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Looking through dark lenses: How those with a history of nonsuicidal self-injury experience positive emotional situations

By

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Abstract

Looking through dark lenses: How those with a history of nonsuicidal self-injury experience positive emotional situations

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Theories suggest that nonsuicidal self-injury (NSSI) is strongly related to heightened negative emotion. However, it is unclear when and why those who engage in NSSI experience heightened negative emotion. In a series of studies, I examined whether individuals with a history of NSSI (versus controls) experience greater negative emotion in response to positive (but not negative) contexts. Results showed that in community, clinical, and college samples, after controlling for depression and anxiety, those with a history of NSSI (versus controls) do not experience heightened negative emotions in negative situations (Studies 1, 2, and 4). However, they consistently experience heightened negative emotions in positive situations (Studies 1-5) even when controlling for depression and anxiety symptoms (Studies 2-4). Heightened negative emotion persists across both high and low-arousal positive situations (Studies 3-4). Furthermore, the association between NSSI and negative emotion in positive situations is mediated by negative self-beliefs (Studies 5 and 6). However, experimentally manipulating negative self-beliefs was not shown to reduce negative self-beliefs or negative emotion in positive situations (Study 6). These findings suggest that NSSI is associated with heightened negative emotion in positive, but not negative, situations and that heightened negative self-beliefs contribute to these negative emotions. However, interventions that directly target negative self-beliefs may not be the most effective way to reduce negative emotions in NSSI.

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Looking through dark lenses: How those with a history of nonsuicidal self-injury experience positive emotional situations.

Nonsuicidal self-injury (NSSI) refers to behaviors (e.g., cutting, burning, and scratching) that involve directly and deliberately injuring oneself without the intention to kill oneself (Nock & Favazza, 2009). NSSI is alarmingly common in community, college, and clinical samples (Claes et al., 2010; Whitlock, Eckenrode, & Silverman, 2006). Moreover, NSSI is practiced by people from both low and high socio-economic status (Latzman et al., 2010; Yates, Tracy, & Luthar, 2008) and in countries all over the world (Giletta, Scholte, Engels, Ciairano, & Prinstein, 2012). Thus, NSSI represents a widespread and significant problem that is fast becoming a major concern for both medical health professionals (McAllister, Creedy, Moyle, & Farrugia, 2002) and mental health professionals (Linehan, 1993). Given the significance of this problem, NSSI has been included in section III of the DSM-V, a section devoted to syndromes in need of further research (American Psychiatric Association, 2013). Thus, it is crucial to assess which factors are uniquely and reliably associated with NSSI to better understand and treat this syndrome.

Theoretical Perspectives on NSSI

Although many genetic, environmental, and psychological factors are thought to contribute to NSSI (see Nock, 2010, for a review), theories suggest that emotional difficulties are among the most common of these factors (Chapman, Gratz, & Brown, 2006; Horne & Csipke, 2009; Najmi, Wegner, & Nock, 2007; Nock, 2009; Selby & Joiner, 2009; Suyemoto, 1998; Suyemoto & MacDonald, 1995; Yip, 2005). From the biosocial perspective, heightened negative emotion contributes to the development of NSSI and other maladaptive behaviors among individuals with borderline personality disorder (BPD; Linehan et al., 2007). In extensions of this perspective beyond BPD, Chapman, Gratz, and Brown's experiential avoidance model, Nock's integrated model, and Selby and Joiner's emotional cascade model all suggest that negative emotion is a key contributor to NSSI (Chapman et al., 2006; Nock, 2009; Selby & Joiner, 2009). In sum, all of these models propose that heightened negative emotion leads individuals to regulate emotions "by any means necessary," including by deliberately harming themselves.

