



## Research Paper

# We have so much in common: Does shared variance between emotion-related constructs account for relationships with self-injury?

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## ABSTRACT

**Background:** Emotion regulation, distress tolerance, experiential avoidance, and both positive and negative affect have all been linked to NSSI. These constructs are proposed to be distinct; however, they share conceptual similarities. For example, some people may regulate emotions by avoiding stressful situations, conflating emotion regulation and avoidance. We tested if constructs linked with NSSI (when studied in isolation), remain significant correlates of NSSI when considered alongside related constructs (with which they may share variance).

**Method:** University students ( $n = 487$ ,  $M = 21.36$ ,  $SD = 2.48$ , 74% female, 40% with lived experience of self-injury) completed well-validated self-report measures of NSSI, difficulties with emotion regulation, distress tolerance, experiential avoidance, emotional reactivity, positive and negative affect, and alexithymia.

**Results:** As predicted, emotion-related constructs were generally highly correlated. Additionally, with the exception of lack of emotional awareness, all constructs were significantly associated with NSSI in bivariate analyses. In multivariate analyses, associations were substantially attenuated. Positive affect, distress tolerance, and experiential avoidance were negatively associated with NSSI, and limited emotion regulation strategies was positively associated with NSSI. No other constructs were uniquely associated with NSSI and exploratory factor analyses indicated that all constructs loaded onto a single factor.

**Limitations:** Cross-sectional design rules out temporal sequencing.

**Conclusion:** Findings raise the possibility that associations between some emotion-related constructs (e.g., alexithymia) and NSSI may reflect variance shared with other emotion-related constructs. If true, this will have important theoretical, clinical, and measurement implications for NSSI research.

## 1. Introduction

Non-suicidal self-injury (NSSI) is the intentional damage to one's own body tissue in the absence of suicidal intent (International Society for the Study of Self-injury [ISSI], 2020). NSSI is common, with one in five adolescents, 13.4% of young adults, and 5.5% of adults reporting engaging in the behavior in their lifetime (Swannell et al., 2014). Furthermore, 20% of university students report engaging in NSSI, with many beginning to engage in NSSI for the first time during their first year of university (Kiekens et al., 2019; Muehlenkamp et al., 2019). Common methods of NSSI include burning, cutting, and scratching (Klonsky and Muehlenkamp, 2007). Individuals report engaging in NSSI for a number of reasons including self-punishment and anti-dissociation, however the most frequently reported reason for engagement in NSSI is

emotion regulation (Taylor et al., 2018).

Given the emotion regulatory function of NSSI, most models of NSSI focus on the experience and regulation of emotion (Chapman et al., 2006; Hasking et al., 2017; Nock, 2009; Nock and Prinstein, 2004; Selby and Joiner, 2009). Across the models a number of emotion-related constructs have been postulated to play a role in the onset and maintenance of self-injury; including negative affect (Chapman et al., 2006; Nock and Prinstein, 2004; Selby and Joiner, 2009), difficulties regulating emotions (Chapman et al., 2006; Hasking et al., 2017), inability to tolerate distress (Chapman et al., 2006; Hasking et al., 2017; Nock, 2009; Selby and Joiner, 2009), emotional reactivity (Nock, 2009), and experiential avoidance (Chapman et al., 2006).

Emotion related constructs have been linked to engagement in NSSI, as well as recency and frequency of engagement. Difficulties regulating

