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Common pathways to NSSI and suicide ideation:

The roles of rumination and self-compassion

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Abstract

Objectives: We investigated whether rumination and self-compassion moderate and/or mediate the relationships between negative affect and both non-suicidal self-injury (NSSI) and suicide ideation. **Methods:** Undergraduate university students ($n = 415$) completed well-validated measures of negative affect, rumination, self-compassion, NSSI, and suicide ideation. **Results:** Neither rumination nor self-compassion moderated associations between negative affect and NSSI and suicide ideation. However, both rumination and self-compassion mediated associations between negative affect and life-time history of NSSI and suicide ideation. Self-compassion additionally mediated the association between negative affect and both 12 month NSSI and suicide ideation. **Conclusion:** The salience of self-compassion, particularly in predicting recent NSSI and suicide ideation, offers promise for early intervention initiatives focusing on less judgmental or self-critical means of self-relation.

Keywords: NSSI, suicide ideation, self-compassion, rumination

Up to one in five young adults report a history of non-suicidal self-injury (NSSI), the deliberate destruction of body tissue without conscious suicidal intent (Nock, 2009; Swannell, Martin, Page, Hasking, & St John, 2014). NSSI is typically used to relieve intense negative affect, and is associated with a number of adverse outcomes including poor academic performance, and comorbid psychopathology (Bentley, et al., 2015; Bentley, Nock & Barlow, 2015; Hamza & Willoughby, 2016; Kiekens et al., 2016). Despite being engaged with no conscious suicidal intent, NSSI is strongly associated with suicidal thoughts and behaviour (Ribeiro et al., 2016). While NSSI may be a precursor to subsequent suicide ideation (Whitlock et al., 2013), a significant proportion of young people experience both NSSI and suicide ideation within the same year (Glenn et al., 2017; Hamza & Willoughby, 2016). There is growing evidence that different cognitive-emotional factors underlie NSSI and suicidal thoughts (Fox et al., 2015; Franklin et al., 2017), suggesting that better understanding of common and differential pathways to NSSI and suicide ideation may assist in targeted prevention and early intervention initiatives to reduce both suicidal and non-suicidal behaviours. Of note, while significant efforts have been made to understand factors which might increase risk, more work is needed to identify factors that might reduce risk of suicidal and non-suicidal behaviours used to alleviate negative affect.

Negative affect, NSSI, and suicide ideation

Although NSSI can serve a number of functions for an individual, the most frequently cited motive for self-injury is to regulate intense or unwanted affect. People reporting heightened negative emotions are more likely to self-injure (Nicolai, Wielgus, & Mezulis, 2016; Nock & Prinstein, 2005), and people who self-injure report greater reductions in negative affect following the application of a painful stimulus (Bresin & Gordon, 2013). Daily diary studies also show heightened negativity on days when people self-injure, and reductions in negative affect following NSSI, supporting the affect regulation function

(Muehlenkamp et al., 2009; Turner, et al., 2016). Similarly, sensitivity to negative affect, and the intensity with which negative affect is experienced, are temporally related to suicide ideation (Selby, Yen, & Spirito, 2013). While it seems clear that negative affect is related to both NSSI and suicidal ideation, the pathways by which negative affect can lead to these outcomes are less clear. Specifically, while NSSI and suicide ideation could be two outcomes of a common pathway from negative affect it is just as likely that negative affect exerts an effect on different underlying mechanisms in the pathways to NSSI and ideation. In this paper we explore rumination and self-compassion as two such pathways.

