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The Unique Contributions of Distinct Experiential Avoidance Domains to Severity and Functionality of Non-Suicidal Self-Injury

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Abstract

Objectives: This study explored the associations between domains of experiential avoidance and severity and functions of non-suicidal self-injury (NSSI).

Methods: Undergraduates reporting a history of repeated engagement in NSSI (*N* = 150) completed measures of experiential avoidance, psychopathology, and self-injury.

Results: Procrastination, a specific domain of experiential avoidance, was related to the severity of self-injurious behavior; however, procrastination did not account for significant incremental variance in the NSSI severity over and above the contributions of depression and anxiety. Correlational and hierarchical regression analyses indicated that procrastination and repression/denial domains of experiential avoidance were associated with automatic negative and automatic positive reinforcement functions of NSSI (respectively) and accounted for significant incremental variance after controlling for depressive and anxiety symptoms. Both repression/denial and distress aversion also explained a significant proportion of variance in engagement in NSSI for interpersonal reasons when controlling for the contributions of depression and anxiety.

Conclusions: These findings provide preliminary support for the notion that unique relationships exist among distinct forms of experiential avoidance and both severity and functions of NSSI. Clinical and theoretical implications for these results are discussed.

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Keywords: nonsuicidal self-injury, experiential avoidance, functional analysis, four-function model, self-injurious behavior

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Table of Contents

Introduction
Aims and Hypotheses
Method
  Participants
  Measures
    Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009; Klonsky & Olino, 2008).
    Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez et al., 2011).
    Overall Depression Severity and Impairment Scale (ODSIS; Bentley, Gallagher, Carl, & Barlow, in press).
    Overall Anxiety Severity and Impairment Scale (OASIS; Norman, Cissell, Means-Christensen, & Stein, 2006).
  Procedure
Results
  Preliminary Analyses
  Relationships between EA Domains and NSSI Features
Discussion
References

Introduction

Non-suicidal self-injury (NSSI) refers to the deliberate destruction of one's own bodily tissue in the absence of suicidal intent and for reasons not socially sanctioned (Nock & Favazza, 2009). Studies suggest that NSSI is most prevalent in young adult and adolescent populations (Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Nock, 2010), with individuals between ages 18 and 25 reporting the highest levels of engagement (Rodham & Hawton, 2009) and lifetime prevalence rates of NSSI among college students estimated between 12 and 38% (Gratz, Conrad, & Roemer, 2002; Rodham & Hawton, 2009; Whitlock, Powers, & Eckenrode, 2006). The majority of research on this perplexing phenomenon has used clinical samples, primarily those with borderline personality disorder (BPD). Although recent years have witnessed an increasing number of large-scale studies of NSSI in nonclinical populations (e.g., Andrews, Martin, Hasking, & Page, 2013; Klonsky, 2011), the need to conduct research in populations of nonclinical young adults continues to persist.

The construct of experiential avoidance (EA), which refers to the unwillingness to experience negatively evaluated feelings, sensations, and thoughts (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996), has been implicated in the development and maintenance of NSSI (Chawla & Ostafin, 2007). Engagement in NSSI has long been conceptualized in the literature as an intentional effort to escape from emotional pain (Carr, 1977; Gratz, 2003) and several models highlighting the role of EA in NSSI have recently been proposed. First, according to the Experiential Avoidance Model (EAM; Chapman, Gratz, & Brown, 2006), NSSI is maintained by the negative reinforcement that occurs when this behavior indeed serves to escape or avoid unwanted emotional experiences. Next, the affect-regulation model suggests that individuals engage in NSSI in order to alleviate aversive affective arousal or acute negative affect (Klonsky, 2007). NSSI is conceptualized as an attempt to lessen, thereby avoiding, intolerable emotional arousal; thus, EA is directly relevant to this model as well. Finally, the four-function model (FFM; Nock, 2009; Nock & Prinstein, 2004) proposes that NSSI is maintained by four distinct functional reinforcement processes—automatic negative reinforcement (ANR; reduction of or distraction from aversive thoughts or feelings), automatic positive reinforcement (APR; generation of desired feeling states), social negative reinforcement (SNR; facilitation of escape from social situations), and social positive reinforcement (SPR; promotion of help-seeking). Within the FFM framework, ANR is consistently endorsed more frequently than the other three functions (e.g., Nock & Prinstein, 2004; Nock, Prinstein, & Sterba, 2009), and given the focus on reducing aversive thoughts or feeling states, ANR is also the function most theoretically aligned with EA. Collectively, theoretical models support the notion that NSSI, and specifically, the functionality that NSSI serves, is strongly related to EA.

Empirical findings also demonstrate strong associations between NSSI and EA. First, a considerable literature indicates that individuals with a history of NSSI tend to exhibit higher levels of various manifestations of EA (e.g., thought suppression, alexithymia) than those without self-injurious behavior (e.g., Chapman, Specht, & Cellucci,

2005; Gratz, 2004; Gratz & Roemer, 2004; Howe-Martin, Murrell, & Guarnaccia, 2012; Zlotnick, Mattia, & Zimmerman, 1999). Second, a growing body of research suggests that EA mediates the relationship between negative emotionality or closely related constructs (e.g., emotional reactivity, negative affective intensity) and NSSI (e.g., Kingston, Clark, & Remington, 2010; Najmi, Wegner, & Nock, 2007; Rosenthal, Cheavens, Lejuez, & Lynch, 2005). Although numerous studies have shown that there is a strong relationship between *engagement* in NSSI and EA, there is no empirical work investigating the relations between *functionality* of NSSI and EA to date. As previously noted, the well-established FFM posits that self-injurious behavior can be maintained by intrapersonal or interpersonal, negative or positive reinforcement. Given the conceptual distinctions between these functions, it is conceivable that EA would be differentially related to each function. For example, EA may be a good predictor of engagement in NSSI for ANR (i.e., the tendency to engage in behavior that functions to avoid unwanted internal experiences supports self-injury maintained by negative reinforcement in the form of escape from unwanted emotions). Conversely, it may be less plausible that EA would be directly related to engagement in NSSI to attract attention from others (SPR). The demonstration of such findings may offer valuable incremental insight to current conceptualizations of NSSI functionality. Further, increased knowledge in this area may have implications for psychological treatment based on self-injuring individuals' idiosyncratic functions of NSSI behavior.