Empirical Support for Theories of NSSI

Heightened experience of negative emotion *in general* is, perhaps, the factor most frequently and robustly linked to NSSI (Baetens, Claes, Willem, Muehlenkamp, & Bijttebier, 2011; Crowell et al., 2005; Hay & Meldrum, 2010). For example, these individuals experience increased high-arousal negative emotions such as anger/hostility (Armey & Crowther, 2008; Brittlebank, 1990; S. A. Brown, Williams, & Collins, 2007; Cheng, Mallinckrodt, Soet, & Sevig, 2010; Claes, Vandereycken, & Vertommen, 2003, 2007; Sarno, Madeddu, & Gratz, 2009; Simeon et al., 1992), anxiety/fear (S. A. Brown et al., 2007; Claes, Vandereycken, & Vertommen, 2004; Simeon et al., 1992), and stress/distress (Hasking et al., 2010; Weinberg & Klonsky, 2011) as well as increased low-arousal negative emotions such as sadness (S. A. Brown et al., 2007) and hopelessness (Brittlebank, 1990; Hunter & O'Connor, 2003). In addition, NSSI groups (versus controls) report heightened self-focused negative emotions like shame/guilt (M. Z. Brown, Linehan, Comtois, Murray, & Chapman, 2009; S. A. Brown et al., 2007; Claes et al., 2003) and negative feelings about the self (Gilbert et al., 2010). Thus, negative emotion appears to be a key correlate of – or risk factor for – NSSI.

Despite the association between NSSI and heightened negative emotion *in general*, data suggest that NSSI is not consistently related to heightened negative emotion in response to negative situations. Although a few studies have found physiological responding to negative

situations to be associated with NSSI (Crowell et al., 2005; Niedtfeld et al., 2010; Nock & Mendes, 2008), these findings are by no means reliable. For example, several studies found no differences between a NSSI group and control group in self-reported negative emotion in response to negative images (Davis et al., 2014; Glenn, Blumenthal, Klonsky, & Hajcak, 2011; Niedtfeld et al., 2010). Other studies found no differences between a NSSI group and control group when negative emotion was indexed with negative emotion ratings, amygdala activation (Davis et al., 2014), skin conductance responses (Crowell et al., 2012; Crowell et al., 2005), pre-ejection period (Crowell et al., 2005), or startle response (Franklin et al., 2010; Glenn et al., 2011). Thus, across studies using different measures, there has not been consistent evidence that those with a history of NSSI exhibit heightened negative emotion in response to negative situations. However, these findings have uncovered a crucial question: When and how do elevated negative emotions emerge among individuals who engage in NSSI?

When and how do Elevated Negative Emotions Emerge?

One potential way that elevated negative emotions could emerge in NSSI is that those with a history of NSSI seek to self-verify the negative feelings they have about themselves. Self-verification theory proposes that people prefer experiences, information, and situations that are consistent with their beliefs about the self, even if those beliefs are negative (Swann, 2011). More specifically, individuals with negative self-beliefs (versus those with positive self-beliefs) are predicted to respond more negatively to positive situations – situations which are inconsistent with the negative beliefs they have about themselves. However, these individuals may not respond more negatively to negative situations – situations which are consistent with the negative beliefs they have about themselves. For example, research has shown that individuals with negative self-beliefs (but not those with positive self-beliefs) experience higher stress responding (indexed with Mean Arterial Pressure) in a positive (compared to negative) situation (Ayduk, Gyurak, Akinola, & Mendes, 2013). Dozens of additional studies further support self-verification theory by showing that those with negative self-beliefs prefer situations, feedback, and interaction partners that are consistent with negative self-beliefs (Swann, 2011). Thus, positive (but not negative) situations are experienced as highly distressing.

Initial research that may support a role of self-verification in NSSI shows that negative self-beliefs are associated with NSSI. For example, those with a history of NSSI report more self-blame (Slee, Garnefski, Spinhoven, & Arensman, 2008) and self-criticism compared to both healthy control groups (Glassman, Weierich, Hooley, Deliberto, & Nock, 2007; Hooley, Ho, Slater, & Lockshin, 2010) and control groups who engage in indirect forms of self-injury (e.g., abusing substances, depriving themselves of food, remaining in abusive associations; St. Germain & Hooley, 2012). Furthermore, diary studies show that feelings of self-hatred and self-anger even contribute to increased likelihood of subsequently engaging in NSSI (Nock, Prinstein, and Sterba, 2009). Thus, negative self-beliefs do appear to characterize those with a history of NSSI. According to self-verification theory, negative self-beliefs should contribute to heightened negative emotions in positive (but not negative) situations. Therefore, if individuals with a history of NSSI have heightened negative self-beliefs, they should exhibit heightened negative emotions in positive (but not negative) situations.