Rumination

Rumination is a transdiagnostic cognitive process consisting of repetitive attempts to analyse problems and feelings of distress, without taking the necessary action to make positive changes (Harvey, Watkins, Mansell, & Shafran, 2004; McEvoy, Mahoney & Moulds, 2010; McEvoy, Watson, Watkins & Nathan, 2013; Nolen-Hoeksema, 1991). Rumination is associated with increases in negative thoughts and images, and reduces the likelihood that individuals will engage in more adaptive emotion regulation strategies (McEvoy, Hayes, Hasking & Rees, 2017; Watkins, 2015). In describing Emotional Cascade Theory, Selby and Joiner (2009) explain how rumination can increase use of emotion-regulatory behaviours such as NSSI. They argue that rumination on negative stimuli can exacerbate negative affect, intensify the cycle, and result in emotional cascades of increasingly intense emotion (Selby & Joiner, 2009). Given the intensity of the emotion, simple distraction techniques (e.g., going for a walk) are often insufficient to interrupt the cascade. However, NSSI can effectively disrupt the cascade by providing a physical diversion from the distressing emotional state. The resulting reduction in arousal and negative affect then maintains use of NSSI in distressing situations.

Self-report, experimental, and ecological momentary assessment studies offer support for Emotional Cascade Theory, evidencing strong links between escalating rumination and NSSI (Arbuthnott, Lewis, & Bailey, 2015; Bresin & Verona, 2016; Nicolai, et al., 2016; Selby, Franklin, Carson-Wong, & Rizvi, 2013). Similarly, there is a strong relationship between rumination and suicide ideation (Morrison & O'Connor, 2008; Rogers and Joiner, 2017). Rumination demonstrates cross-sectional and prospective relationships with suicide ideation and suicide attempts (Morrison & O'Connor, 2008), and mediates the relationship between cognitive vulnerability and suicide ideation (Miranda, et al., 2013; Smith, Alloy & Abramson, 2006; Surrence, Miranda, Marroquín, & Chan, 2009). Consequently, rumination may be a common cognitive vulnerability for both NSSI and suicide attempts.

Self-compassion

While rumination can exacerbate negative affect, less work has explored factors that might protect against NSSI and suicidal ideation when feeling negative emotion. One potential factor is self-compassion, an adaptive form of self-relation characterised by the tendency to respond to difficult experiences in a balanced and self-nurturing way, while acknowledging that suffering is part of the common human experience (Neff, 2003). Previous work has found that self-compassion promotes adaptive self-regulation in the face of difficult emotions (Arch et al, 2014; Breines et al. 2014), and is inversely linked with maladaptive cognitions such as rumination (Finlay-Jones, 2017; Raes, 2010). Conversely, low self-compassion – characterised by high levels of self-judgement, over-identification with difficult emotions (i.e., “I feel bad therefore I *am* bad”), and feelings of isolation during times of suffering – may increase the likelihood that one may self-injure (Xavier, Pinto-Gouveia, & Cunha, 2016). Supporting this, self-compassion is negatively associated with NSSI thoughts and actions, and moderates the relationship between depression and NSSI in adolescents (Jiang, You, Ren, et al., 2017; Jiang, You, Zheng, & Lin, 2017). Previous work

has also found that self-compassion moderates the relationship between negative affect and symptoms of depression and anxiety (Trompeter et al., 2017). However, it is also plausible that self-compassion *mediates* the link between negative affect and both NSSI and suicide ideation, such that high negative affect undermines self-compassion and leads to greater NSSI and suicide ideation.

The current study

In the current study we aimed to determine whether rumination and self-compassion moderate the relationship between negative affect and both NSSI and suicide ideation separately, such that rumination increases risk of NSSI and suicide ideation in the context of negative affect, while self-compassion reduces this risk. We also assessed whether negative affect exerts an indirect effect on these outcomes, working through rumination and self-compassion. Finally, given that factors underlying any history of NSSI or suicide ideation may differ from pathways which maintain behaviour (Taliaferro & Muehlenkamp, 2015), we assessed these relationships both in predicting odds of any history of NSSI and/or suicide ideation, and among people reporting 12-month NSSI and/or ideation.

