Published in final edited form as:

Psychiatry Res. 2018 July ; 265: 144–150. doi:10.1016/j.psychres.2018.04.038.

Perceived Effectiveness of NSSI in Achieving Functions on Severity and Suicide Risk

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Abstract

Nonsuicidal self-injury (NSSI) continues to be a psychiatric problem for youth and young adults, and is a robust risk factor for suicidal thoughts and behaviors. Research has established that NSSI is motivated by intrapersonal and interpersonal functions; however, research on the perceived effectiveness of NSSI for achieving the desired functions is lacking. In the current study, it was expected that using NSSI to achieve intrapersonal functions would be rated as more effective than interpersonal functions, and that perceived effectiveness of NSSI would be differentially related to NSSI severity and suicide risk outcomes. In a sample of 264 adults with lifetime NSSI history (over 70% past year), intrapersonal functions were endorsed more than interpersonal functions, and were rated as significantly more effective. Overall, perceived effectiveness of NSSI for intrapersonal functions was significantly and positively predictive of NSSI severity, while interpersonal functions were significantly and negatively related. Perceived effectiveness of NSSI for intrapersonal functions, but not interpersonal functions, were significantly predictive of more frequent and intense suicide ideation and greater likelihood of suicide plans and attempts. Results highlight the importance of assessing the perceived effectiveness of NSSI for specific functions in identifying individuals at risk for more severe NSSI and suicide.

1. Introduction

Non-suicidal self-injury (NSSI) is a notable psychiatric problem for youth and young adults (Swannell et al., 2014; Taliaferro and Muehlenkamp, 2015), and is a robust risk factor for suicidal thoughts and behaviors (Klonsky et al., 2013; Whitlock et al., 2013). A large body of research has established that NSSI is motivated by intrapersonal/self-regulating and interpersonal/social functions (e.g., Klonsky et al., 2015). Even individuals who report only one or two acts of NSSI endorse at least one function for their act; with intrapersonal functions being the most common (Brausch et al., 2016; Klonsky et al., 2015). Intrapersonal functions appear to be more strongly associated with repetitive NSSI; whereas, interpersonal functions tend to be associated with the initiation of NSSI (Muehlenkamp et al., 2013).

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However, these functional categories are intertwined given that interpersonal stressors often activate the aversive internal states for which the NSSI self-regulates (Santangelo et al., 2016; Turner et al., 2016).

A breadth of studies have documented that acts of NSSI decrease negative affect and increase positive affect, providing evidence that NSSI does regulate emotional states for many (e.g., Hamza and Willoughby, 2015; Kranzler et al., 2017). Yet, most individuals report more than one function driving the NSSI (Brausch et al., 2016; Victor et al., 2016), and existing studies have failed to examine whether NSSI achieves the other functions identified as motivators for the behavior. The field also lacks empirical evidence to explain why some who engage in NSSI continue to repetitively self-injure when many do not. According to behavioral theories (e.g., Chapman et al., 2006), NSSI is repeated because it was reinforced by the desired outcome. However, we are unaware of any studies explicitly examining the perceived effectiveness of NSSI on achieving the function desired and how that relates to NSSI frequency, duration, and method versatility (total number of different NSSI methods used) – markers of NSSI severity.

Understanding the perceived effectiveness of the NSSI is an integral component to: a) further validating the functional models of NSSI that underlie current treatment approaches (Bentley et al., 2014), and b) understanding the mechanisms that are most likely to contribute to increasing NSSI severity. Perceived effectiveness of NSSI is unique from the self-reported function, as the latter represents the driving motivation for the act but does not indicate whether the NSSI actually produced the desired outcome. The extent to which the desired outcome is perceived to be met is what is most likely to influence future occurrences. It may be that low effectiveness in achieving a desired function leads to lower NSSI frequencies, duration, and method versatility because the behavior is not subjectively perceived as reinforcing. On the other hand, high perceived effectiveness could result in greater severity because it “works.” These patterns may also be influenced by the relative importance of the specific functions motivating the act. For example, interpersonal functions are endorsed less frequently than are intrapersonal functions (Klonsky et al., 2015; Saraff and Pepper, 2014) which may indicate they are not as salient to maintaining NSSI. The less salient functions may need heightened perceived effectiveness to sufficiently reinforce the behavior, or even if effective, may produce fewer NSSI acts and duration because the motivating drivers are not as strong or frequent. However, there is no known data examining these potential patterns.