An additional limitation of existing NSSI research is the use of unsatisfactory measures that do no capture the full range of structurally distinct domains of EA (e.g., cognitive, behavioral; Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011). For example, researchers examining NSSI have often used the Acceptance and Action Questionnaire (AAQ; Hayes, Strosahl, Wilson, et al., 2004), which taps into only narrow dimensions of EA (namely, nonacceptance of distress and interference with values), excluding other important types of EA (e.g., Chawla & Ostafin, 2007). The AAQ has also evidenced less than satisfactory internal consistency (e.g., Marx & Sloan, 2005; Roberts, Wilson, & Roberts, 2005) and discriminant validity with neuroticism (e.g., Boelen & Reijntjes, 2008; Kashdan & Breen, 2007), which calls into question its psychometric strength. Other measures used to assess EA, such as the White Bear Suppression Inventory (WBSI; Wegner & Zanakos, 1994) and the Toronto Alexithymia Scale (TAS; Bagy, Parker, & Taylor, 1994) also capture only particular types of avoidance or avoidant coping strategies, and thus fail to adequately measure the broad EA construct.

The recently developed Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez et al., 2011) may fulfill the need for a psychometrically sound, comprehensive measure of EA. Its initial validation resulted in a 62-item measure that demonstrated good internal consistency, strong convergent associations, and discriminant validity with neuroticism across student, community, and clinical samples (Gámez et al., 2011). The MEAQ consists of six subscales, which each tap into a different domain of EA—behavioral avoidance, distress aversion, repression/denial, distraction/suppression, procrastination, and distress endurance. Utilizing a reliable, multifaceted measure like the MEAQ in NSSI research may improve our understanding of how specific EA dimensions are differentially related to NSSI, which may inform the most effective intervention strategies for this maladaptive behavior. Furthermore, in light of observed associations between EA and anxiety and depression (e.g., Gámez et al., 2011; Hayes et al., 1996), as well as higher levels of these symptoms in self-injuring individuals (e.g., Robertson, Miskey, Mitchell, & Nelson-Gray, 2013; Stanley et al., 2010), it is also important to examine the degree to which EA accounts for incremental variance in NSSI severity and functionality over and above the contributions of anxiety and depression.

Aims and Hypotheses

Using a sample of undergraduate students with repeated engagement in non-suicidal self-injurious behavior, the present study aimed to explore the relationship between six specific dimensions of EA and features of NSSI, including indicators of severity and functionality, independent of anxious and depressive symptomatology. Based on the strong theoretical relevance of specific domains of EA to NSSI, which is widely conceptualized as a behavior that serves to lessen or avoid unwanted emotions (e.g., Chapman et al., 2006; Klonsky, 2007), it was expected that distress aversion (i.e., negative evaluations or attitudes toward distress), distraction/suppression (i.e., attempts to ignore or suppress distress), repression/denial (i.e., distancing and dissociating from distress), and distress endurance (i.e., willingness to behave effectively in the face of distress) would be related to indicators of NSSI severity, whereas behavioral avoidance (i.e., overt, situational avoidance of physical discomfort and distress) and

procrastination (i.e., delaying anticipated distress) would not. We also anticipated that distress aversion, distraction/suppression, repression/denial, and distress endurance would explain a significant proportion of variance in the severity of NSSI, beyond that of anxiety and depression. In light of the important theoretical distinctions between distinct domains of EA and reasons for engaging in NSSI, it was also hypothesized that dimensions of EA would evidence differential relationships with NSSI functions, and that any unique relations would remain significant after accounting for anxious and depressive symptomatology. Given that, to our knowledge, this was the first study to examine this hypothesis, it was not specified which domains were expected to be associated with which reinforcement types.

Method

Participants

Participants were undergraduate students (*N* = 150) who reported at least two episodes of prior NSSI on the Inventory of Statements about Self-Injury (ISAS; Klonsky & Glenn, 2008; Klonsky & Olino, 2008). The sample was selected based on endorsing at least two previous NSSI acts from a larger pool of 280 students enrolled in an introductory psychology course at a private university in Boston who completed a larger questionnaire battery (including the measure of NSSI used in the present study; see *Measures*). Individuals who reported only one lifetime episode were excluded because our aim was to assess the relationship between EA and features of self-injurious behavior among individuals for whom NSSI may have become habitual. Participants were recruited via a voluntary Internet-based sign-up system, and received research credit for their participation. Of the 146 students who provided their age, the mean age was 18.77 years (*SD* = 0.97), with ages ranging from 18 to 24. Participants predominantly identified as female (71.3%) and Caucasian (54.0%); they also identified as Asian (34.0%), Black or African American (3.3%), Native Hawaiian or Other Pacific Islander (0.7%), American Indian or Alaska Native (0.7%), more than one race (6.0%), and 1.3% chose not to report their race.