Method

Participants & Procedure

The sample comprised 415 undergraduate psychology students enrolled in different units across the first three years of their undergraduate degree (Mean age = 20.99, $SD = 5.33$). The majority were female ($n = 317$, 76.8%). Most were studying full time (93.2%) and, as is typical in Australia, living at home with parents/family ($n = 286$, 69.1%). The study was promoted to students via an electronic notice board advertising studies in which students could participate for course credit. The study was advertised as an examination of different emotion regulation strategies and psychological distress. The information sheet explicitly called for both participants who self-injured and those who did not. Interested students were

directed to an online questionnaire where they completed the following measures as part of a larger study. All participants were provided information about the aims of the study, participation requirements, confidentiality of responses, and compliance with secure data handling procedures. Upon completion, participants were provided information sheets about NSSI and mental health, as well as a list of local mental health resources. The study was approved by the (blinded for review) Human Research Ethics Committee.

Measures

Nonsuicidal self-injury. Self-injury was assessed with Section I of the Inventory of Statements about Self-Injury (Klonsky & Olino, 2008), a self-report measure enquiring about engagement in 12 common forms of NSSI (e.g., cutting, burning, self-battery). The measure has sound test-retest reliability ($r = .85$; Klonsky & Olino, 2008). Participants were also asked how often they have engaged in NSSI in the last 12 months (once, twice, three times, four times, 5+ times). History of NSSI was coded as 0 = no history, 1 = lifetime history. Frequency of NSSI in the last year was used as an ordinal variable in analyses.

Suicide ideation. To assess suicide ideation, participants were asked “In the *last 12 months* have you thought about ending your life?” and “Have you *ever* thought about ending your life?” The dichotomous responses to these questions (0 = no, 1 = yes) were used in analyses.

Negative affect. Negative affect was assessed with the negative affect scale of the Positive and Negative Affect Schedule (PANAS; Watson, Clarke & Tellegan, 1988). In the negative affect subscale, participants are presented with 10 negative emotions (e.g., ashamed, distressed) and asked to rate the extent to which they have experienced each emotion over the past week. Responses are summated to provide a total scale score. This scale evidences construct validity, reliability, and measurement invariance across demographic groups (Crawford & Henry, 2004). In this sample, internal consistency was $\alpha = .86$.

Rumination. Rumination was assessed with the 10-item Repetitive Thinking Questionnaire (RTQ; McEvoy, et al., 2010; McEvoy, Thibodeau, & Asmundson, 2014). Participants responded to items assessing their tendency to think negatively when feeling distressed (e.g., “I think about the situation all the time”), on a 5-point Likert scale. Item responses are summated to produce a total score. The RTQ has demonstrated reliability and validity (McEvoy et al., 2010; 2014). Internal consistency was evident in the current sample, $\alpha = .93$.

Self-compassion. We assessed self-compassion with the short form of the Self-Compassion Scale (Raes, Pommier, Neff, & van Gucht, 2011), a 12-item measure of how an individual responds to themselves when upset. Six subscale scores reflect: self-kindness (e.g. “I try to be understanding and patient towards those aspects of my personality I don’t like”), self-judgment (e.g. “I’m disapproving and judgmental about my own flaws and inadequacies”), common humanity (e.g. “I try to see my failings as part of the human condition”), isolation (e.g. “When I’m feeling down, I tend to feel like most other people are probably happier than I am”), mindfulness (e.g. “When something painful happens I try to take a balanced view of the situation”), and over-identification (e.g. “When I’m feeling down I tend to obsess and fixate on everything that’s wrong”). For each subscale, item scores are summated. Participants indicate the degree to which they endorse each statement on a 5-point scale. The short form correlates almost perfectly with the longer version, although subscale scores tend to be less reliable (Raes et al., 2011). Consistent with initial validation of the shortened scale, in our sample internal consistency for the subscales ranged from $\alpha = .53$ -.83.