Existing data show that individuals report more functions for their NSSI over time, and as frequency increases so does method versatility, reported severity of the wounds, and number of functions motivating the behavior (Andrews et al., 2013; Steakley-Freeman and Whitlock, 2016). Function accumulation is associated with elevated risk for suicidal ideation and behaviors (Steakley-Freeman and Whitlock, 2016), and some studies suggest that the functions motivating NSSI have differential associations with suicidality (Nock and Prinstein, 2005). While studies document that basic endorsement of both intra- and interpersonal functions of NSSI are related to suicidal ideation and behaviors, endorsement of intrapersonal functions tend to have stronger associations (Klonsky and Olino, 2008; Victor et al., 2015). Of interest, the individual functions comprising intra- and inter-personal

superordinate functions also appear to differ in the strength of their association with suicidality. For example, in a large sample of university students, Paul and colleagues (2015) found that endorsement of interpersonal communication was the only (of 17 options) individualized function to be associated with all aspects of suicidality; however, affect regulation functions (i.e., coping with uncomfortable feelings) were only associated with suicide behavior and not ideation. Self-retribution/self-punishment functions were associated with suicide plans but not attempts, and the function of avoiding suicide retained an exceptionally high connection to attempts (see also Victor et al, 2015). These results indicate that it is important to examine individual functions, in addition to the superordinate inter- and intra-personal functions in order to best understand risk (Kortge et al., 2013).

Yet, again, it is unclear whether the perceived effectiveness of the NSSI in achieving the individualized function would increase or decrease the observed associations with suicide. It could be that high perceived effectiveness is associated with decreased suicide risk because the NSSI is meeting coping needs. Similarly, if NSSI is a relied upon coping strategy but loses its perceived effectiveness, experiences of distress or hopelessness may increase and the desire to permanently escape could intensify; thereby, increasing risk for suicide. In a study of motivations for suicide attempts, May and Klonsky (2013) found that motives reflecting a desire to escape one's distress, psychache, and hopelessness were the mostly strongly endorsed reasons for a suicide attempt. Thus, perceived effectiveness of NSSI in achieving, or not achieving, its coping or distress-relieving function(s) may influence suicide risk. Indirectly related to this idea is the only study examining how perceived effectiveness of a suicide attempt in achieving its goal predicted re-attempt six months later. O'Connor and colleagues (2017) found that perceived effectiveness of a suicide attempt in achieving the goal, particularly interpersonal communication of distress, reduced the likelihood a re-attempt occurred. This suggests that if self-harm behaviors, like NSSI, are perceived to be "working" and effective in serving the desired function, suicide risk may decrease. However, if the NSSI is perceived as not accomplishing the function, risk may increase. To our knowledge, there are no studies examining these ideas. To advance current understanding of the mechanisms contributing to repetitive and potentially more severe NSSI, as well as subsequent associations with suicide risk, we need to examine the perceived effectiveness of NSSI in achieving the desired functional outcome.

The purpose of the current study was to fill the void in the literature and examine how perceived effectiveness of NSSI is associated with markers of severity (i.e., frequency, duration, method versatility) as well as suicidal thoughts and behaviors. We hypothesized that 1) participants would perceive NSSI as being more effective for achieving intrapersonal functions than interpersonal functions, 2) perceived effectiveness of NSSI in achieving intrapersonal and interpersonal functions would be differentially associated with NSSI severity, including duration, lifetime frequency, and total number of NSSI methods used (versatility; i.e., cutting, burning, hitting), 3) perceived effectiveness of NSSI in achieving intrapersonal and interpersonal functions would be differentially associated with the lifetime frequency and average severity of suicide ideation, and likelihood of suicide plans and attempts, and 4) perceived effectiveness of NSSI in achieving individual 'sub-functions' such as avoiding suicide, self-punishment, and interpersonal communication would vary in

their magnitude of association with NSSI severity markers and suicidal ideation, plans, and attempts.

2. Method

2.1 Participants

Participants were 264 students with NSSI history recruited from two mid-sized universities; one in the southcentral and one in the midwestern region of the United States. The mean age was 19.05 (SD=1.75) with a range of 18 to 35 years. Most of the sample were first and second year undergraduates (88%) and identified as female (84%). Others in the sample identified as male (12.4%) or transgender (2.7%). A majority of participants identified as heterosexual (67%), with 20.7% identifying as bisexual, 3.5% as gay/lesbian, 4.2% not sure, and 3.8% as other. Participants identified as white (93.3%), followed by black (2.4%), Hispanic/Latino (1.6%), Asian/Pacific Islander (1.6%), and multi-ethnic (.01%).

