added unique variance in discriminating between those with and without disfigurement secondary to NSSI (i.e., NSSI scarring) and those who do and do not meet for clinically significant social anxiety, after taking into account NSSI frequency (past year and lifetime) (Table 3). Contrary to study hypotheses, the INS did not discriminate between those who do and do not meet for clinically significant depression (Table 3).

### Divergent Validity

A series of bivariate correlations also were performed to examine the divergent validity of the INS. Congruent with study hypotheses, the INS was not correlated with

insomnia ( $r(126) = 0.12$ ,  $p > .05$ ) or co-rumination ( $r(126) = 0.09$ ,  $p > .05$ ).

### Discussion

The psychosocial consequences of NSSI are important to consider not only in clinical settings but also in research, particularly given the need to critically investigate the proposed inclusion of NSSI disorder in the DSM-5 (APA, 2013). To date, no measure has been designed to specifically assess the social, behavioral, and emotional consequences of engaging in NSSI. This is an important area of research as individuals who engage in NSSI greatly differ in behavior severity, and correspondingly, the extent of psychosocial interference they experience as a result of the behavior. The current study investigated the psychometric properties of a scale designed to assess NSSI-related psychosocial impairment. Results support both the reliability and the validity of the Impact of NSSI Scale (INS). The development of the INS fills a significant gap in the literature and has important implications for both research on NSSI and assessment of NSSI in clinical settings.

Our findings demonstrated that the INS has a unitary factor structure, high internal consistency, and acceptable convergent and divergent validity. Importantly, the factor structure is consistent with the Skin Picking Impact Scale (Keuthen et al. 2001), from which the INS was adapted. This suggests that despite the INS assessing three areas of potential impairment (i.e., social, behavioral, emotional), the measure is reliably assessing the overall impact of engaging in NSSI. A valid measure of NSSI related impairment should be associated with severity of the behavior. As hypothesized, the INS was positively related to well-known severity indices of NSSI, including lifetime and past year NSSI frequency, as well as recency

**Table 2** Correlations between the INS and measures of convergent validity

	1	2	3	4	5	6	7	8	9
1. INS	–								
2. Life NSSI Freq	.258**	–							
3. NSSI Recency	.207*	.580***	–						
4. LY NSSI Freq	.235**	.682***	.780***	–					
5. Num NSSI Meth	0.128	.552***	.370***	.335***	–				
6. SA Hx	.283**	.249**	0.063	0.068	.260**	–			
7. NSSI Scarring	.309**	.444***	.281**	.274**	.302**	.235**	–		
8. NSSI Scar Num	.374***	.564***	.368***	.337***	.444***	.333***	.841***	–	
9. ERS	.197*	.261**	0.147	.185*	0.068	0.084	.205*	.207*	–
10. BDI-II	.136	.070	.210*	.145	.038	.020	.070	.036	.543***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Note INS = Impact of NSSI Scale Total; Life NSSI Freq = Lifetime frequency of NSSI; NSSI Recency = History of NSSI over prior year; LY NSSI Freq = Last year frequency of NSSI; Num NSSI Meth = Number of NSSI Methods; SA Hx = Suicide attempt history; NSSI Scarring = presence of scarring from NSSI; NSSI Scar Num = Number of NSSI scars, ERS = Emotion Reactivity Scale; BDI = Beck Depression Inventory-II

**Table 3** Logistic regressions predicting NSSI scarring and clinically significant social anxiety, and depression

Step	Predictor	$\beta$	Wald	OR	$p$	95 % CI	$\Delta R^2$
Predicting NSSI scarring							
1	LY NSSI Freq	−0.19	0.80	0.83	.370	0.54–1.25	0.26
	Life NSSI Freq	0.84	12.77	2.31	.000	1.46–3.66	
2	INS	0.10	6.49	1.10	.011	1.02–1.18	0.33
Predicting clinically significant social anxiety							
1	LY NSSI Freq	−0.09	0.23	0.91	.635	0.62–1.33	0.28
	Life NSSI Freq	0.52	4.95	1.68	.046	1.06–2.65	
	BDI-II	0.07	13.84	1.07	.004	1.03–1.11	
2	INS	0.07	5.24	1.07	.017	1.01–1.13	0.33
Predicting clinically significant depression							
1	LY NSSI Freq	0.26	2.11	1.30	.146	0.91–1.85	0.10
	Life NSSI Freq	−0.27	1.76	0.76	.184	0.51–1.14	
	SIAS	0.33	5.74	1.03	.017	1.01–1.06	
2	INS	0.02	0.01	1.00	.942	0.95–1.05	0.10