Measures

Inventory of Statements About Self-Injury (ISAS; Klonsky & Glenn, 2009; Klonsky & Olino, 2008).

The ISAS is a self-report measure that comprises two sections. The first asks respondents to “estimate the number of times in your life you have intentionally (i.e., on purpose) performed” 12 types of non-suicidal self-harm. This section also assesses other characteristics of NSSI, including approximate date of the most recent act and whether pain is experienced during self-injury. For the present study, three variables were generated using data from this section—NSSI frequency (i.e., total number of NSSI episodes), recency (i.e., number of months elapsed since most recent NSSI act), and severity of NSSI behavior. In light of prior work suggesting that number of methods and potential degree of tissue damage associated with such methods are the most important factors to consider when determining NSSI severity (e.g., Lloyd-Richardson et al., 2007; Walsh, 2006; Whitlock, Muehlenkamp, & Eckenrode, 2008), individuals were classified into one of three severity classes based on number of methods used and potential tissue damage associated with those methods (superficial, light, or severe damage). Methods with potential for superficial damage included scratching, pinching, interfering with wound healing, pulling hair, and rubbing skin against a rough surface; light damage included biting, banging or hitting, sticking with needles, and severe damage included cutting, burning, carving, and swallowing dangerous substances. Individuals who reported $\geq$ 2 episodes only involving method(s) with potential for superficial damage were classified as “superficial NSSI.” Those who indicated $\geq$ 2 episodes using methods with potential for light tissue damage, with or without additional use of superficial methods (but not severe methods), were classified as “moderate NSSI,” and those reporting $\geq$ 2 episodes using methods with potential for severe damage, with or without superficial and/or light damage methods, were classified as “severe NSSI.”

The second ISAS section assesses 13 functions of NSSI that make up one of two higher order dimensions, an intrapersonal function and an interpersonal function. This section asks respondents, “When I self-harm, I am…”

and is followed by 39 statements. Each of the 13 functions is indicated by three statements rated on a Likert scale ranging from 0 (“not at all relevant”) to 2 (“very relevant”). Overall intrapersonal and interpersonal superordinate scores are generated by summing the relevant subscale scores and dividing by three; thus, both individual subscale and superordinate scores on the ISAS range from 0 to 6. Of note, although the Functional Assessment of Self-Mutilation (FASM; Lloyd, Kelley, & Hope, 1997) has indicated a four-factor model consistent with the FFM (e.g., Lloyd-Richardson et al., 2007), individual functions assessed by the ISAS can be similarly interpreted within the functional framework proposed by Nock & Prinstein (2004). For the present study, two individual function subscales and one superordinate factor score were used to measure NSSI functions from the FFM. Specifically, the ISAS affect regulation subscale (e.g., “I am reducing anxiety, frustration, anger, or other overwhelming emotions”) was used to indicate the ANR function, and the feeling generation subscale (e.g., “I am causing pain so I will stop feeling numb”) was used to indicate the APR function. Although the FFM distinguishes between interpersonal negative and positive reinforcement, data from the ISAS subscales that map onto these functions could not be normalized. Therefore, only overall interpersonal function of NSSI, as indicated by the ISAS superordinate interpersonal scale (e.g., “I am seeking care or help from others”), was used for present analyses. Research has shown the ISAS to be a reliable, valid measure of NSSI severity and functionality (Klonsky & Glenn, 2009; Klonsky & Olino, 2008).

Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez et al., 2011).

As previously noted, the MEAQ is a recently developed 62-item measure that assesses a broad variety of EA content. The six subscales include behavioral avoidance, distress aversion, repression/denial, distraction/suppression, procrastination, and distress endurance. Items comprising the MEAQ have shown good internal consistency, construct validity, and discriminant validity with indicators of closely related constructs (Gámez et al., 2011).

Overall Depression Severity and Impairment Scale (ODSIS; Bentley, Gallagher, Carl, & Barlow, 2014).

The ODSIS is a five-item instrument designed to assess the severity and impairment due to depressive symptoms across heterogeneous mood disorders and with subthreshold depression. Items are scored on a five-point scale ranging from 0 to 4. The ODSIS has demonstrated excellent internal consistency and convergent and discriminant validity across undergraduate, community, and clinical samples (Bentley et al., 2014).

Overall Anxiety Severity and Impairment Scale (OASIS; Norman, Cissell, Means-Christensen, & Stein, 2006).

The OASIS is a five-item measure of anxiety-related severity and impairment for use across the anxiety disorders and with subthreshold anxiety. Items are coded from 0 to 4. Results from previous psychometric evaluations of the OASIS have indicated high internal consistent, excellent test-retest reliability, and covergent and discriminant validity in nonclinical and clinical populations (Campbell-Sills et al., 2009; Norman et al., 2006, 2011).

Procedure

Data were derived from a larger questionnaire-based study on a variety of emotional experiences; as previously noted, only data from individuals who endorsed at least two lifetime NSSI episodes (N = 150; 54% of the larger sample) were included in the present analyses. Participants provided informed consent prior to completing the electronic questionnaire battery. After study completion, participants were debriefed and assigned course credits. The university’s institutional review board approved all study-related procedures.