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one's emotions have been found to be one of the main reasons for engaging in NSSI (Nock and Prinstein, 2004). Experiential avoidance has been positively associated with a recency of engagement in NSSI (i.e. engagement in self-injury in the last 12 months; Lin et al., 2017; Nielsen et al., 2017). An inability to tolerate distress has been associated with frequency of engagement in NSSI (Anestis et al., 2014; Slabbert et al., 2018). Likewise, alexithymia (an inability to describe or differentiate one's feelings; Nemiah and Sifneos, 1970) has been associated with both recency and frequency (Lin et al., 2017; Howe-Martin et al., 2012; Nielsen et al., 2017). A large body of research has been conducted into the links between negative affect and NSSI; including trait negative affect being associated with likelihood and frequency of engagement in NSSI and engagement in NSSI associated with a reduction of negative affect (Bresin and Gordon, 2013; Nicolai et al., 2016; Turner et al., 2016). However, recently there has been a growing body of literature that focuses on the role positive affect plays in the engagement of NSSI. Positive affect differentiates individuals who have never, previously, and currently engage in NSSI, in that those with less positive affect were more likely to report a history of NSSI regardless of level of negative affect (Boyes et al., 2020; Slabbert et al., 2020). Individuals also report an increase in positive affect (i.e. relief) after self-injuring, but this may be more accurately considered a reduction in negative affect (Jenkins and Schmitz, 2012).

Whilst constructs such as negative and positive affect, alexithymia, emotion regulation, distress tolerance, emotional reactivity, and experiential avoidance, are theorized to be unique, there are conceptual overlaps between them. For example, avoidance and emotion regulation are posed as different constructs (Chapman et al., 2006; Hasking et al., 2017; Nock, 2009), however an individual's avoidance may be a form of emotion regulation, in that if an individual gets anxious in social situations they may regulate that anxiety by avoiding social situations (Jazaieri et al., 2015).

Concerns regarding the general overlap across emotional constructs were recently expressed by Juarascio and colleagues (2020). In their paper, they explored constructs that are associated with emotional states that fall under the umbrella of "negative emotion". These included constructs such as anxiety sensitivity, negative urgency, distress tolerance, emotional dysregulation, and avoidance. Juarascio et al. (2020) found considerable overlap between item content on widely used measures of these constructs, and moderate to high correlations between items ( $r = .24 - .67$ ). Conceptually some of the items were very similar, even though they purported to be measuring separate constructs. For example, across all measures, the non-acceptance of emotions is assessed. Specifically, the items "when I am upset I become angry with myself for feeling that way" on the Difficulties with Emotion Regulation Scale (Gratz and Roemer, 2004), "my feelings of distress or being upset are not acceptable" on the Distress Tolerance Scale (Simons and Gaher, 2005), and "I'm afraid of my feelings" on the Acceptance and Action Questionnaire – II (AAQ-II; Bond et al., 2011) appear to be similar. Similarly, items on the widely used Distress Tolerance Scale (Simons and Gaher, 2005) "I'll do anything to avoid feeling distress or upset" and "I'll do anything to stop from feeling distressed or upset" appear to be measuring avoidance of distress rather than tolerance. Likewise, on the Brief Experiential Avoidance Questionnaire (Gámez et al., 2014) the item "It is hard for me to know what I am feeling" appears to be tapping into the construct of alexithymia.

Juarascio and colleagues' (2020) paper raises important theoretical and methodological implications, particularly for areas such as self-injury, where these constructs are central to most theoretical models (Chapman et al., 2006; Hasking et al., 2017; Nock, 2009; Nock and Prinstein, 2004; Selby and Joiner, 2009). Due to the focus on the importance of the emotional experience and its relationship with NSSI, it is also important to consider the overlap and complementary nature of emotion related constructs (Gross, 2008). Emotion related constructs involve multiple processes and skills that whilst distinct do have some level of inter-relatedness. This includes how we monitor, evaluate,

accept, and modulate our emotions all dependent on the situation (Gross, 1998). We should also be considering how, based on this awareness or lack thereof, we decide whether or not to act on these emotions (Gratz and Roemer, 2004). The aim of this study was to test whether emotion-related constructs previously identified as being important to our understanding of NSSI (when studied in isolation) still make a unique contribution when considered alongside other related constructs, with which they may share variance. It is expected that the constructs will be associated with self-injury when considered in isolation. However, if constructs do overlap in terms of shared variance, we hypothesized that when constructs are analyzed simultaneously associations with NSSI may be reduced or no longer present. Furthermore, it is hypothesized that when factor analyzed together all constructs will load on a single factor.