Note NSSI scarring = presence of scarring from NSSI; clinically significant social anxiety = presence or absence of a score of 33 or higher on the Social Interaction Anxiety Scale; clinically significant depression = presence or absence of a score of 21 or higher on the Beck Depression Inventory-II; INS = Impact of NSSI Scale Total; LY NSSI Freq = Last Year frequency of NSSI; Life NSSI Freq = Lifetime frequency of NSSI; BDI = Beck Depression Inventory-II

of NSSI. The strengths of these associations were small to medium, indicating the consequences of NSSI are related to the severity of the behavior, but that the INS assesses a unique aspect of NSSI impairment not already captured by current measures of the behavior. The INS was not related to the number of NSSI methods, however. This was surprising given considerable literature suggesting number of methods to be a prominent indicator of NSSI severity (Victor and Klonsky 2014). It is possible that the INS did not relate to number of methods because of the limited

variability in the number of methods endorsed by participants in the current sample. For example, on average, participants reported using less than two NSSI methods ( $M=1.77$ ,  $SD=1.06$ ) and 51.6 % ( $n=66$ ) of participants reported employing only one NSSI method. Future research utilizing a clinical sample with a greater mean number of NSSI methods should be conducted to explore the validity of this explanation (Table 4).

Additional support for the convergent validity of the INS was demonstrated by its significant positive

**Table 4** Inter-item correlation matrix

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10
Item 1	–									
Item 2	0.315	–								
Item 3	0.403	0.475	–							
Item 4	0.528	0.449	0.722	–						
Item 5	0.371	0.311	0.738	0.534	–					
Item 6	0.470	0.407	0.707	0.829	0.561	–				
Item 7	0.442	0.321	0.81	0.675	0.714	0.742	–			
Item 8	0.448	0.231	0.517	0.648	0.405	0.742	0.6	–		
Item 9	0.608	0.291	0.618	0.632	0.679	0.644	0.729	0.469	–	
Item 10	0.527	0.315	0.349	0.32	0.426	0.347	0.378	0.257	0.535	–

relationships with suicide attempt history and emotional reactivity. Given the well-documented relationship between NSSI and suicidal self-injury (Andover and Gibb 2010; Asarnow, et al. 2011; Boxer 2010; Klonsky et al. 2013; Whitlock et al. 2013), we would expect that greater scores on the INS (e.g., greater impairment) would also be related to suicidal behavior. This significant relationship not only supports the convergent validity of the INS, but also suggests possible implications for its use in clinical settings as a relatively unexplored risk factor for suicide attempts (Victor and Klonsky 2014). In addition, we would expect higher emotional reactivity to be related to greater NSSI impairment, a construct found to be highly related to NSSI engagement (Glenn et al. 2011). For instance, prior research has demonstrated that those with higher emotional reactivity were more likely to have engaged in NSSI (Nock et al. 2008) and emotional reactivity has been found to mediate the relationship between psychopathology and NSSI engagement (Nock et al. 2008). Supporting our hypothesis, the INS was related to emotional reactivity in the present study. Importantly, this correlation was only modest, suggesting that although the INS is related to emotional reactivity, it is assessing an independent construct.

We had hypothesized that a scale assessing the psychosocial impairment of a behavior that results in tissue damage would be able to distinguish between individuals who do and do not have lasting disfigurement due to the behavior (see Skin Picking Impact Scale validation manuscript: Snorrason et al. 2013). Although we do not propose that the impairment precipitates the disfigurement, we did expect there to be an association between having greater psychosocial impairment as a result of NSSI and exhibiting disfigurement secondary to NSSI. Consistent with our hypotheses, we found that the INS was significantly associated with disfigurement secondary to NSSI (as indicated by scarring), even after controlling for NSSI frequency. Similarly, we hypothesized that a scale assessing the psychosocial impairment of a behavior that

simultaneously leaves physical evidence and that is likely highly stigmatized by the general public should be associated with clinically significant social anxiety (Snorrason et al. 2013). In line with our hypotheses, our results supported this notion by demonstrating that the INS added unique variance in the prediction of clinically significant social anxiety, even after taking into account NSSI frequency. Overall, these findings indicate that the INS is a valid measure of impairment due to NSSI engagement that is unique and independent from the indicators of NSSI severity that are currently and routinely assessed. Further supporting the validity of the INS, and as hypothesized, our results revealed non-significant relationships between the INS and measures of insomnia and co-rumination, supporting the divergent validity of the INS.

Unexpectedly, the INS was not significantly correlated with levels of current depression, nor did it distinguish between individuals with and without clinically significant depression when controlling for NSSI frequency. In line with these findings, but also surprising, was that current depressive symptoms were also uncorrelated with other NSSI severity proxies, including NSSI lifetime frequency, NSSI last year frequency, and number of NSSI methods. These findings are surprising given ample research supporting the high comorbidity of NSSI with depressive symptoms and mood disorders (Bently et al. 2015; Braga and Gonçalves 2014; Kerr and Muehlenkamp 2010). However, as discussed with regard to the significant, yet modest, correlations between the INS and NSSI severity, this finding may support the notion that the INS is assessing distress specific to NSSI engagement, as opposed to the more global distress captured in the measure of depressive symptoms. For instance, individuals who experience distress and impairment in their interpersonal relationships specifically due to their self-harming may not endorse many of the symptoms typical of depression, such as difficulties involving sleep or anhedonia. It is also possible that individuals with greater depression may experience more global impairment in functioning that is not

specific to self-harming behavior. Future studies examining a clinical sample should be conducted to determine whether the nonsignificant relationship between the INS and depressive symptoms (and between other NSSI severity indices and depressive symptoms) is replicable, or may be a byproduct of the current sample's characteristics.