2.2 Procedure

At both universities, students with NSSI history were recruited through an on-line screening survey that was distributed by mass e-mail to the student bodies, as well as through online study boards in the psychology department. The screening survey included items assessing NSSI history to identify potential participants and asked them to provide contact information if they were interested in a follow-up study. The screening survey was completed by 5358 students. About 12% of participants reported past-year NSSI ($n=620$), but only 463 (75%) also agreed to be contacted for the follow-up study. Eligible students who expressed interest in participating in the follow-up study ($n=463$) were contacted through their preferred method of communication (i.e., texting, phone call, or e-mail) and invited to schedule a time to visit the on-campus research labs. The study was completed by 264 of the participants who were contacted, for a participation rate of 57%. The remaining 43% did not respond to multiple contacts to participate in the follow-up study.

Upon arrival to the research lab, participants were provided with informed consent and assessed by graduate research assistants for baseline levels of distress and self-harm potential using the University of Washington Risk Assessment Protocol (UWRAP; Reynolds et al., 2006). Participants were then seated at a private computer to complete the research protocol administered using Inquisit software. The protocol included a battery of self-report measures assessing NSSI history and features, perceived effectiveness of NSSI functions, and history of suicide behaviors (ideation, plans, and attempts). Upon completion of the protocol, participants were assessed again using the UWRAP to determine if level of distress or self-harm risk had changed from pre- to post-assessment. Across both research sites, no participants met UWRAP criteria for an imminent risk assessment. Both the screening survey and the follow-up study received approval from the Institutional Review Boards at their respective universities.

2.3 Measures

2.3.1. NSSI effectiveness—To assess perceived effectiveness of NSSI for achieving specific functions, a modified version of the Inventory of Statements About Self-Injury,

Section II (ISAS; Klonsky and Glenn, 2009) was used. Section II of the original ISAS includes 39 individual items that assess relevancy of NSSI functions on a scale of 0 (not at all relevant) to 2 (very relevant). The 39 items are further grouped into 13 NSSI functions, with five categorized as Intrapersonal (self-regulating) and eight categorized as Interpersonal (social). Intrapersonal functions include: Affect Regulation, Self-Punishment, Anti-Dissociation/Feeling Generation, Anti-Suicide, and Marking Distress. Interpersonal functions include: Interpersonal Boundaries, Self-Care, Sensation Seeking, Peer Bonding, Interpersonal Influence, Toughness, Revenge, and Autonomy. For the current study, the ISAS directions were modified to assess perceived effectiveness of NSSI in achieving each function. Participants were given these instructions: “Sometimes individuals report using NSSI for various reasons or purposes. You will read several different possible reasons or purposes for NSSI. If you have used NSSI for that reason, please rate how effective engaging in NSSI was in achieving that purpose.” Participants rated each item on a scale of 1 to 4 ranging from “not at all effective” to “extremely effective.” Perceived effectiveness scores for the 13 function subscales were calculated by summing the ratings for their respective three items. Subscale scores could be calculated even if participants responded to one or more items in a particular subscale as being N/A, as that item was coded as zero and summed with endorsed items for a total score. The total possible score for each subscale ranged from 0–12. Overall scores for Interpersonal and Intrapersonal composites were calculated by summing their respective function subscales and taking the mean, as the composites are comprised of different numbers of subscales. Therefore, composite scores also ranged from 0–12. Internal consistency reliabilities for the modified ISAS were adequate to good for both the Interpersonal ($\alpha = .86$) and the Intrapersonal ($\alpha = .74$) function effectiveness, and are in line with the internal consistencies for both composite scores from the original ISAS (Interpersonal, $\alpha = .88$; Intrapersonal, $\alpha = .80$; Klonsky and Glenn, 2009).