Results

Preliminary Analyses

Descriptions of NSSI behavior are presented in Table 1. Of note, the relatively high average number of lifetime NSSI acts in the present study (*M* = 150.47, *SD* = 441.34, range = 2 - 5000) was likely due to some NSSI behaviors included in the ISAS (e.g., pulling hair, pinching) that may be performed habitually several times a day for years and thereby result in high lifetime frequency estimates due to extreme outliers (see: Glenn & Klonsky, 2011). 30 (20.0%) individuals reported 2 to 10 prior NSSI episodes, 52 (34.7%) individuals indicated 11 to 50 previous episodes, 68 (45.3%) individuals more than 50 NSSI episodes, and the median number of NSSI episodes was 50. Grubbs' Outlier Test identified one outlier in NSSI frequency; this individual was removed prior to conducting any analyses for the final sample size of 150. On average, participants reported using 3.38 (SD = 2.30) methods of self-injury. In terms of overall NSSI severity, 55 (36.7%) individuals were classified as engaging in superficial NSSI, 47 (31%) moderate severity NSSI, and 48 (32%) severe NSSI. Data regarding the recency of NSSI was only available for a subset of participants (*n* = 92); among these individuals, 17 (11.3%) reported engaging in NSSI within the past month, 26 (28.3%) reported that their last NSSI episode was between 1 and 12 months ago, and 13 (8.7%) between one and two years ago. As such, the majority of participants (60.9%) had engaged in NSSI within the past two years.

Cronbach's alpha coefficients, means, and standard deviations for all other study variables are presented in Table 2. The distributions of NSSI frequency, APR, and interpersonal function variables were all positively skewed; thus, natural logarithmic transformations were performed on these variables. Values transformed as ln(1+x) were used for all subsequent analyses, per the recommendation of Tabachanick and Fidell (2001). Following these transformations, skewness and kurtosis were .26 and -.46, 1.56 and .98, and 1.44 and 1.2 for NSSI frequency, APR, and interpersonal functionality (respectively).

Relationships between EA Domains and NSSI Features

Correlational analyses were first used to examine associations between MEAQ subscales, features of NSSI (frequency, recency, severity, functions), and psychopathology (depression and anxiety). Findings are presented in Table 3. With regard to the relationships between features of NSSI and EA, contrary to our hypotheses, only the procrastination domain was significantly associated with NSSI severity, and no types of EA were related to NSSI frequency or recency. In terms of functionality, our hypothesis that distinct EA domains would evidence different associations between unique forms of NSSI reinforcement was partially supported. Specifically, behavioral avoidance was significantly associated with only the ANR function of NSSI; however, the magnitude of this correlation coefficient was significantly smaller than those between both procrastination and ANR ($Z = -2.11$, $p < .05$) and distress aversion and ANR ($Z = -2.07$, $p < .05$). Although the association between procrastination and ANR was moderate in magnitude, whereas those between procrastination and APR and interpersonal reinforcement were small, the magnitudes of these correlations were not significantly different. Correlations between distress aversion and all three functions were also not significantly different. Only the associations between repression/denial and APR and the interpersonal function reached statistical significance; these correlations also did not significantly differ in magnitude. The ANR function was significantly related to both frequency and severity of NSSI, indicating that individuals belonging to more severe classes of NSSI were more likely to report performing NSSI to manage negative thoughts/feelings, whereas APR and interpersonal functions were related only to NSSI severity, but not frequency. Severity of NSSI behavior was also significantly related to depression and anxiety. Finally, recency of NSSI behavior was associated with depression only, indicating that individuals for whom less time had elapsed since the most recent NSSI episode were more likely to report higher levels of depression.

Additional analyses were conducted using the domains of EA that evidenced statistically significant correlations with features of NSSI. The purpose of these analyses was to determine if dimensions of EA are related to aspects of NSSI behavior independently of anxious and depressive symptomatology. First, an analysis of covariance (ANCOVA) was performed to investigate whether levels of procrastination differed significantly across NSSI

severity classes when controlling for anxiety and depression, which were both related to severity of NSSI. Results indicated that anxiety was significantly related to NSSI severity, $F(1, 142) = 11.23$, $p < .01$, $r = .27$; however, after controlling for anxiety and depressive symptoms, procrastination did not differ as a function of NSSI severity, $F(2, 142) = .819$, $p = .44$, partial $\eta^2 = .01$.

Table 1: Descriptions of NSSI Behavior

	Mean (SD) or *n* (%)
Total number of episodes	150.47 (441.34)
Total number of methods	3.38 (2.30)
Frequency of NSSI	
2-10 episodes	30 (20%)
11-50 episodes	52 (35%)
> 50 episodes	68 (45%)
Severity of NSSI	
Superficial	55 (37%)
Moderate	47 (31%)
Severe	48 (32%)
Recency of NSSI	
Past month	17 (11.3%)
1-12 months	26 (28.3%)
13-24 months	13 (8.7%)
> 2 years	36 (24.0%)

Note: N = 150 for all variables except recency, which was available for only a subset (*n* = 92) of the total sample.

Table 2: Means, SDs, and Cronbach's Alpha of NSSI Functions, Experiential Avoidance, and Symptom Variables

	Mean	**SD**	**Cronbach's alpha**
Behavioral avoidance	34.21	9.41	.90
Distress aversion	40.76	11.08	.88
Repression/denial	33.29	10.31	.86
Distraction/suppression	26.14	5.95	.88
Procrastination	23.58	6.55	.87
Distress endurance	48.47	8.05	.86
Affect regulation function	2.01	2.15	.85
Feeling generation function	0.74	1.52	.85
Interpersonal function	1.06	2.11	.89
ODSIS	2.65	3.31	.92
OASIS	3.29	3.22	.87

Note: Behavioral avoidance, distress aversion, repression/denial, distraction/suppression, procrastination, and distress endurance variables were gleaned from the Multidimensional Experiential Avoidance Questionnaire (MEAQ). Affect regulation, feeling generation, and interpersonal function variables were gleaned from the Inventory of Statements About Self-Injury (ISAS). ODSIS = Overall Depression Severity and Impairment Scale. OASIS = Overall Anxiety Severity and Impairment Scale