Data analysis

No variable had more than 10% missing data (range 1.4% to 9.2%) and data were missing completely at random, $\chi^2(157) = 73.08$, $p = 1.00$. Expectation maximisation was used to impute missing data. As outlined above, the relationship between negative affect and either

NSSI or suicide ideation could work indirectly through rumination and self-compassion, or the relationships could be moderated by these variables. For the sake of parsimony in model testing, we first conducted a series of moderated logistic regressions to predict: lifetime history of NSSI, lifetime suicide ideation, and 12 month suicide ideation. We also conducted a multinomial regression to predict frequency of NSSI in the last year. No significant interactions terms were observed in any of the analyses (all $ps > .05$). As such, we tested direct and indirect effects of NA, rumination, and self-compassion on the outcomes, but did not test moderation.

Two models were tested. In the first, lifetime NSSI (no/yes) and lifetime suicide ideation (yes/no) were entered as the two criterion variables. In the second, we restricted the sample to participants who had self-injured or reported suicide ideation in the last 12 months, and used frequency of NSSI in the last 12 months, and 12-month suicide ideation (no/yes), as the two criterion variables. In both models, direct effects of negative affect, rumination, and self-compassion on the criterion variables were assessed, as were indirect effects of negative affect working through rumination and self-compassion. Given some subscale scores had poor internal consistency, we entered self-compassion as a latent variable, indicated by subscale scores; all other variables were observed variables. Self-reported history of any mental illness was statistically controlled in all analyses (i.e., “Have you ever been diagnosed with a mental illness”). All models were tested using the WLSMV estimator in MPlus v7.4 (Muthén & Muthén, 2012). Model fit was determined by: $\chi^2/df \leq 3$, Comparative Fit Index (CFI) $> .95$, Tucker Lewis Index (TLI) $> .95$, Root Mean Error of Approximation (RMSEA) $< .05$, and Weighted Root Mean Square Residual (WRMR) < 1.0 (Hu & Bentler, 1999)

Results

Sample characteristics

Of the sample, 33.1% ($n = 135$) reported a history of NSSI, with 70.1% ($n = 87$) self-once or twice in the last year. Half (50.4%, $n = 202$) reported ever experiencing suicidal ideation, and 22.4% ($n = 90$) reported ideation in the last 12 months. Of the sample, 24.8% reported a lifetime history of both NSSI and suicide ideation; 12.53% reported both NSSI and suicide ideation in the last 12 months.

Neither history of NSSI, nor frequency in the last twelve months, were related to gender or age (all $ps > .05$). One quarter of the sample (24.6%) self-reported they had been diagnosed with a mental illness at some point in their life, most commonly depressive (74.7%) and anxiety (44.19%) disorders. History, but not frequency, of NSSI was associated with a mental illness diagnosis, $\chi^2(1) = 30.74, p < .001$. Similarly, neither past ideation, nor recent ideation, were associated with age or gender of participants (all $ps > .05$). Both past ideation, $\chi^2(1) = 52.74, p < .001$, and recent ideation, $\chi^2(1) = 34.442, p < .001$, were associated with mental illness. The majority of variables were correlated in the expected direction (Table 1).

Lifetime NSSI and ideation

The model predicting lifetime NSSI and lifetime suicide ideation fit the data well, $\chi^2(15) = 23.58, p = .07, \chi^2/df = 1.57, CFI = .99, TLI = .97, RMSEA = .04, WRMR = .47$. Neither NSSI nor suicide ideation were directly related to NA, but rumination and self-compassion were (Figure 1). There were significant indirect effects of NA on both NSSI and suicidal ideation, working through both rumination and self-compassion (Table 2).

12 month NSSI frequency and 12-month suicide ideation

The model predicting 12-month NSSI and suicide ideation was an adequate fit to the data, $\chi^2(35) = 58.07, p = .01, \chi^2/df = 1.66, CFI = .94, TLI = .90, RMSEA = .06, WRMR =$

.78. Again, neither NSSI frequency nor suicidal ideation were directly related to NA, nor was rumination. Indirect paths through self-compassion were observed for both outcomes (Table 2).