2.3.2 NSSI features and suicide behaviors—The computerized self-report version of the Self-Injurious Thoughts and Behaviors Interview (SITBI; Nock et al., 2007) was used to assess NSSI features and suicide behaviors. Variables of interest for the current study included items measuring NSSI duration (age of most recent NSSI minus age of first NSSI), NSSI versatility (total number of different NSSI methods used, such as cutting, burning, hitting), and NSSI lifetime frequency. Variables related to suicide behaviors included items assessing lifetime frequency of suicide ideation, average intensity of suicide ideation (0 to 4 scale), lifetime suicide plan (yes/no), and lifetime suicide attempt (yes/no). The SITBI has strong reported interrater reliability (average kappa = .99, $r=1.0$).

2.3.3. Demographics—Participants also completed a measure that collected information on gender, sexual orientation, age, year in school, and race/ethnicity.

3. Results

3.1 Data management/analytic plan

Results from one-way ANOVAs found no significant differences across gender or ethnicity for the perceived effectiveness of NSSI in achieving Intrapersonal and Interpersonal

composite scores. Therefore, gender and ethnicity were not included in subsequent analyses as covariates. All study variables had normal distributions except lifetime NSSI and suicide ideation frequency variables. For both lifetime NSSI and suicide ideation frequency variables, participants with values three or more standard deviations above the means were omitted as outliers (e.g., one participant reported 1 billion acts of NSSI, and one participant reported 5000 instances of suicide ideation). A total of 4 participants were removed due to extreme values on these variables for a total n of 260. After omitting these participants, both variables still had elevated values for skew (4.01, 4.08) and kurtosis (16.63, 18.40). A log10 transformation was used to normalize the distribution of these variables, which showed great improvement in both skew (0.79, 0.18) and kurtosis (0.54, -0.20).

Descriptive analyses were conducted on individual function subscales to evaluate the first group of hypotheses regarding the overall ratings of perceived effectiveness of NSSI in achieving Interpersonal and Intrapersonal functions. Mean effectiveness ratings were calculated for each function, as well as for the Intrapersonal and Interpersonal composite scores. A one-sample t -test was used to directly compare the mean Intrapersonal composite score to the mean Interpersonal composite score. To evaluate the second group of hypotheses regarding the association between intrapersonal and interpersonal effectiveness scores and NSSI features, linear regression analyses were used with effectiveness scores as predictor variables and NSSI feature scores as outcome variables. For analyses that showed significant associations between effectiveness scores and outcome variables, follow-up linear regressions were used with the subscales for the respective composite score to determine which specific functions were associated with each outcome. To test the third group of hypotheses about the associations between function effectiveness and suicide behavior outcomes, linear regressions were used with average suicide ideation intensity and lifetime frequency of ideation as outcome variables. Binary logistic regression was used with lifetime suicide plan and lifetime suicide attempt as outcome variables. The intrapersonal and interpersonal composite scores were both entered as predictors in all analyses in order to determine which had a stronger relationship with NSSI severity and suicide outcome measures.

3.2 NSSI characteristics and suicide behaviors

All participants in the sample reported a lifetime history of NSSI; over 70% reported NSSI in the past year ($n=182$). Before the log10 transformation, mean lifetime NSSI was 50.77 ($SD=103.02$), median=20, with a range of 1-700. Mean frequency for past year was 8.34 (17.93), past month was 1.20 (2.93), and past week was 0.26 (0.89). Mean age of onset for NSSI was 14.18 (2.28), mean duration was 3.96 years (3.23), and mean versatility was 4.00 methods (2.50). The mean frequency of lifetime suicide ideation before log10 transformation was 26.86 (59.18), median = 8.50, with a range of 0-400; the average intensity of ideation was 2.14 (0.89). About half of the sample (55%) reported ever having made a suicide plan, and 30.6% reported at least one suicide attempt (25% of those were reported in the past year).

3.3 Descriptive results for perceived effectiveness scores

The top five most endorsed functions for NSSI were the subscales that comprise the Intrapersonal Composite (in order): Affect Regulation, Self-Punishment, Anti-Dissociation, Marking Distress, and Anti-Suicide. Mean effectiveness scores ranged from 5.33 (3.75) to 8.31 (2.68). Interpersonal function subscales showed lower mean effectiveness ratings (range 1.28 to 3.78) than Intrapersonal functions. To test the hypothesis that NSSI would be perceived as being more effective for achieving intrapersonal functions than interpersonal functions, a one-sample *t*-test was used to compare means. The Intrapersonal function effectiveness mean (6.74, *SD*=2.36) was significantly higher than the Interpersonal function effectiveness mean (2.69, *SD*=1.77), $t(252) = 27.31$, $p < .001$, Cohen's $d = 1.91$. See Table 1 for all function effectiveness mean scores.