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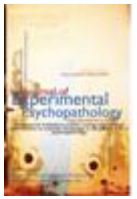

Table 3: Correlations of Experiential Avoidance, Features of NSSI, and Psychopathology Variables

	Behavioral avoidance	Distress aversion	Repression/ denial	Distraction/ suppression	Procrast-ination	Distress endurance	NSSI frequency[a]	NSSI recency	NSSI severity	Affect regulation	Feeling generation	Inter-personal	ODSIS
Distress aversion	.69**	--											
Repression/ denial	.44**	.54**	--										
Distraction/ suppression	.55**	.56**	.33**	--									
Procrast-ination	.48**	.50**	.40**	.38**	--								
Distress endurance	-.49**	-.36**	-.31**	-.09	-.32**	--							
NSSI frequency[a]	-.05	-.04	.08	.01	.13	.14	--						
NSSI recency	-.09	-.12	-.13	-.06	-.13	-.11	-.34**	--					
NSSI severity	.03	.11	.14	.03	.17*	-.13	.07	.09	--				
Affect regulation	.18*	.32**	.16	.15	.36**	-.05	.34**	-.13	.29**	--			
Feeling generation[a]	.13	.25**	.32**	.10	.23**	-.15	.11	-.01	.29**	.55**	--		
Inter-personal[a]	.17	.30**	.29**	.16	.27**	-.09	.17	-.08	.34**	.64**	.71**	--	
ODSIS	.30**	.30**	.30**	.13	.38**	-.24**	.05	-.24*	.18*	.52**	.38**	.37**	--
OASIS	.30**	.32**	.17*	.11	.45**	-.29**	-.02	-.10	.20*	.46**	.32**	.33**	.67**

Note: $^{**}p < .01$. $^{*}p < .05$. [a]Log transformed variables. NSSI frequency reflects the total number of NSSI episodes. NSSI recency reflects the number of months elapsed since most recent NSSI episode (0 months, 1-12 months, 3-24 months, 25+ months). NSSI severity reflects three severity classes (superficial, moderate, severe).

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Next, a series of hierarchical regression analyses were conducted to investigate the relative contributions of depression, anxiety, and domains of EA to NSSI functions; for all regressions, depression and anxiety symptoms were entered at Step 1 and each individual subscale of EA that evidenced a significant correlations with a specific NSSI function was entered in Step 2. Results from regressions in which the EA domain was shown to account for significant incremental variance in NSSI functionality can be viewed in Table 4. The first analysis examined the contributions of anxiety and depressive symptoms, and procrastination to the ANR function. Anxiety and depression accounted for a significant amount of variance in the ANR function (29%), and the addition of procrastination at Step 2 accounted for an additional 2.6% of the variance; in fact, when procrastination was added to the model, anxiety was no longer significantly related to ANR. Neither distress aversion nor behavioral avoidance explained significant variance in ANR after controlling for anxiety and depression. The second analysis examined the relative importance of anxiety and depressive symptoms and repression/denial in contributing to the APR function of NSSI. Depression, but not anxiety, was significantly related to APR in this model, and repression/denial accounted for significant additional variance (5.6%). Neither distress aversion nor procrastination accounted for significant incremental variance in the APR function. With regard to the interpersonal function of NSSI, both distress aversion and repression/denial explained a significant proportion of variance in performing NSSI for interpersonal reasons over and above the contributions of depression and anxiety (ΔR^2 = .032 and .045, respectively). Only repression/denial, but not distress aversion, rendered both depression and anxiety insignificant when entered into the model. Procrastination did not remain significantly related to the interpersonal function after controlling for anxiety and depression.[1]

Discussion

The present study examined the contributions of domains of EA, controlling for anxious and depressive symptomatology, to the severity and functionality of NSSI. This was the first study of its kind to investigate the differential relationships between a variety of specific types of EA and severity and functions of NSSI, and employ a recently developed, reliable self-report questionnaire that assesses a broad range of EA content (MEAQ; Gámez et al., 2011). EA is implicated across well-established conceptualizations and treatments of NSSI (e.g., Chapman, Gratz, & Brown, 2006; Klonsky, 2007; Gratz & Gunderson, 2006; Gratz & Tull, 2011; Linehan, 1993; Nock, 2009, 2010). Therefore, this study adds unique knowledge to the growing literature on EA and NSSI by using a novel measure that captures diverse dimensions of EA among individuals with a history of NSSI and focusing on a variety of variables related to self-injury.

We first investigated the magnitude of associations between dimensions of EA and indicators of NSSI severity. Contrary to our hypotheses, only one EA domain (procrastination) was related to the severity of NSSI behavior. These results indicate that self-injuring individuals with strong tendencies to delay impending distress or unpleasant tasks are more likely to engage in severe NSSI behavior, using methods with potential for more severe damage (e.g., cutting, burning). Given increasing evidence that more severe NSSI is predictive of more serious pathology

[1] Given the potential questionable reliability of asking individuals who last engaged in NSSI over two years ago to recall what functions this behavior served, analyses involving NSSI functionality variables were also conducted with only those participants who both provided recency data and reported NSSI in the past two years (n = 56). Similar to findings from the entire sample, all three reinforcement types were still significantly associated with NSSI severity. Procrastination and distress aversion were also still significantly related to all three NSSI functions, and repression/denial was significantly associated with APR and the interpersonal function only. Hierarchical regressions indicated that repression/denial and distress aversion still explained a significant proportion of variance in APR and interpersonal functions after accounting for anxiety and depression, respectively; however, neither procrastination nor repression/denial accounted for significant incremental variance in the ANR or interpersonal functions (respectively), although the proportion of variance in the interpersonal function accounted for by repression/denial approached statistical significance (p = .055).