Discussion

The aim of the current study was to explore whether rumination and self-compassion moderate links between negative affect, NSSI and suicide ideation, or if negative affect exerts an indirect effect on NSSI and suicide ideation, working through rumination and self-compassion. Surprisingly, rumination and self-compassion did not moderate the affect-NSSI relationship. Instead, negative affect was seen to exert an indirect effect on lifetime history of both NSSI and suicide ideation, working through both rumination and self-compassion. Specifically, high negative affect related to more rumination and less self-compassion, which in turn increased odds of NSSI and suicide ideation.

Our analyses returned different results when predicting recent NSSI and suicide ideation; here lack of self-compassion was observed to underlie the relationship between negative affect and NSSI, whereas rumination was not related. Consistent with previous research (e.g. Jiang et al, 2017; Xavier et al., 2016), this suggests that individuals who are prone to responding to difficult emotional experiences in an over-identified, self-isolating, and self-judgemental manner may be more likely to engage in NSSI or suicide ideation. On the other hand, these outcomes are less likely amongst individuals who are able to respond to negative emotions in a balanced and self-nurturing way, and see the common humanity in their hardships and difficult experiences. These findings suggest that while a general tendency to ruminate is related to any history of suicidal thoughts and behaviours, ongoing suicidal thoughts and behaviour relate more strongly to a lack of self-compassion.

Treatment implications

The current study was cross-sectional and included a non-clinical sample, but if the observed pattern of relationships is replicated within prospective or experimental studies they would have important implications for interventions that target both rumination and self-compassion. The degree to which negative affect leads to rumination may determine risk of NSSI or suicide ideation, making rumination a particularly salient target for prevention as well as intervention. Some recent approaches have been developed that attempt to directly target rumination by helping individuals to step-out of habitual patterns of rumination. Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams & Teasdale, 2002) is a group-based intervention that combines elements of cognitive therapy (including efforts to reduce rumination) with mindfulness practices, with demonstrated efficacy in reducing depression vulnerability. Rumination-Focused Cognitive Behavioural Therapy (Watkins et al. 2007) builds on conventional cognitive-behavioural therapy (CBT) by using functional analysis to explore how, where, and when rumination occurs and its function with the aim to systematically reduce or replace it.

Although tentative, our findings suggest self-compassion might be an important mechanism underlying the relationship between negative affect and both NSSI and suicide ideation. Because self-compassion spans a dimension from actively self-critical to actively self-soothing, this can be interpreted in two ways. First, in individuals with low trait self-compassion, negative affect could trigger overidentification with the negative emotional experience, leading to self-criticism, self-isolation, and a tendency to engage in NSSI or suicide ideation. Second, amongst individuals with high trait self-compassion, the experience of negative affect might prompt a mindful response to the difficult experience, acting as a reminder that negative emotions are shared by all humans, and triggering an actively self-soothing response. In this context, self-compassion may act as an emotion regulation strategy

that removes the need for alternatives (such as NSSI) to reduce feelings of distress. Further work is required to confirm these potential mechanisms.

A number of interventions are now available to support the cultivation of self-compassion, including the Mindful Self-Compassion program (Neff & Germer, 2013), the Compassion Cultivation Training Program (Jazaieri et al., in press), the Mindfulness-Based Compassionate Living program (van den Brink & Koster, 2015), and Compassion-Focused Therapy (CFT; Gilbert, 2009; 2014). These interventions – particularly CFT – have been trialled with individuals experiencing clinical and subclinical symptoms of psychopathology, including depression, anxiety, psychosis, and eating disorders. To our knowledge, no previous work has examined the efficacy of self-compassion-based interventions for reducing NSSI or suicide ideation in at-risk individuals.