## 2. Method

### 2.1. Participants

University students completed one of two studies on emotion regulation and NSSI. Datasets were combined to increase sample size. Both datasets included responses from Australian university students recruited between 2017 and 2019. Four hundred and eighty seven participants completed measures of interest; of these eight identified as transgender, intersex or did not specify a gender (74% Female, 25% Male, 1 % Transgender/Inter-sex/Unspecified,  $Mage = 21.36$ ,  $SD = 2.48$ ).

Most participants were born in Australia (78%), 191 (40%) reported a lifetime history of NSSI and 115 (33%) reported a diagnosis of a mental illness. The most commonly reported diagnoses were anxiety (23 %) and depression (18%), or comorbid anxiety and depression. Of the individuals reporting a history of self-injury 123 (63%) had engaged in self-injury during the last year. Age of onset ranged from 4 – 30 years ( $M = 13.85$ ,  $SD = 3.32$ ). Most commonly reported methods of self-injury were cutting (45.4%), banging or hitting oneself (11.7%), and severe scratching (11.2%).

### 2.2. Measures

#### 2.2.1. Demographic information

Information regarding age, gender, country of birth, and any mental illness diagnoses (as well as specific diagnosis) was collected.

#### 2.2.2. Non-suicidal self-injury

Information related to non-suicidal self-injury was collected using Section 1 of the Inventory of Statements about Self-injury (ISAS; Klonsky and Glenn, 2009). Participants were presented with a definition of NSSI and then asked if they had ever engaged in self-injury. Participants who indicated that they had engaged in NSSI were then asked if they had engaged in the last year, what their main form of self-injury is (if any), and how old they were when they first engaged in self-injury. The short term (1 – 4 weeks) test-retest reliability of the ISAS is good ( $r = .85$ ; Glenn and Klonsky, 2011).

#### 2.2.3. Positive and negative affect

Trait positive and negative affect were measured using the Positive and Negative Affect Schedule (Watson et al., 1988). The scale consists of two factors that measure positive affectivity (e.g. "enthusiastic") and negative affectivity (e.g. "afraid"). Participants were asked to read each item and rate the extent to which they felt that emotion "in general" on a 5 point Likert scale (1: very slightly or not at all; 5: extremely). The scale has demonstrated good internal consistency for both factors: positive affect ( $\alpha = .89$ ) and negative affect ( $\alpha = .85$ ; Crawford and Henry, 2004). The internal consistency in the current sample was excellent for both positive ( $\alpha = .91$ ) and negative ( $\alpha = .91$ ) affect.

#### 2.2.4. Alexithymia

The Toronto Alexithymia Scale (TAS-20; Bagby et al., 1994) is a 20 item scale with items (e.g. "I have feelings that I can't quite identify") rated on a 5 point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Scores range from 20 – 100; higher scores indicate greater alexithymia. The TAS-20 total score demonstrates good internal consistency ( $\alpha = .81$ ) and test-retest reliability ( $r = .77$ ; Bagby et al., 1994). The internal consistency in this study was excellent ( $\alpha = .89$ ).

#### 2.2.5. Emotion regulation

Participants' perceived ability to regulate emotion was assessed using the Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer, 2004). The DERS is a 36 item scale, consisting of 6 subscales, with items (e.g. "When I'm upset, I become embarrassed for feeling that way.") rated on a five-point Likert scale ranging from 1 (almost never) to 5 (almost always). Subscales include non-acceptance of emotional responses, difficulty engaging in goal directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. The DERS has excellent internal consistency ( $\alpha = .80 - .89$ ), construct validity, and test-retest reliability (Gratz and Roemer, 2004). In this study internal consistency was excellent for all subscales (lack of emotional awareness  $\alpha = .84$  – non-acceptance of emotional responses  $\alpha = .93$ ).