Despite the advantages of the current study, and potential utility of the INS, future research will need to provide further evaluation of the current scale. The psychometrics of the INS should be replicated in a clinical sample. Although all participants in the current study had a history of NSSI, and nearly half reported NSSI in the past year, they were recruited from an undergraduate population, which was largely homogeneous. Future research should investigate whether the INS performs differently in samples with current (e.g., past month) and more severe NSSI behavior (e.g., greater frequency, greater number of NSSI methods) likely found among clinical samples. Relatedly, sensitivity and specificity analyses should be conducted to inform an optimal cutoff for discrimination of individuals with NSSI disorder versus those engaging in the behavior but not meeting full NSSI disorder criteria. Such cutoffs would be valuable for both researchers and clinicians. Further, we derived the INS from the Skin Picking Impact Scale, which evaluated psychosocial impact over the past one week and included several items that focus heavily on distress related to physical appearance. Thus, future research should evaluate whether different timeframes would better capture psychosocial impairment from NSSI. In addition, although items that focus on physical injuries from NSSI are important given that the most common forms of NSSI are cutting and scratching and that the most common bodily areas affected are on visible body parts (e.g., arms, wrists) (e.g., Whitlock et al. 2011), it is possible that these items may not generalize to individuals with less visible NSSI injuries. However, the scale does include several items that do not specifically relate to physical appearance (e.g., "My relationships have suffered because of my self-harming," "There are some things I can't do because of my self-harming."). Still, future research should consider the utility of adding additional items that address psychosocial impairment experienced in other domains besides social concerns, such as work or school. It also will be important for future research to examine the utility of the INS over time. Through the psychometric investigation of the INS in a longitudinal framework, information with regard to test-retest reliability and predictive validity of the measure would be obtained. Further, longitudinal analysis would provide the opportunity to examine if the INS is sensitive to change over time, and thus, can be used to monitor treatment progress, which may be particularly useful in both treatment efficacy research and clinical settings.

The use of the INS as a measure to assess the specific impact of NSSI has important implications for future research on NSSI. Foremost, the INS has the potential to provide valuable information with regard to examining NSSI disorder. Currently, there is not a standard measure of impairment used in the literature, which may explain prior inconsistent findings. Thus, it will be important to compare results of the INS to those impairment items used in previous studies (e.g., Andover 2014; Gratz et al. 2015; In-Albon et al. 2013; Zetterqvist et al. 2013) to examine whether the INS is capturing aspects of impairment above and beyond these items. Beyond the study of NSSI disorder, the INS will serve as a valuable measure to use in research among those with a history of NSSI. For example, in the current study, among participants with high NSSI frequency, scores on the INS were varied, suggesting that even among people with more severe NSSI behavior, there may be important individual differences to explore regarding the extent to which the behavior impacts functioning. Examining moderators of the relationship between NSSI severity and NSSI-related psychosocial impairment (e.g., NSSI methods, scarring, stigma) would allow an advanced understanding of those who may most benefit from services. Future research may also benefit from examining the clinical correlates of exhibiting high NSSI frequency but low distress. Theoretically, if an individual does not experience distress due to their self-injurious behavior despite frequent engagement, this may mean that the individual does not deem their self-injurious behavior to be problematic. This may in turn lead the self-injurer to have less desire to discontinue engaging in self-injury, thus resulting in greater engagement. Given that research suggests that self-injury frequency is significantly positively related to suicidal behavior (Paul et al. 2015), it is possible that these individuals may be at particularly heightened risk for suicide related outcomes. Moreover, in line with having less desire to discontinue engaging in NSSI, these individuals may be less likely to exhibit treatment-seeking behavior or may be less receptive to treatment. However, these hypotheses are purely speculative. Interaction analyses should be conducted to determine whether individuals with frequent NSSI and low distress are at greater risk for the proposed outcomes. Furthermore, the INS has the potential to serve as a valuable clinical tool. Not only is the INS brief and in a format that is easy to administer (e.g., self-report), but also it may be important for motivating individuals for treatment through the examination of consequences associated with NSSI. Relatedly, treatment for NSSI should then include a focus on psychological and interpersonal consequences of NSSI as potential mechanisms for reducing NSSI severity.

## Compliance with Ethical Standards

**Conflict of Interest** Taylor A. Burke, Brooke A. Ammerman, Jessica L. Hamilton, and Lauren B. Alloy declare that they have no conflict of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (national and institutional). Informed consent was obtained from all individual subjects participating in the study.

**Animal Rights** No animal studies were carried out by the authors for this article.

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