Limitations and research implications

As noted above, our findings require replication in larger, more representative, gender balanced, and clinical samples. The fact that students self-selected into our study naturally raises the possibility of self-selection bias, although our sample demographics, and NSSI distributions, are similar to other studies using the same methodology (e.g. Hasking & Rose, 2016). Our finding that rumination was not related to recent NSSI or suicide ideation may be an artefact of our design rather than an indication that rumination is not implicated in recent NSSI or ideation. Specifically, we assessed repetitive negative thinking as a broad construct. Prior work has suggested different facets of rumination (e.g., brooding, reflection; Polanco-Roman, et al., 2015) might be differentially related to suicidal and non-suicidal outcomes, suggesting a more nuanced assessment of rumination may be warranted. We assessed negative affect over the last week, but assessed any prior NSSI and suicide ideation. Due to the cross-sectional nature of the data we cannot make temporal inferences, although correlations between trait and state affect (Komulainen et al., 2014; Miller, Vachon, &

Lynam, 2010) suggest assessing trait negative affect is likely to have given similar findings. However future work should assess constructs across similar timeframes. Further, Emotional Cascade Theory proposes a dynamic interplay between rumination and affect, resulting in an escalation of the emotional experience. Momentary assessment studies, rather than assessment of trait rumination, are required to understand the complex interplay between affect and rumination, and to determine whether rumination moderates the relationship between negative affect and outcomes such as NSSI and suicide ideation. Finally, any treatment programs designed to reduce rumination or enhance self-compassion must necessarily be evaluated for their ability to reduce NSSI and suicidal ideation. Further, the proposed mechanisms of any treatment effect must be established before confirming whether changes in rumination and self-compassion are fundamental to producing positive change in suicidal and non-suicidal behaviour.

Conclusion

The above limitations notwithstanding, our findings suggest that negative affect exerts an indirect effect on NSSI and suicide ideation, working through rumination and self-compassion. The salience of self-compassion, particularly in predicting recent NSSI and suicide ideation, offers promise for early intervention initiatives focusing on less judgmental or self-critical means of self-relation. Further work exploring whether fostering self-compassion reduces the frequency and severity of NSSI and/or suicide ideation is warranted.

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Figure 1. Final model showing standardised coefficients in predicting lifetime history of NSSI and suicide ideation. NSSI = non-suicidal self-injury. ** $p < .01$ *** $p < .001$