#### 2.2.6. Distress tolerance

The ability to tolerate distress was measured using the Distress Tolerance Scale (DTS; Simons and Gaher, 2005). Fourteen items (e.g. "I can't handle feeling distressed or upset.") were rated on a 5 point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree); higher scores indicate a greater capacity to tolerate distress. The DTS demonstrates excellent internal consistency ( $\alpha = .89$ ), as well as good convergent and divergent validity with positive ( $r = .26$ ) and negative affect ( $r = -.59$ ; Simons and Gaher, 2005). The internal consistency in this sample was excellent ( $\alpha = .93$ ).

#### 2.2.7. Emotional reactivity

An individual's tendency to react to emotional stimuli was assessed using the 21 item Emotional Reactivity Scale (ERS; Nock et al., 2008). Items (e.g. "I experience emotions very strongly") were rated on a 5 point Likert scale ranging from 0 – 4 (0: not at all like me; 4: completely like me). The ERS has excellent internal consistency ( $\alpha = .94$ ) and has demonstrated convergent and divergent validity with related measures (Nock et al., 2008). The internal consistency in this sample was excellent ( $\alpha = .97$ ).

#### 2.2.8. Experiential avoidance

Experiential avoidance was measured using the Brief Experiential Avoidance Scale (BEAQ; Gámez et al., 2014), a short form of the Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez et al., 2011). The BEAQ is a 15 item, unidimensional scale. Participants rated statements (e.g. "I rarely do something if there is a chance it will upset me") on a 6 point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). Scores range from 15 – 90, with higher scores indicative of higher levels of experiential avoidance. Internal consistency for the BEAQ is good ( $\alpha = .86$ ) and it demonstrates convergent validity with the MEAQ ( $r = .62$ ; Gámez et al., 2014). The internal consistency in this sample was excellent ( $\alpha = .90$ ).

### 2.3. Procedure

After approval from the University Human Research Ethics Committee, studies were advertised and made available on the University's online research participation pool, and online via various social media platforms. Students recruited through Curtin University were awarded course credit, and students recruited through other universities were entered into a prize draw to win an iPad. Participants were provided

with a link to the online survey that detailed the projects aims, nature of the questionnaire, confidentiality, and how the data would be stored. Participants were able to complete the survey in their own time. Each survey took approximately 45-60 minutes to complete. Upon completion, all participants were provided with a list of resources including counselling services and information on self-injury.

### 2.4. Data analysis

Participants were categorized into two groups depending on their NSSI history; participants with no history of NSSI or a lifetime history of NSSI. Point biserial correlations were conducted to assess bivariate associations between each emotion-related construct and NSSI history. Binary logistic regression assessed unique associations between these constructs and NSSI history when variables were entered into the same model simultaneously. Factor analysis was conducted to investigate the underlying structure of all constructs.

## 3. Results

### 3.1. Preliminary analysis

All analysis were conducted with SPSS version 27. Although not missing completely at random,  $\chi^2(5751) = 6021.865$ ,  $p = .006$ , there was minimal missing data (<1% across variables), therefore expectation maximization was used to impute the data (Tabachnick and Fidell, 2013). Age was correlated with the TAS-20 and Lack of Emotional Clarity (see Table 1). More female participants reported a history of NSSI,  $\chi^2(3) = 22.09$ ,  $p < .001$ ,  $V = .21$ . As such, age and gender were included as a covariate in the logistic regression. In bivariate analyses, history of self-injury was associated with positive and negative affect, alexithymia, emotional regulation, DERS (non-acceptance of emotions, difficulties with goal directed behavior, impulse control difficulties, limited emotion regulation strategies, lack of emotional clarity), emotional reactivity, and experiential avoidance ( $r = -.39 - .41$ ). The only item not associated with self-injury was the lack of emotional awareness subscale from the DERS. All correlations between constructs of interest were in the expected direction (Table 1).