Summary

In sum, models suggest that heightened negative emotion is a key contributor to NSSI. Despite the association between NSSI and heightened negative emotion *in general*, data suggest that NSSI is not consistently related to heightened negative emotion in response to negative situations. Self-verification theory offers a potential explanation for these perplexing findings by

suggesting that because individuals with a history of NSSI hold negative self-beliefs, they may experience negative emotions in response to positive (but not negative) situations – situations that are inconsistent with their self-beliefs. Exploring this potential mechanism has important implications for understanding causes of, and treatments for, NSSI. Therefore, across six studies, I examine whether heightened negative emotion in positive (but not negative) contexts is related to NSSI. I hypothesize that 1.) Those with a history of NSSI (versus controls) will exhibit heightened negative emotion in response to positive (but not negative) situations, and 2.) The association between NSSI and heightened negative emotion in response to positive situations will be explained by heightened negative self-beliefs.

Limitations of Prior Research

There are a number of limitations of existing research that I aim to address with the present investigation. First, much of the research on NSSI samples has used self-report questionnaires, which assess negative emotion *in general*. Given the retrospective nature of these questionnaires and the inability of these measures to assess responses to specific situations, they cannot be used to determine which situations negative emotion emerges. Past studies suggest that those with a history of NSSI do not consistently show heightened negative responses to negative situations (Davis et al., 2014), and no studies have assessed the association between NSSI and emotions in response to positive situations. Therefore, the present research will assess group differences in responding to both negative and positive emotional situations using standardized emotion inductions.

Second, previous research on NSSI has generally not controlled for important confounds such as depression or anxiety. Given studies consistently show increased depression and anxiety symptoms are associated both with engagement in NSSI (Crowell et al., 2005; Klonsky, Oltmanns, & Turkheimer, 2003) and with emotional dysfunction (Aldao, Nolen-Hoeksema, & Schweizer, 2010), it is essential to control for these symptoms. By controlling for depression and anxiety in the present investigation, I will be able to rule out the possibility that NSSI is a proxy for these related syndromes and I can, therefore, make more internally valid claims about the associations between NSSI specifically and negative emotional responses.

Overview of Present Investigation

Study 1 assessed negative emotion in response to a negative emotion induction and a positive emotion induction in a community sample. Study 2 assessed negative emotion in response to a negative emotion induction and positive emotion induction and controlled for potential confounds (depression and anxiety symptoms) in a college sample. Study 3 assessed negative emotion in response to either a high or low-arousal positive emotion induction and controlled for potential confounds (depression and anxiety symptoms) in a community sample. Study 4 assessed negative emotion in response to two positive emotion inductions (high and low-arousal) and two negative emotion inductions (high and low-arousal) and controlled for potential confounds (depression and anxiety symptoms) in a sample with remitted depression. Study 5 assessed whether negative self-beliefs (in response to the positive situation) explained the association between NSSI and negative emotions to a positive emotion induction in a community sample. Study 6 randomized a college sample with a history of NSSI (or not) to either a positive self-beliefs condition (or a control condition) and then assessed negative self-beliefs and negative emotion to a positive emotion induction.

Study 1

Study 1 aimed to examine, in a community sample, whether those with a history of NSSI (versus controls) experience more negative emotions in response to either a self-relevant

negative situation or a positive situation. I hypothesized that those with a history of NSSI (versus controls) will exhibit heightened negative emotion in response to a positive (but not negative) situation.

Method

Participants. Two hundred and sixteen participants (59% male) between the ages of 18 and 72 (M=35.01, SD=12.33) were recruited from the community through Amazon Mechanical Turk. Of these participants, three had technical difficulties resulting in them being unable to view the positive film clip. Five participants incorrectly answered at least one attention check question asking them to select a specific response. Seventeen participants indicated that they did "not at all try", indicating a failure to follow instructions. These participants were excluded to ensure data quality throughout the study. Of the remaining 192 participants, 68 (35%) indicated a history of NSSI.

Measures. ***Demographics.*** Participants responded to questions about their age and gender.

NSSI. History of NSSI was measured with the Inventory of Statements About Self-Injury (ISAS), a validated and commonly used measure assessing history of engagement in 12 NSSI behaviors (Klonsky & Glenn, 2009). The measure asks whether or not a person has ever engaged in each NSSI behavior and, if so, how many times (M=112.76, SD=247.80).

Mood induction. A resting baseline assessment was taken by asking participants to indicate their current emotions. The negative mood induction was based on past research (Ayduk & Kross, 2010) and aimed to induce high-arousal negative emotions.