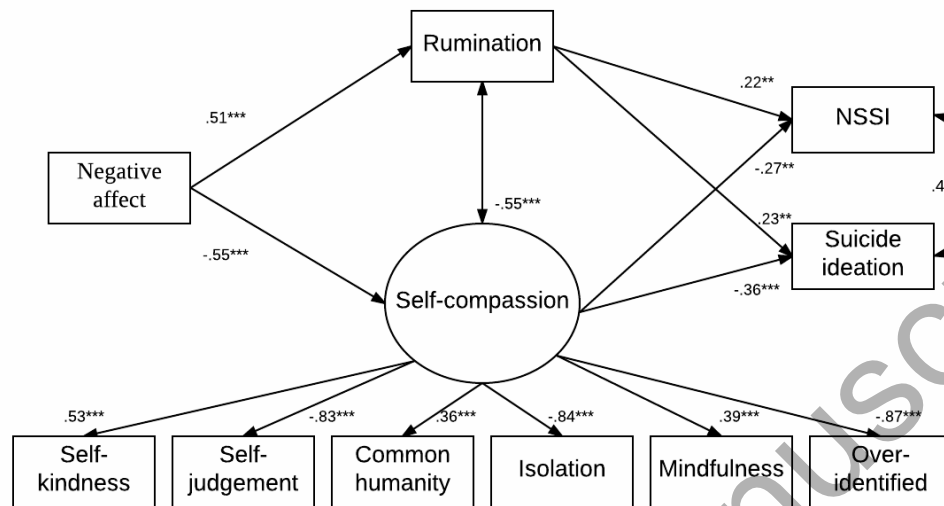


Table 1. Descriptive statistics and correlations between variables of interest

Variable	Mean (SD)	3	4	5	6	7	8	9	10	11	12
1. History of NSSI ^a	-	.35***	.32***	.23***	.32***	-.20***	.29***	-.20***	.24***	-.20***	.25***
2. NSSI frequency ^b	-	.17	.35***	.14	.28**	-.21*	.13	-.23*	.15	-.13	.15
3. Lifetime ideation	-	-	.51***	.32***	.42***	-.30***	.37***	-.16**	.40***	-.14**	.37***
4. 12 month ideation	-	-	-	.32***	.38***	-.30***	.36***	-.25***	.34***	-.19***	.35***
5. Negative affect	22.82 (7.06)			-	.51***	-.28***	.46***	-.19***	.47***	-.25***	.47***
6. Rumination	32.87 (8.59)				-	-.32***	.56***	-.21***	.57***	-.24***	.64***
7. Self-kindness	6.18 (1.70)					-	-.60***		.39***		.36***
8. Self-judgement	6.57 (2.09)						-	-.27***	.61***	-.28***	.64***
9. Common humanity	6.32 (1.86)							-	-.19***	.48***	.22***
10. Isolation	6.83 (2.00)								-	-.25***	.73***
11. Mindfulness	7.09 (1.56)									-	-.27***
12. Over-identified	6.78 (2.09)										-

* $p < .05$ ** $p < .01$ *** $p < .001$. NSSI = non-suicidal self-injury

^apoint biserial correlations for dichotomous variables; ^bamong people with a history of NSSI

Table 2. Unstandardized coefficients for direct and indirect effects

Path	Coefficient	Standard error	p	95%CI
Lifetime NSSI and suicide ideation				
Direct effects				
NA → NSSI	<.01	.01	.74	-.02 to .03
Rumination → NSSI	.03	.01	.003	.01 to .05
Self-compassion → NSSI	-.33	.12	.006	-.57 to -.09
NA → Suicide ideation	.02	.01	.18	-.01 to .04
Rumination → Suicide ideation	.03	.01	.001	.01 to .05
Self-compassion → Suicide ideation	-.50	.13	<.001	-.76 to -.23
NA → Rumination	.62	.06	<.001	.51 to .73
NA → Self-compassion	-.07	.01	<.001	-.09 to -.05
Indirect effects				
NA → NSSI	.04	.01	<.001	.03 to .06
NA → Rumination → NSSI	.02	.01	.004	.01 to .03
NA → Self-compassion → NSSI	.02	.01	.006	.01 to .04
NA → Suicide ideation	.06	.01	<.001	.04 to .07
NA → Rumination → Suicide ideation	.02	.01	.002	.01 to .03
NA → Self-compassion → Suicide ideation	.04	.01	<.001	.02 to .05
12 month NSSI frequency and 12 month ideation				
Direct effects				
NA → NSSI	-.01	.02	.74	-.04 to .03
Rumination → NSSI	.03	.02	.14	-.01 to .06
Self-compassion → NSSI	-.55	.21	.009	-.88 to .22

NA → Suicide ideation	.01	.02	.61	-.04 to .03
Rumination → Suicide ideation	.00	.02	.89	-.03 to .04
Self-compassion → Suicide ideation	-.89	.28	.002	-.1.53 to -.11
NA → Rumination	.41	.09	<.001	.30 to .58
NA → Self-compassion	-.05	.01	<.001	-.08 to -.02

Indirect effects

NA → NSSI	.03	.01	.007	.01 to .05
NA → Self-compassion → NSSI	.03	.01	.007	.01 to .05
NA → Suicide ideation	.05	.02	.001	.02 to .08
NA → Self-compassion → Suicide ideation	.05	.02	.001	.02 to .08

Note. NA = negative affect, NSSI = non-suicidal self-injury

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