### 3.2. Binary logistic regression

A logistic regression, with all variables entered simultaneously, significantly differentiated participants who did and did not report a history of NSSI,  $\chi^2(14) = 132.55$ ,  $p < .001$ , Cox and Snell  $R^2 = .24$ , Nagelkerke  $R^2 = .33$ . However, unlike in the bivariate analyses, few variables uniquely differentiated participants who did and did not report a history of NSSI. Only positive affect, limited emotion regulation strategies (DERS), distress tolerance, and experiential avoidance were significant predictors in the model (Table 2). However, in the regression the relationships were significantly weaker; positive affect ( $r = .01$ ), limited emotion regulation strategies ( $r = .02$ ), distress tolerance ( $r = .01$ ), and experiential avoidance ( $r = .01$ ).

### 3.3. Factor analysis

Exploratory Factor Analysis was conducted in Jamovi (The jamovi project, 2021; R Core Team, 2020; Revelle, 2019) to explore whether the measures could be captured by a single underlying construct. Maximum likelihood extraction with Promax (oblique) rotation was used, as factors were expected to be correlated. Parallel analysis indicated a potential 2 factor solution; however, Eigenvalues and visual inspection of the scree plot indicated a clear single factor structure (see Supplementary Material Figure 1). A subsequent test of this single factor solution demonstrated that all constructs, with the exception of lack of emotional awareness, had loadings over .30. After removing lack of emotional awareness, the single factor accounted for 52% of the overall variance

**Table 1**  
Correlations between Variables in the Model

	Never (n = 291)		Engaged in NSSI (n = 196)		14	13	12	11	10	9	8	7	6	5	4	3	2	
	M	SD	M	SD														
1 Age	21.35	4.25	21.36	2.48														
2 NSSI <sup>a</sup>																		
3 Positive affect	33.53	7.02	28.65	7.85														
4 Negative affect	23.55	7.90	28.81	8.71														
5 Alexithymia	49.38	13.34	53.71	13.58														
6 Non-acceptance of emotional responses	14.69	6.14	18.28	6.62														
7 Difficulty in goal directed behaviour	14.95	4.46	18.37	4.60														
8 Impulse control difficulties	13.20	5.07	16.39	6.17														
9 Lack of emotional awareness	15.25	4.54	15.83	5.31														
10 Limited emotion regulation strategies	18.85	7.23	25.62	7.79														
11 Lack of emotional clarity	12.38	4.05	13.69	4.63														
12 Distress Tolerance	48.14	11.86	38.04	11.81														
13 Emotional Reactivity	55.15	18.88	71.67	19.87														
14 Experiential Avoidance	46.49	13.35	52.09	13.88														

<sup>a</sup> Correlations between dichotomous and continuous variables are point bi-serial correlations  
\* p < .05. \*\*p < .01. \*\*\*p < .001

**Table 2**  
Predictor Coefficients for the Model Predicting NSSI

	b	SE (b)	p	Exp (B) [95% CI]
Constant	1.53			
Gender	.60	.26	.022	1.83 [1.09, 3.06]
Age	-.01	.03	.675	.99 [.93, 1.05]
Positive affect	-.05	.02	.007	.95 [.92, .99]
Negative affect	.01	.02	.595	1.01 [.97, 1.05]
Alexithymia	-.01	.01	.696	.99 [.97, 1.02]
Non-acceptance of emotional responses	-.02	.02	.382	.98 [.93, 1.03]
Difficulty in goal directed behaviour	.06	.03	.097	1.06 [.99, 1.13]
Impulse control difficulties	-.05	.03	.091	.95 [.89, 1.01]
Lack of emotional awareness	.01	.03	.737	1.01 [.95, 1.07]
Limited emotion regulation strategies	.07	.03	.013	1.08 [1.02, 1.14]
Lack of emotional clarity	-.01	.04	.858	.99 [.92, 1.07]
Distress Tolerance	-.03	.01	.009	.97 [.94, .99]
Emotional Reactivity	.02	.01	.053	1.02 [1.00, 1.04]
Experiential Avoidance	-.03	.01	.030	.97 [.95, 1.00]

and all factor loadings were above .40 (Table 3).