Instructions: *"No matter how well romantic partners and friends get along, there are times when they experience conflict. They get annoyed about something the other person does, get into fights because they are in bad moods, or argue over major decisions. Take a few moments right now to recall a time when you experienced such conflict with a romantic partner or close friend - a time when you became truly enraged at this person. Although it may be difficult, most people can usually remember at least one incident. Please try to remember an experience that is relatively recent and unresolved and still highly upsetting to you. Take your time as you try to do bring to mind such an experience."*

The positive mood induction included watching a calm film clip, a scene from the film *Planet Earth*. Participants reported on a 1 (*none at all*) to 9 (*extreme*) scale the amount they felt eight negative emotions (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness; $\alpha_{baseline}$=.92, $\alpha_{negative}$=.90, $\alpha_{positive}$=.90). All procedures were in compliance with the local IRB.

Results

To examine whether those with a history of NSSI (versus controls) differed in their negative emotions in response to the negative situation, I conducted a GLM with group (NSSI group, control group) as a between-subjects factor and negative emotion in response to the negative situation as the dependent variable. Analyses revealed that there was no effect of group on negative emotion, $F(1, 190)=0.02$, p=.88, η_p^2<.01 (see Table 1 for means). When analyzing sadness, anger, and anxiety items separately, there was still no effect of group on sadness, anger, or anxiety, ps>.82.

To examine whether greater NSSI frequency was associated with negative emotions in response to the negative situation, I additionally conducted a correlation. There was no association between NSSI frequency and negative emotions in response to the negative situation, r=.19, p=.14.

To examine whether those with a history of NSSI (versus controls) differed in their negative emotions in response to the positive situation, I conducted a GLM with group (NSSI group, control group) as a between-subjects factor and negative emotion in response to the positive situation as the dependent variable. Analyses revealed that there was a significant effect of group on negative emotion, $F(1, 190)=5.34$, $p=.02$, $\eta_p^2=.03$, with the NSSI group reporting more negative emotion (see Table 1 for means). These findings became non-significant when controlling for baseline negative emotion, $F(1, 189)=2.39$, $p=.12$, $\eta_p^2=.01$. When analyzing sadness, anger, and anxiety items separately, there was an effect of group on sadness, $F(1, 190)=4.41$, $p=.04$, $\eta_p^2=.02$, and anxiety, $F(1, 190)=8.02$, $p=.01$, $\eta_p^2=.04$, but not anger, $F(1, 190)=2.42$, $p=.12$, $\eta_p^2=.01$. These findings became non-significant when controlling for baseline, ps$>.05$.

To examine whether greater NSSI frequency was associated with negative emotions in response to the positive situation, I additionally conducted a correlation. There was a marginal association between NSSI frequency and negative emotions in response to the positive situation, $r=.23$, $p=.08$.

When entering NSSI (NSSI group, control group) and emotion valence (negative, positive) as between-subjects factors and negative emotion as the outcome variable in a repeated measure ANOVA, there was a significant effect of emotion valence, $F(1, 190)=380.64$, $p<.01$, $\eta_p^2=.67$, but not group, $F(1, 190)=1.21$, $p=.27$, $\eta_p^2=.01$, or emotion valence X group, $F(1, 190)=1.14$, $p=.29$, $\eta_p^2=.01$, suggesting that the NSSI group did not differ from the control group in the extent to which their negative emotion changed between the negative and positive emotion inductions.

Table 1

Study 1: Group Means for Baseline Assessment, Response to a Negative Situation, and Response to a Positive Situation among a Community Sample

	NSSI		Control				
Variable	*M*	*SD*	*M*	*SD*	*Statistic*	*p*	η_p^2
Baseline Assessment	2.47	1.62	2.07	1.44	$F(1, 190) = 3.01$	.08	.02
Negative Situation	4.56	1.86	4.51	2.06	$F(1, 190) = 0.02$	.88	<.01
Positive Situation	1.77	1.24	1.41	0.93	$F(1, 190) = 5.34$	.02	.03

Note. Negative emotion was assessed with eight negative emotion items (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness).

Discussion

Compared to the control group, the NSSI group did not exhibit heightened negative emotion in response to the negative situation. The NSSI group did exhibit heightened negative emotion in response to the positive situation. However, these results did not hold when controlling for baseline emotion. Frequency of engaging in NSSI behavior was not related to negative emotion in the negative situation, but was marginally related to negative emotion in the positive situation. Analyses did not reveal a significant interaction of emotion valence X group, suggesting that the effect of NSSI is not significantly different for positive relative to negative situations. Given somewhat elevated negative emotions across situations (see Table 1), this study may have been underpowered to detect differences in the effect of NSSI on positive relative to negative situations.