3.4 Perceived effectiveness associated with NSSI features

Linear regression analyses indicated that ratings for perceived effectiveness of NSSI in achieving intrapersonal or interpersonal functions were not significantly predictive of NSSI duration. However, the intrapersonal function effectiveness composite score was significantly and positively predictive of greater NSSI method versatility and lifetime frequency, while the interpersonal function effectiveness composite score was significantly and negatively predictive of NSSI versatility and lifetime frequency (see Table 2). When individual Intrapersonal subscales were examined, all but the anti-suicide function (affect regulation, self-punishment, anti-dissociation, and marking distress) were significantly predictive of NSSI versatility and lifetime frequency. When individual Interpersonal subscales were examined, the overall models predicting NSSI versatility and lifetime frequency were not significant (see Table 2).

3.5 Perceived effectiveness associated with suicide behaviors

Linear regression analyses indicated that perceived effectiveness of NSSI in terms of intrapersonal function composite scores were significantly predictive of average SI intensity and lifetime SI frequency, such that higher effectiveness ratings were related to more intense SI and greater lifetime SI frequency. Interpersonal function effectiveness composite scores were not significantly predictive of suicide ideation intensity, but were significantly and negatively predictive of SI lifetime frequency (see Table 3). However, no individual interpersonal function effectiveness scores were predictive of lifetime suicide ideation frequency. By contrast, the anti-suicide and anti-dissociation function effectiveness subscales were significantly and positively predictive of suicide ideation intensity, and self-punishment, anti-suicide, and marking distress function effectiveness subscales were positively predictive of lifetime SI frequency (see Table 3).

Lastly, binary logistic regression analyses showed that intrapersonal function effectiveness composite scores were predictive of an increased likelihood of having made a suicide plan and attempt, but interpersonal function effectiveness composite scores were not. For individual intrapersonal effectiveness function subscales, perceived effectiveness of the self-punishment, anti-suicide, and anti-dissociation functions were predictive of an increased likelihood of a suicide plan, while all subscales (self-punishment, anti-suicide, anti-

dissociation, and marking distress) except affect regulation were predictive of an increased likelihood of suicide attempt (see Table 4).

4. Discussion

Results from the current study provide the first insight into the perceived effectiveness of NSSI in achieving specific functions, extending existing studies identifying common motivators of NSSI, and how they associate with NSSI severity markers and suicide risk. The data replicated prior findings that intrapersonal (self-regulating) functions of NSSI are endorsed more frequently than interpersonal (social) functions (Klonsky et al., 2015). More importantly, using NSSI to achieve intrapersonal functions was perceived as being more effective in attaining the desired outcomes than interpersonal functions. These findings provide preliminary evidence that intrapersonal functions may be endorsed more frequently as motivators for NSSI because NSSI is perceived to be highly effective in achieving those functions. This perceived effectiveness may then drive repetitive engagement in NSSI, but further studies are needed to confirm this idea.

Results also confirmed our hypothesis of a differential association between function types and NSSI severity markers. Perceived effectiveness of NSSI in achieving intrapersonal functions were associated with greater lifetime frequency and more methods of NSSI; whereas, perceived effectiveness of NSSI in achieving interpersonal functions were associated with less lifetime frequency and fewer methods. While the overall interpersonal function score was significantly related to NSSI severity, models including individual function subscales scores were not significant, and no interpersonal function was uniquely associated with any NSSI severity markers. It may be that engaging in NSSI specifically for these social drivers is not as effective in achieving the desired outcomes as originally assumed (Nock, 2008), or it could be that the need for NSSI to achieve interpersonal functions occurs less often which would naturally lead to less NSSI. Further research is needed to examine the intriguing association between the specific interpersonal functions, perceived effectiveness, and NSSI severity.

In contrast, analyses of the perceived effectiveness of NSSI in achieving each unique intrapersonal function predicting NSSI severity markers identified notable patterns. Increasing perceived effectiveness of NSSI for affect regulation and self-punishment functions were strongly predictive of increased NSSI severity. This reinforces the evidence that NSSI is helping individuals to self-regulate, and underscores the importance of addressing other ways to manage emotions and self-deprecating attitudes in treatment. It may also suggest that the more effective NSSI is perceived to be in achieving these functions, the more likely the person is to develop a habitual pattern of NSSI that requires clinical intervention. Monitoring the perceived effectiveness of NSSI for these specific intrapersonal functions would be an important aspect of any intervention.