**4. Discussion**

The aim of the current study was to investigate the unique contributions of constructs relating to the experience and regulation of emotion that are theorized to be important in initiating and maintaining NSSI. Responses to measures of positive and negative affect, alexithymia, emotion regulation, distress tolerance, emotional reactivity, and experiential avoidance were analyzed. Moderate to large correlations were found between all constructs, suggesting there may be conceptual or methodological overlap between constructs. Not surprisingly then, although most constructs were significantly associated with NSSI history in bivariate analysis, these association were attenuated, or disappeared, in multivariate analyses. Although the overall model, in which constructs were entered simultaneously, performed well in differentiating individuals with or without a history of self-injury, only positive affect, limited emotion regulation strategies, distress tolerance, and experiential avoidance uniquely differentiated individuals with and without a lifetime history of NSSI, and their unique contribution was small. Consistent with this, all emotion related constructs, except a lack of emotional awareness, loaded onto a single factor accounting for 52% of total variance.

These findings highlight the need for careful consideration of the existing theories of NSSI and the constructs identified as central to onset and engagement in NSSI. Most existing theories propose there are multiple emotion-related constructs that either predispose or play a role

**Table 3**  
Factor Structure of Emotion Related Constructs

	Loadings
	Factor 1
Limited emotion regulation strategies	.92
Emotional Reactivity	.81
Impulse control difficulties	.80
Negative affect	.77
Non-acceptance of emotional responses	.74
Distress Tolerance	-.74
Difficulty in goal directed behaviour	.73
Experiential Avoidance	.70
Alexithymia	.61
Lack of emotional clarity	.54
Positive affect	-.47

Note: Lack of emotional awareness was excluded due to loading of less than .30. Factor loadings <.03 were suppressed.

in the onset and maintenance of NSSI. Our findings demonstrate this is the case when we consider these constructs individually. However, when considered collectively it appears that for many of these constructs (e.g. alexithymia, negative affect, emotional reactivity, and some difficulties in emotion regulation) the shared variance with other related constructs may account for their association with self-injury. Additionally, the factor analysis highlights the potential of a single underlying latent emotion-related construct. Future research investigating this possibility is clearly needed.

Overlapping constructs and shared variance have been noted in other fields such as health psychology and social psychology (Bianchi and Brisson, 2019; Hagger and Luszczynska, 2014; Lancaster and Boivin, 2005). Hagger and Luszczynska (2014) coined the term “deja-variable” referring to how descriptions of constructs are often familiar but labelled differently. This built on the work of Skinner (1996) who identified the lack of consensus in regards to control-related constructs in social psychology. Identification of overlap between constructs and refinement of the definition of constructs will allow for more clearly operationalized definitions that will be beneficial in identifying the specific constructs that are involved in the onset and maintenance of NSSI.

These findings raise theoretical implications regarding our current understanding of the mechanisms that may be involved in the onset and maintenance of NSSI. Current models postulate that there are multiple constructs at play. However, the findings from both the logistic regression and exploratory factor analysis (and consistent with the findings of Juarascio et al., 2020), raise the possibility that it may be a general “negative emotion” construct that may account for the relationships with NSSI. This may explain why positive affect, and an ability to tolerate distress were still be associated with NSSI when analyzed simultaneously, as these differ in valence of the emotion (positive affect) and the specific focus on tolerating negative emotion (distress tolerance).

With regards difficulties with emotion regulation only the subscale *limited access to emotion regulation strategies* differentiated those with and without a history of NSSI. This is consistent with the meta-analysis by Wolff et al. (2019), suggesting individuals who are lacking in access to a variety of emotion related skills are more likely to report a history of NSSI. Additionally, the fact that experiential avoidance remained associated with NSSI suggest that the measure is capturing something unique. This corresponds with Chapman and colleagues (2006) Model of Experiential Avoidance. However, The Brief Experiential Avoidance Questionnaire is a unidimensional measure (Gámez et al., 2014) making it difficult to tease apart the specific nuances of what forms of avoidance are associated with a lifetime history of NSSI. Whilst the measure was created to provide a briefer version of the Multidimensional Experiential Avoidance Questionnaire (Gámez et al., 2011), what is gained in brevity it lacks in the ability to differentiate between the various types of avoidance including; behavioral avoidance, distress aversion, procrastination, distraction and suppression, repression and denial, and distress endurance.