and clinical correlates (e.g., suicidality; Lloyd-Richardson et al., 2007; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006; Whitlock et al., 2008; Zlotnick et al., 1999), these findings suggest that procrastination may be an important construct to consider when determining who is at risk for developing severe NSSI and thus other critical outcomes. This form of avoidance may be an especially relevant target when treating more severe self-injuring college students; however, given that the relationship between procrastination and NSSI severity was rendered insignificant after accounting for anxiety and depression, incorporating a range of strategies for managing negative emotions (e.g., cognitive restructuring, mindfulness, behavioral activation) on a case-by-case basis is likely to be the most efficacious approach when treating severe NSSI.

Table 4: Hierarchical Regressions Predicting NSSI Functionality

DV	Variable entered	*B*	SE	*β*	R^2	ΔR^2	*p*
Affect regulation function (ISAS)							
Step 1	Depression (ODSIS)	.258	.067	.385			.000
	Anxiety (OASIS)	.136	.067	.202	.292		.045
Step 2	Depression	.009	.013	.061			.000
	Anxiety	.040	.012	.306			.173
	Procrastination (MEAQ)	.027	.010	.229	.318	.026	.029
Feeling generation function (ISAS)[a]							
Step 1	Depression	.057	.020	.308			.006
	Anxiety	.020	.020	.110	.151		.318
Step 2	Depression	.042	.020	.225			.043
	Anxiety	.025	.020	.136			.205
	Repression/denial (MEAQ)	.014	.005	.245	.207	.056	.004
Interpersonal function (ISAS)[a]							
Step 1	Depression	.053	.022	.265			.018
	Anxiety	.032	.022	.157	.150		.156
Step 2	Depression	.046	.022	.229			.039
	Anxiety	.024	.022	.120			.278
	Distress aversion (MEAQ)	.011	.005	.191	.182	.032	.030
Interpersonal function[a]							
Step 1	Depression	.054	.022	.266			.017
	Anxiety	.031	.022	.152	.148		.169
Step 2	Depression	.039	.022	.192			.087
	Anxiety	.036	.022	.176			.106
	Repression/denial	.014	.005	.221	.193	.045	.010

Note: This data refers to the 126 participants with responses to the ISAS section regarding NSSI functionality. [a]Log transformed variables.

There are several potential interpretations for our surprising findings that no domains of EA were significantly related to the frequency or recency of NSSI. One possibility is that EA may not actually be particularly important in explaining self-injurious behavior among undergraduates; however, given a large literature suggesting EA is positively related with NSSI frequency (e.g., Howe-Martin et al., 2012; Najmi et al., 2007), more research is needed before drawing firm conclusions. Another possible explanation is that the MEAQ, which has not been tested in the context of NSSI before our study, does not well capture the forms of EA relevant to self-injurious behavior as well as other previous measures. Yet another possible explanation is that there are differences in the degree to which EA contributes to indicators of NSSI severity across clinical and nonclinical samples. In the present study, scores on MEAQ subscales were in line with normative data gleaned from other undergraduates, and consistently lower than those of psychiatric patients (see: Gámez et al., 2011). Thus, it is possible that the marked deficits in EA often seen in clinical samples is necessary to observe a strong effect of EA on engagement in NSSI. Findings indicating

that although EA is significantly associated with NSSI among individuals with a BPD diagnosis, this relationship does not exist among those without BPD (Chapman et al., 2005) lend support this notion. More research is needed to explore the possibility that EA is differentially related to self-injury as a function of sample type.

We also explored whether unique relationships exist between distinct EA domains and three common functions of NSSI, consistent with the functional model proposed by Nock and Prinstein (2004). As prior studies have consistently shown that individuals engage in NSSI for a variety of reasons (e.g., Klonsky, 2011; Nock & Prinstein, 2004, 2005), it is important that researchers also seek to elucidate how constructs known to be broadly correlated with *engagement* in NSSI (e.g., EA) may be differentially related to the idiosyncratic *function* that NSSI serves. In accordance with a functional model of NSSI, it makes good sense that individual functions should be related only to constructs that serve similar functions (i.e., convergent validity) and not related to those that fulfill discrepant functions (i.e., divergent validity). Previous research has shown that a variety of clinical correlates (e.g., depression, perfectionism, hopelessness) are uniquely associated with different functions of NSSI (Nock & Prinstein, 2005); however, this line of research has not yet extended to how distinct domains of EA may also be uniquely associated with the functions of NSSI.

First, it should be noted that all affect regulation, feeling generation, and interpersonal reinforcement were significantly related to NSSI severity, indicating that individuals engaging in more severe forms of NSSI were more likely to report using self-injury to serve specific functions. These findings are consistent with the distinction between self-injury enacted for a particular purpose (e.g., relief from a negative feeling state, interpersonal difficulty) and that of a more common, trivial nature (e.g., picking at a wound) made in the criteria for NSSI disorder, a condition in need of further study included in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). Furthermore, the ANR function was significantly related to frequency of NSSI and also the most commonly endorsed function in the present study. These findings are in line with prior research on the prevalence of NSSI functions (e.g., Nock & Prinstein, 2004; Klonsky, 2011), and suggest that the self-injurious behavior endorsed by the college students in our sample is most often maintained by a drive to reduce or escape from negative emotional states.