Surprisingly, the perceived effectiveness of NSSI for the marking distress function was consistently associated with *decreased* severity markers as its effectiveness increased, which is in opposition to all the other subscales within the intrapersonal functions composite. An examination of the marking distress items provide some insight, as a majority of the items

involve an outward expression of emotional pain (e.g., creating a physical sign / signifying emotional distress I'm feeling). These items arguably cross into social/interpersonal functions, and perceived effectiveness of NSSI for the other interpersonal functions in our sample were associated with decreased NSSI severity. Factor analytic studies of the ISAS have documented that the marking distress items cross-load on both the intrapersonal and interpersonal superordinate factors, and basic endorsement of the interpersonal functions as a whole share weaker correlations with NSSI severity (Klonsky et al., 2015). Thus, it may be that when NSSI is used as an outward expression of one's level of distress, and is experienced as effective, the NSSI will stop because the needs have been met. It may also be that the perceived effectiveness of NSSI for social functions are more stable and longer lasting (e.g., others continue to offer support over a few weeks or more) than the intrapersonal functions; therefore, less frequent or severe NSSI is required to achieve the interpersonally motivated NSSI. Consistent with this idea, albeit indirectly, are studies documenting that endorsement of intrapersonal functions for NSSI is less stable over time compared to endorsement of interpersonal functions, which evidence strong test-re-test reliability (Glenn & Klonsky, 2011; Kortge et al., 2013). Future studies should continue to assess how both rote endorsement and perceived effectiveness of NSSI for intra- and interpersonal functions relate to NSSI severity over time.

The perceived effectiveness of NSSI for the intrapersonal and interpersonal functions were also differentially associated with aspects of suicide risk. Similar to NSSI, increased perceived effectiveness of NSSI for the intrapersonal functions predicted more frequent and intense lifetime suicide ideation, as well as a greater likelihood of suicide plans and attempts. These results are consistent with prior research showing that intrapersonal motivations for NSSI are strongly associated with suicide risk (Victor and Klonsky, 2014; Victor et al., 2015), but may seem counter-intuitive given an assumption that if NSSI is "serving its purpose for coping" there would be lower suicide risk. However, our results indicate this does not seem to be the case. An alternative explanation is that an individual learns, through the perceived effective self-regulation caused by NSSI, that one can escape from extreme distress via self-harm (Chapman et al., 2006). Repeated experiences of relief from unbearable distress via NSSI may then increase the extrapolation to suicide serving a similar escape (Baumeister, 1990). These ideas are consistent with recent studies documenting that intrapersonal functions are strong motivators of suicide attempts (Bryan et al., 2013; May and Klonsky, 2013). Our results provide preliminary evidence that individuals who find NSSI to be very effective in achieving intrapersonal functions could be at elevated risk for suicide.

When the perceived effectiveness of NSSI for intrapersonal functions were examined on an individual level, additional patterns emerged in relation to the suicide outcomes. In contrast to NSSI severity markers, perceived effectiveness of NSSI for affect regulation was not significantly associated with any suicide risk markers. Instead, affect regulation appears to be a strong reinforcer for increased NSSI. Individuals who engage in NSSI to manage strong emotions and distress, and find the NSSI to be effective in doing so, may not experience the level of emotional misery linked to suicide because the NSSI helps them manage the distress. However, this effect appears to be limited to general negative affect, as self-punishment had a strong association to suicide risk. Self-hatred functions of NSSI have

consistently been identified as being associated with increased suicidality (Paul et al., 2015; Victor et al., 2015). It may be that when effective, NSSI inadvertently reinforces and potentially intensifies the self-hate that then becomes a driver for suicide. Additional prospective studies are needed to validate this idea.

Of particular interest is that perceived effectiveness of NSSI in avoiding suicide was a robust predictor of suicide risk. Effectiveness of the avoiding suicide function was the strongest predictor of likelihood of a lifetime suicide attempt. This is consistent with a growing body of research documenting that using NSSI to avoid suicide is associated with notably higher levels of suicide risk relative to other functions (Paul et al., 2015; Victor et al., 2015). Our findings extend this work by showing that the perceived effectiveness of NSSI in avoiding suicide is also strongly associated with suicide attempts. However, the current study, and most previous studies, use data that does not identify whether suicide attempts precede or follow onset of NSSI. Our findings highlight the need for prospective studies to identify the trajectory and progression of self-harm behavior in relation to different functions and their perceived effectiveness.