Although Study 1 provided partial support for my hypotheses that NSSI is related to heightened negative emotion in positive but not negative situations, Study 1 did not take into consideration potential confounds such as depression and anxiety, which may contribute to both NSSI and negative emotions, and therefore may explain this association. By statistically controlling for depression and anxiety symptoms, I can rule out an alternative explanation that mood disorder symptoms are responsible for the association between NSSI and negative emotion in response to positive situations. Given NSSI has been included in section III of the DSM-V, a section devoted to syndromes in need of further research (American Psychiatric Association, 2013), it is essential to assess which factors and mechanisms are uniquely associated with NSSI and distinguish NSSI from closely related syndromes like depression and anxiety.

Study 2

To further test my hypotheses and additionally control for depression and anxiety, which are key potential confounds, I conducted a second study in a college sample. Study 2 assessed negative emotion in response to a self-relevant negative emotion induction and a positive emotion induction in a college sample. Secondary analyses statistically controlled for depression and anxiety symptoms. I hypothesized that those with a history of NSSI (versus controls) would exhibit heightened negative emotion in response to a positive (but not negative) situation, even after controlling for depression and anxiety symptoms.

Method

Participants. Three hundred and one participants (73% female) between the ages of 18 and 37 (*M*=20.86, *SD*=2.66) were recruited from the University of California, Berkeley student research participant pool to take part in an online study in exchange for course credit. Of these participants, four had technical difficulties resulting in them being unable to view the positive film clip. Thirty participants incorrectly answered at least one of three attention check questions asking them to select a specific response. These participants were excluded to ensure data quality throughout the study. Of the remaining 268 participants, 93 (35%) indicated a history of NSSI.

Measures. ***Demographics.*** Participants responded to questions about their age and gender.

NSSI. History of NSSI was measured with the Deliberate Self Harm Inventory (DSHI), a validated and commonly used measure assessing history of engagement in NSSI. The DSHI has been shown to have good reliability and validity (Gratz, 2001).

Depression symptoms. Depression symptoms were measured with the 21-item Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988). The BDI was shown to have good internal consistency (α=.94 in the present sample).

Anxiety symptoms. Anxiety symptoms were measured with the 21-item Beck Anxiety Inventory (BAI; Fydrich, Dowdall, & Chambless, 1992). The BAI has been shown to have good reliability, validity, and internal consistency (α=.92 in the present sample).

Mood induction. A resting baseline assessment was taken by asking participants to indicate their current emotions. The negative mood induction was based on past research (Ayduk & Kross, 2010) and aimed to induce high-arousal negative emotions.

Instructions: For the following section, imagine a time when you got in an argument with a romantic partner (or a good friend). Try to recall all the things that were said, the thoughts you had, and the emotions you felt. Please answer the following questions while keeping in mind this argument.

To induce positive emotion, participants watched a positive film clip, a scene from the film *Planet Earth.* Participants reported on a 1 (*none at all*) to 9 (*extreme*) scale the amount they

felt eight negative emotions (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness; $\alpha_{baseline}$=.91, $\alpha_{negative}$=.92, $\alpha_{positive}$=.91). All procedures were in compliance with the local IRB.

Results

To examine whether those with a history of NSSI (versus controls) differed in their negative emotions in response to the negative situation, I conducted a GLM with group (NSSI group, control group) as a between-subjects factor and negative emotion in response to the negative situation as the dependent variable. Analyses revealed that there was a significant effect of group on negative emotion, $F(1, 266)=4.81$, $p=.03$, $\eta_p^2<.02$ (see Table 2 for means). This association disappeared after entering depression, anxiety, and baseline responding as covariates, $F(1, 263)=0.13$, $p=.72$, $\eta_p^2<.01$. When analyzing sadness, anger, and anxiety items separately, there was an effect of group on sadness, $F(1, 266)=7.34$, $p=.01$, $\eta_p^2=.03$, and anxiety, $F(1, 266)=5.28$, $p=.02$, $\eta_p^2=.02$, but not anger, $F(1, 266)=0.78$, $p=.38$, $\eta_p^2<.01$. These associations disappeared after entering depression, anxiety, and baseline responding as covariates, ps >.41.