Consistent with our hypothesis, the present findings indicate that only some domains of EA were related to specific NSSI functions. These results suggest the need to investigate a broad array of EA content, rather than one unidimensional construct, in research on NSSI functionality. It should be noted that both anxiety and depression also evidenced small to medium effects on all functions and five of six EA domains. Thus, identifying the degree to which specific forms of EA are uniquely related to NSSI functions independently of the contributions of anxious and depressive symptomatology precludes interpretations of these findings.

To this end, the relative contributions of psychopathology and domains of EA in predicting NSSI functionality types were investigated. Results indicated that procrastination, repression/denial, and distress aversion explained a significant proportion of variance in engagement in NSSI for distinct functions after accounting for depression and anxiety. Taken together, these findings suggest that although depression, and to a lesser extent, anxiety contribute to the degree to which individuals engage in NSSI to fulfill specific functions, domains of EA are also significant factors to consider. These results underscore the importance of clinicians examining a variety of specific EA dimensions in maintenance of self-injurious behavior in order to select the most appropriate treatment targets.

The significant relationship between procrastination and affect regulation after controlling for anxiety and depression suggests that the self-injurious behavior of undergraduate students who often procrastinate is most likely maintained by an unwillingness to experience negatively evaluated emotions, rather than a desire to create certain physiological states or influence interpersonal domains. These findings are consistent with conceptual underpinnings of the ANR function that refer to NSSI as an effortful attempt to down-regulate or regulate away from uncomfortable, or *potentially* uncomfortable, emotional experiences. As the procrastination domain of EA is future-oriented, these results support the notion that for individuals who self-injure to reduce negative emotions, NSSI may be commonly used as a mechanism to reduce anxiety about future events or prevent anticipated distress. It should also be noted that the present sample consisted entirely of college students, who overall tend to evidence high rates of procrastination in order to avoid potentially unpleasant school-related tasks (e.g., Steel, 2007). When assessing and/or treating self-injuring college students, it may be especially important to consider procrastination

as a feature contributing to the maintenance of NSSI, particularly given our other findings that procrastination was the only EA domain related to severity of NSSI behavior. Strategies that target procrastinatory behaviors (e.g., distributed studying, intermediate deadlines, problem-solving strategies; Leahy, 2002; Perrin et al., 2011) may be useful to incorporate in multifaceted, interventions for individuals endorsing the ANR function of NSSI. There is also an accumulating body of research to suggest that personality traits (e.g., neuroticism, conscientiousness) may discriminate between individuals who engage in NSSI and those who do not (e.g., Allrogen et al., 2014; Baetens, Claes, Willem, Muehlenkamp, & Bijttebier, 2011; Brown, 2009). Future research may seek to better elucidate the nature of the relationships between underlying temperamental styles, EA domains, and NSSI functionality; for example, whether the relationship between procrastination and engagement in NSSI for ANR among college students is better accounted for by lower levels of conscientiousness represents an intriguing empirical question.

Our findings also demonstrated that repression/denial is related to engagement in NSSI to generate certain sensations or feelings after controlling for anxiety and depression. The feeling generation function serves as the counterpart to the ANR function, in that self-injury is maintained by an up-regulation of desired emotions, rather than a down-regulation of aversive emotions (Turner, Chapman, & Layden, 2012). Research suggests that when NSSI is enacted to create preferred physiological states, individuals are seeking to relieve “numb” or empty states that feel aversive (e.g., Brown, Comtois, & Linehan, 2002; Nock & Prinstein, 2004). In a related vein, when individuals continuously use repression/denial to deal with uncomfortable thoughts or feelings, they dissociate from their distress (Gámez et al., 2011), which can elicit emotional numbing (e.g., Tull & Roemer, 2003). It is possible that for self-injuring individuals, repressing aversive emotions contributes to feelings of numbness and emptiness; consequently, they may self-injure in order to “feel something,” even if that feeling is pain (Nock & Prinstein, 2005). The present findings provide lend support to this notion, as the repression/denial domain of EA was related to the feeling generation, but not the affect regulation, function of NSSI after controlling for anxious and depressive symptomatology. Overall, these results suggest the utility of strategies targeting maladaptive repression/denial for self-injuring individuals who endorse the APR function. Relevant techniques may include mindfulness to promote awareness of naturally occurring affective states they may not otherwise recognize and/or behavioral activation methods that encourage replacing NSSI with functionally equivalent behaviors to counter anhedonia.

Finally, findings showed that both repression/denial and distress aversion were related to the NSSI enacted for interpersonal reasons (e.g., to escape from interpersonal demands, to influence the behavior of others) independently of psychopathological symptoms. The repression/denial subscale has also been referred to as implicit avoidance of negative emotions (Gámez et al., 2014); thus, it is possible that individuals may endorse using NSSI to seek attention or escape social obligations, but this strategy may actually be functioning to reduce negative emotions or facilitate positive emotions (consistent with ANR and APR interpretations). Thus, treatment skills targeting repression/denial (e.g., mindfulness) may be equally important when working with self-injuring individuals who engage in NSSI for interpersonal reasons. The distress aversion domain of EA consists of broad, negative attitudes or evaluations regarding distress (e.g., “I’d do anything to feel less stressed”), and as indicated by the MEAQ, serves as one of the most representative markers of the higher order EA construct (Gámez et al., 2011). From conceptual and empirical standpoints, distress aversion may be less specific than other domains of EA (e.g., behavioral avoidance, procrastination), and thus evidence more applicability across the variety of interpersonal purposes that NSSI may serve. For example, with increased distress aversion, individuals may feel the need to self-injure in order to communicate to others *just how bad* they feel, as negative emotions seem particularly intolerable. Alternatively, with strong, negative attitudes toward distress, individuals may also be more likely to self-injure in order to avoid interpersonal demands because the aversive feelings such demands may evoke are perceived as highly unmanageable. Therapeutic techniques to target elevated levels of distress aversion may include desensitization (e.g., distress tolerance), as well as social skills training and problem-solving in order to promote more effective modes of interpersonal communication. The latter strategies are key components of Dialectical Behavior Therapy (DBT; Linehan, 1993), many tenets of which are highly applicable to functionally-informed treatment of self-injuring individuals.