The current findings need to be understood within the context of the study limitations. The use of a cross-sectional design relying on self-report data is the most salient limitation because it prevents us from determining whether perceived effectiveness of NSSI prospectively predicts NSSI engagement or, how changes in perceived effectiveness may influence NSSI engagement and suicide risk. The biases inherent to using retrospective recall are also limitations to the accuracy of perceived effectiveness. Studies using daily or weekly sampling methods would be able to provide additional insight into how perceived effectiveness influences subsequent self-injury. We also made slight modifications to an established measure of NSSI functions for the purpose of this study. While the reliability analyses indicate these modifications did not negatively affect the scale, we were not able to conduct a formal analysis of the psychometric properties of the modified version. The current study also required a large number of analyses to fully test the hypotheses, which does increase risk for Type I errors. However, examination of effect sizes suggests that the results observed are likely to be true effects. Lastly, the lack of diversity with respect to gender, race/ethnicity, age, and knowledge of co-occurring pathology or treatment status of our participants limits the generalizability of the current results.

In summary, this represents the first known study documenting that perceived effectiveness of NSSI in achieving the desired function of the behavior plays a role in the potential severity of NSSI and suicidality. Our results indicated that the perceived effectiveness of NSSI in achieving intrapersonal and interpersonal functions have different associations with features of NSSI severity, and suicidal thoughts and behaviors. These findings underscore the importance of inquiring about the effectiveness of NSSI in achieving the desired outcome when conceptualizing risk and planning treatment. Future studies are needed to replicate our findings and further examine how changes in perceived effectiveness may impact NSSI severity, cessation, and potential suicide risk.

Acknowledgments

This research was supported by the National Institute of Mental Health under Award Number R15MH110960. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

The authors would also like to acknowledge and thank the following individuals for their assistance and support in completing this project: Michael McClay, Sherry Woods, Natalie Perkins, Shelby Bandel, Krista Carter-Young, and Sue Holm.

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Highlights

- NSSI severity is strongly linked to perceived effectiveness of NSSI for intrapersonal functions
- Perceived effectiveness of NSSI for affect regulation and self-punishment functions is related to more severe NSSI
- Perceived effectiveness of NSSI for interpersonal functions is associated with less NSSI severity
- Perceived effectiveness of NSSI for avoiding suicide predicts suicide plans and attempts
- Perceived effectiveness of NSSI for self-punishment predicts suicide ideation, plans and attempts

Table 1

Intrapersonal and Interpersonal Function Endorsement and Mean Effectiveness

Function	Mean	SD
Affect Regulation	8.31	2.68
Self-Punishment	8.23	3.11
Anti-Dissociation	6.56	3.76
Marking Distress	5.62	3.47
Anti-Suicide	5.33	3.75
Self-Care	3.70	3.07
Toughness	3.78	3.13
Interpersonal Boundaries	3.22	3.04
Autonomy	2.70	2.52
Sensation Seeking	2.51	2.58
Interpersonal Influence	2.55	2.35
Revenge	1.69	2.21
Peer Bonding	1.28	1.60
Intrapersonal Composite	6.74 ^a	2.36
Interpersonal Composite	2.69	1.86

Note. Function subscales and composite scores are from the Inventory of Statements About Self-Injury modified for function effectiveness. Each subscale and composite score has a possible range of 0–12.

^a $t(252) = 27.31, p < .001$, Cohen's $d = 1.91$, intrapersonal composite score significantly higher than interpersonal composite score.