To test the hypotheses regarding responses to a positive situation, I conducted a GLM with group (NSSI group, control group) as a between-subjects factor and negative emotion in response to a positive situation as the dependent variable. Analyses revealed that there was an effect of group on negative emotion to the positive situation, $F(1, 266)=11.12$, $p<.01$, $\eta_p^2=.04$, with the NSSI group reporting more negative emotion (see Table 4 for means). This association remained after entering depression, anxiety, and baseline responding as covariates, $F(1, 263)=4.98$, $p=.03$, $\eta_p^2=.02$. When analyzing sadness, anger, and anxiety items separately, there was an effect of group on sadness, $F(1, 266)=13.46$, $p<.01$, $\eta_p^2=.05$, anxiety, $F(1, 266)=5.66$, $p=.02$, $\eta_p^2=.02$, and anger, $F(1, 266)=6.00$, $p=.02$, $\eta_p^2=.02$. After entering depression, anxiety, and baseline responding as covariates, there was an effect of group on sadness, $F(1, 263)=6.65$, $p=.02$, $\eta_p^2=.02$, but not anxiety, $F(1, 263)=1.52$, $p=.22$, $\eta_p^2=.01$, or anger, $F(1, 263)=2.69$, $p=.11$, $\eta_p^2=.01$. Given a lack of a coherent pattern for discrete emotions in the first 2 studies, I only explored the negative emotion composite in subsequent studies.

When entering NSSI (NSSI group, control group) and emotion valence (negative, positive) as between-subjects factors and negative emotion as the outcome variable in a repeated measure ANOVA, there was a significant effect of emotion valence, $F(1, 266)=391.79$, $p<.01$, $\eta_p^2=.48$, and group, $F(1, 266)=9.60$, $p<.01$, $\eta_p^2=.04$, but not emotion valence X group, $F(1, 266)=0.01$, $p=.94$, $\eta_p^2<.01$, suggesting that the NSSI group did not differ from the control group in the extent to which their negative emotion changed between the negative and positive emotion inductions.

Table 2

Study 2: Group Means for Baseline Assessment and Response to a Positive Situation among a College Sample

	NSSI		Control				
Variable	*M*	*SD*	*M*	*SD*	*Statistic*	*p*	η_p^2
Baseline Assessment	1.91	1.35	1.78	1.24	$F(1, 266) = 0.75$	.39	<.01
Negative Situation	3.91	2.12	3.37	1.79	$F(1, 266) = 4.81$	.03	.02
Positive Situation	2.11	1.62	1.58	0.95	$F(1, 266) = 11.12$	<.01	.04

Note. Negative emotion was assessed with eight negative emotion items (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness).

Discussion

Compared to the control group, the NSSI group exhibited heightened negative emotion in response to the negative situation. However, this association did not remain after controlling for depression and anxiety suggesting that elevated mood disorder symptoms in the NSSI group may explain this association. The NSSI group did exhibit heightened negative emotion in response to the positive situation. These results held even when controlling for responding at baseline, depression, and anxiety symptoms, suggesting that this effect is not explained by mood disorder symptoms. Analyses did not reveal a significant interaction of emotion valence X group, suggesting that the effect of NSSI is not significantly different for positive relative to negative situations. Given somewhat elevated negative emotions across situations (see Table 2), this study may have been underpowered to detect differences in the effect of NSSI on positive relative to negative situations.

Although this study provided further support for an association between NSSI and heightened negative emotion in response to positive situations, to clarify whether this effect is robust, it is essential to assess responses to different positive emotion inductions and in different populations.

Study 3

To further test my hypotheses by exploring whether NSSI is related to negative emotion in both low and high-arousal positive situations, I conducted a third study in a community sample. Study 3 assessed whether those with a history of NSSI (versus controls) would exhibit more negative emotions in *specific* positive situations by randomly assigning community participants to either a high or low-arousal positive emotion induction, assessing negative emotions, and controlling for potential confounds by including depression and anxiety symptoms as covariates. It is possible, for example, that NSSI groups only exhibit heightened negative emotion in low-arousal positive situations because the positive emotions aren't strong enough to counteract negative emotions. However, self-verification theory suggests that individuals with negative self-beliefs would likely experience heightened negative emotions regardless of the type of positive situation (Swann, 2011). Therefore, I hypothesize that those with a history of NSSI (versus controls) will exhibit heightened negative emotion in response to both positive situations and that this effect will not be moderated by the arousal of the positive situation.