Given that positive affect but not negative affect was associated with NSSI history, future research investigating associations between both negative and positive emotional reactivity may be beneficial. There have recently been similar calls to measure difficulties in the regulation of both negative and positive emotions (Weiss et al., 2015), as well as assess difficulties in identifying and describing both negative and positive emotions (Preece et al., 2018). Future research should consider the inclusion of measures that capture the valence which could allow for further exploration of the role positive affect plays in relation to NSSI.

Further theoretical implications are related to the current models of NSSI. The current models postulate that there are multiple constructs involved in an individual engaging in NSSI. As previously mentioned, individuals experience an event that leads to them to engage in NSSI to regulate their emotions. Given the evident conceptual overlap and interplay between constructs we know to be important in the onset and maintenance of NSSI, it raises the question of whether our existing

models could be simplified, to focus on the specific factors at play. Rather than considering overarching constructs such as difficulties with emotion regulation, looking at the specific factors that contribute to NSSI could improve our understanding of this behavior. For example, as demonstrated in this study, when looking at difficulties with emotional regulation it appears that the lack of alternative strategies may be particularly important in differentiating individuals with and without a history of NSSI. Relatedly, more refined measurement of these emotion-related constructs is likely required if we are to accurately test specific predictions arising from different models of self-injury. This supports the theory that there are multiple processes associated with how we regulate and interact with our emotions (Gratz and Roemer, 2004; Gross, 1998). Refining our existing models and measures to capture the specific strategies that are involved in the onset and maintenance of NSSI, will improve our current understanding of what differentiates individuals with and without a history of NSSI. Notwithstanding these concerns, the findings of the current study support the theory that individuals with higher levels of positive affect and a greater ability to tolerate distress are less likely to engage in NSSI (Boyes et al., 2020; Hasking et al., 2018; Slabbert et al., 2020). This suggests that increasing an individual’s positive affect, emotion regulation strategies, and ability to tolerate distress may be beneficial. Targeting these constructs in interventions may reduce an individual’s likelihood of engaging or beginning to engage in NSSI.

#### 4.1. Limitations

The findings of this study should be considered with some limitations in mind. Firstly, due to the use of cross-sectional data, conclusions about temporal sequencing cannot be drawn. Although not the aim of this study, future longitudinal research could be conducted to investigate if changes in emotion related constructs are associated with changes in frequency or recency of NSSI. Secondly, as this sample was a convenience self-selected sample, the generalizability of the sample may be limited. Future research should consider replicating this study among other community and clinical samples. Thirdly, whilst the measures used in this study were well validated and popular measures in the area of NSSI research, future research should investigate if the same pattern of findings exist with other measures such as The Acceptance and Action Questionnaire II (Bond et al., 2011) and The Multidimensional Experiential Avoidance Questionnaire (Gámez et al., 2011), which assess avoidance over multiple dimensions. Likewise, with measures of emotion-related constructs which differentiate between negative and positive valence (e.g. Difficulties with Emotional Regulation Scale – Positive; Gratz, 2002).

#### 4.2. Conclusion

Self-injury is a significant and prevalent health concern that is associated with a number of negative outcomes, including increased risk of future thoughts and acts of suicide (Kiekens et al., 2018). Therefore, a deeper understanding of the constructs that differentiate individuals with and without a history of self-injury is critical. Emotion regulation is the most frequently reported function of NSSI, and most theoretical models focus on emotion-related constructs, such as positive and negative affect, alexithymia, regulation of emotions, ability to tolerate distress, emotional reactivity, and experiential avoidance. However, the current study demonstrates that there is considerable overlap between a range of constructs we currently believe to be involved in the onset and maintenance of NSSI. If this study is replicated in other samples this would have important theoretical, conceptual, and measurement implications for research into NSSI.

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Supplementary materials

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