Table 2

Linear regression models for intrapersonal and interpersonal function effectiveness associated with NSSI severity

Model	β	t	F	R^2
NSSI Duration			2.42	0.02
Intrapersonal	0.147	1.94		
Interpersonal	-0.011	-0.15		
NSSI Versatility			15.16**	0.114
Intrapersonal	0.391**	5.42		
Interpersonal	-0.146*	-2.02		
NSSI Versatility - Intrapersonal			9.76**	0.168
Affect Regulation	0.199**	3.01		
Self-Punishment	0.214**	3.02		
Anti-Dissociation	0.157*	2.34		
Marking Distress	-0.189**	-2.73		
Anti-Suicide	.062	.906		
NSSI Versatility – Interpersonal			1.50	0.05
Interpersonal Boundaries	-0.08	-1.07		
Self-Care	0.18*	2.40		
Sensation Seeking	-0.06	-0.57		
Peer Bonding	-0.11	-1.16		
Interpersonal Influence	-0.01	-0.12		
Toughness	0.003	0.03		
Revenge	0.02	0.26		
Autonomy	0.17	1.69		
NSSI Lifetime Frequency			24.70**	0.18
Intrapersonal	0.492**	7.02		
Interpersonal	-0.274**	-3.92		0.24
NSSI Lifetime Frequency - Intrapersonal			14.82**	
Affect Regulation	0.256**	4.01		
Self-Punishment	0.272**	3.97		
Marking Distress	-0.242**	-3.70		
Anti-Dissociation	.142*	2.189		
Anti-Suicide	.073	1.10		
NSSI Lifetime Frequency - Interpersonal			1.80	.06
Interpersonal Boundaries	.019	0.24		
Sensation Seeking	-.151	-1.42		
Peer Bonding	-.088	-0.93		

Model	β	t	F	R^2
Interpersonal Influence	-0.09	-1.05		
Toughness	-0.14	-1.43		
Self-Care	0.13	1.72		
Revenge	0.07	0.79		
Autonomy	0.26 [*]	2.51		

^{*}
 $p < 0.05$

^{**}
 $p < 0.01$

Table 3

Linear regression models for intrapersonal and interpersonal function effectiveness associated with suicide outcomes

Model	β	t	F	R^2
Suicide Ideation Intensity			25.99**	0.18
Intrapersonal	0.480**	6.88		
Interpersonal	-0.128	-1.83		
Suicide Ideation Intensity - Intrapersonal			10.63**	0.18
Anti-Suicide	0.21**	2.97		
Anti-Dissociation	0.18**	2.62		
Affect Regulation	0.12	1.73		
Self-Punishment	0.07	0.91		
Marking Distress	0.01	0.18		
SI Lifetime Frequency			10.72**	0.09
Intrapersonal	0.343**	4.61		
Interpersonal	-0.206*	-2.76		
SI Lifetime Frequency - Intrapersonal			7.17**	0.14
Self-Punishment	0.240**	3.18		
Anti-Suicide	0.210**	2.92		
Marking Distress	-0.214**	-4.06		
Affect Regulation	.085	1.24		
Anti-Dissociation	.013	0.19		
SI Lifetime Frequency - Interpersonal			0.74	.03
Interpersonal Boundaries	-0.06	-0.75		
Self-Care	0.02	0.27		
Sensation Seeking	-0.13	-1.18		
Peer Bonding	-0.09	-0.94		
Interpersonal Influence	-0.003	-0.03		
Toughness	-0.01	-0.09		
Revenge	0.12	1.31		
Autonomy	0.14	1.30		

*
 $p < 0.05$

**
 $p < 0.01$

Table 4

Logistic regression models for intrapersonal and interpersonal function effectiveness associated with suicide outcomes

Model	OR	95% CI	χ^2	Nagelkerke R^2
Lifetime Suicide Plan			36.43 **	0.19
Intrapersonal	1.523 **	[1.30, 1.78]		
Interpersonal	0.839	[0.70, 1.01]		
Lifetime Suicide Plan			42.84 **	0.21
Self-Punishment	1.15 *	[1.03, 1.29]		
Anti-Suicide	1.13 **	[1.04, 1.23]		
Anti-Dissociation	1.09 *	[1.01, 1.19]		
Marking Distress	0.96	[0.87, 1.05]		
Affect Regulation	1.02	[0.91, 1.15]		
Lifetime Suicide Attempt			19.10 **	0.11
Intrapersonal	1.38 **	[1.18, 1.62]		
Interpersonal	0.87	[0.73, 1.05]		
Lifetime Suicide Attempt			30.97 **	0.17
Self-Punishment	1.14 *	[1.01, 1.30]		
Anti-Suicide	1.14 **	[1.03, 1.25]		
Anti-Dissociation	1.10 *	[1.00, 1.20]		
Marking Distress	0.90 *	[0.82, 0.99]		
Affect Regulation	1.01	[0.88, 1.15]		

* $p < 0.05$

** $p < 0.01$