This study has several important limitations that must be addressed in future research. First, these data were limited to self-report methods, which renders study constructs susceptible to limitations inherent in retrospective reporting and potential social desirability biases, particularly relevant with a highly stigmatized behavior such as

NSSI. It may be that individuals who had not engaged in NSSI for several years had difficulty accurately recalling the functions that their self-injurious behavior served. To address this issue, we also conducted correlational and hierarchical regression analyses to examine NSSI functionality only among those individuals who provided recency data and reported NSSI within the past two years. Results were largely similar to those from the entire sample, with the exceptions of procrastination and repression/denial no longer contributing to significant variance in the ANR and interpersonal functions after controlling for anxiety and depressive symptoms (see footnote on page 14); these discrepant findings may be in part due to the very small subset of participants used for these additional analyses (*n* = 56). Although these data generally suggest that the questionable reliability of asking individuals to report the functionality of NSSI behavior that occurred over two years ago did not significantly distort our conclusions, future research focused on NSSI functions may be best suited to samples in which self-injurious behavior is ongoing.

It is also possible that the high prevalence of NSSI in our sample (approximately 50% of students who completed the larger questionnaire battery) was due to using a self-report NSSI measure that includes less severe behaviors (e.g., pulling hair, picking at a wound) that may not be conceptualized as NSSI episodes according to DSM-5 criteria for NSSI disorder, but associated with other disorders (e.g., trichotillomania, excoriation) or conceptualized as more trivial, less clinically significant behaviors. However, when individuals who reported engagement in only superficial NSSI (*n* = 55) were excluded from our analyses, the same unique associations between specific EA domains and NSSI functionality were observed. Repression/denial still accounted for significant incremental variance in both APR and interpersonal functions, and distress aversion contributed significantly to APR, over and above the contributions of anxiety and depression. The only discrepant finding was that procrastination no longer accounted for significant variance in the ANR function after controlling for psychopathology. Although in this study, we chose to include individuals who reported engagement in only superficial NSSI to maximize sample size, future research must determine if the observed relationships between EA domains and NSSI functionality are consistent across individuals determined to engage in only *clinically significant* self-injurious behavior. Similarly, collecting data with other methods (e.g., clinician ratings, ecological momentary assessment, behavioral measures) to continue exploring the relationships between NSSI and EA is warranted.

Second, the current sample was relatively small and lacked diversity, in that all participants were college students enrolled in a psychology course, and the sample was predominantly Caucasian females. These factors limit the generalizability of our findings, particularly to clinical samples in which NSSI and other related psychopathology is more severe. For example, our sample scored notably lower on the OASIS (*M* = 3.29, *SD* = 3.22) than prior investigations using undergraduate students (e.g., *M* = 6.61, *SD* = 4.01, Norman et al., 2011; *M* = 7.16, *SD* = 3.05; Norman et al., 2006), which presents the need to extend this line of research to populations with a range of more severe symptoms. Future studies conducted in a variety of larger samples will help generalize the present conclusions, and permit usage of more sophisticated data analytic techniques (e.g., structural equation modeling) in which NSSI severity, NSSI functionality, and domains of EA could all be assessed conjointly. Given recent findings indicating that NSSI may be less strongly related to EA among males (e.g., Howe-Martin, 2012), it will be particularly important for future studies to discern not only whether domains of EA are differentially related to NSSI in clinical versus nonclinical samples, but also as a function of gender. Given that our relatively small sample was almost 75% female, we were unable to draw strong conclusions regarding gender differences. Third, as we have noted, data from the ISAS subscales mapping onto positive and negative interpersonal functions (i.e., SPR and SNR) of NSSI could not be normalized, which rendered us unable to explore potential differences in relationships between EA domains and distinct forms of interpersonal reinforcement. Use of measures that have been shown to possess a four-factor model (e.g., FASM; Lloyd et al., 1997) may have allowed us to distinguish between these types of interpersonal reinforcement. Finally, this study was limited to cross-sectional data, which tempers interpretations of temporal sequence. Although our findings suggest that domains of EA are differentially related to the idiosyncratic reasons why individuals engage in NSSI, causal conclusions are only speculative. Longitudinal research should aim to determine if EA is followed by specific NSSI reinforcement, or if NSSI maintenance contributes to increased EA.

Despite these limitations, the present study adds to the growing literature on the role of EA in both the severity and functionality of self-injury. This study extends previous research on the role of EA in NSSI by investigating how specific forms of EA contribute uniquely to the distinct functions that self-injury serves, thereby augmenting our

understanding of why NSSI is maintained. Given that currently no evidence-based treatments exist to directly target this maladaptive behavior (e.g., Nock, 2009, 2010), it is critical that researchers and clinicians alike take into account a range of idiosyncratic factors that serve to maintain NSSI when developing and delivering effective, efficient interventions specific to self-injury. It is our hope that domains of EA will be considered as key targets of change in functional approaches to treating NSSI.

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