Method

Participants. Four hundred forty-four participants (56% male) between the ages of 18 and 81 (*M*=37.49, *SD*=13.06) were recruited from the community through Amazon Mechanical Turk. Of these participants, five had technical difficulties resulting in them being unable to view the positive film clip. Fifty-eight participants incorrectly answered at least one of six attention check questions asking them to select a specific response. These participants were excluded to ensure data quality throughout the study. Of the remaining 382 participants, 113 (30%) indicated a history of NSSI.

Measures. ***Demographics.*** Participants responded to questions about their age and gender.

NSSI. History of NSSI was measured with the Inventory of Statements About Self-Injury (ISAS), a validated and commonly used measure assessing history of engagement in 12 NSSI behaviors (Klonsky & Glenn, 2009).

Mood induction. Participants began by watching a neutral film clip, a video about how to make bowls, to assess baseline emotions. Participants were then randomized to either a scene from the film *Planet Earth* (low-arousal positive) or a scene from *Sarah Hughes winning the*

gold medal (high-arousal positive). Both film clips were approximately 2 minutes long. Participants reported on a 1 (*none at all*) to 9 (*extreme*) scale the amount they felt eight negative emotions (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness; $\alpha_{baseline}$=.83, $\alpha_{positive}$=.82). All procedures were in compliance with the local IRB.

Results

Manipulation check. To ensure that the high-arousal emotion induction induced significantly more positive emotion than the low-arousal positive emotion induction, I conducted a GLM with condition (low-arousal, high-arousal) as a between-subjects factor and happiness in response to a positive situation as the dependent variable. Analyses revealed that there was a significant effect of condition on happiness, $F(1, 353)=16.84$, $p<.01$, $\eta_p^2=.05$, with the high-arousal positive induction resulting in more happiness. Negative emotion did not differ by condition, $F(1, 353)=1.72$, $p=.19$, $\eta_p^2=.01$. Thus, the high arousal positive emotion induction did effectively induce higher levels of positive emotion.

Primary analyses. To test the hypotheses, I conducted a 2X2 GLM with group (NSSI group, control group) and condition (low-arousal, high-arousal) as between-subjects factors and negative emotion in response to a positive situation as the dependent variable. Analyses revealed that there was a significant effect of group on negative emotion in the positive situation, $F(1, 351)=16.82$, $p<.01$, $\eta_p^2=.05$, with the NSSI group reporting more negative emotion (see Table 3 for means). This effect was marginally significant even after additionally entering depression, anxiety, and baseline responding as covariates, $F(1, 348)=3.14$, $p=.08$, $\eta_p^2=.01$. There were no other significant main effects or interactions suggesting that the arousal level of the positive mood induction did not change the extent to which the NSSI group experienced heightened negative emotions.

Table 3

Study 3: Group Means for Baseline Assessment and Response to a Positive Situation among a Community Sample

	NSSI		Control				
Variable	*M*	*SD*	*M*	*SD*	*Statistic*	*p*	η_p^2
Baseline Assessment	1.37	0.81	1.22	0.61	$F(1, 376) = 13.24$	<.01	.03
Positive Situation (Whole Group)	1.57	0.79	1.24	0.62	$F(1, 353) = 17.75$	<.01	.05
Positive Situation (Low-Arousal Subgroup)	1.54	0.78	1.30	0.76	$F(1, 161) = 3.83$	.05	.02
Positive Situation (High-Arousal Subgroup)	1.59	0.81	1.19	0.50	$F(1, 190) = 16.79$	<.01	.08

Note. Negative emotion was assessed with eight negative emotion items (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness).

Discussion

Compared to the control group, the NSSI group exhibited heightened negative emotions in response to the positive situations. The pattern remained consistent even when controlling for responding at baseline, depression symptoms, and anxiety symptoms, suggesting that this effect is not explained by mood disorder symptoms. This effect was not moderated by the arousal level

of the positive situation, suggesting that elevated negative emotion in the NSSI group was not restricted to a particular type of positive situation. Although Studies 1-3 provided support for heightened negative emotion to the positive situations in NSSI, it was necessary to further establish the robustness of the associations between NSSI and negative emotions in response to both negative and positive situations by assessing responses across a variety of emotion inductions in a sample more carefully matched on depression and anxiety symptoms.

Study 4

To further test the hypotheses that those with a history of NSSI (versus controls) will exhibit more negative emotions in positive situations NSSI, I conducted a fourth study in a sample with remitted depression. Although I statistically controlled for depression and anxiety in Studies 2 and 3, a more rigorous control is to test the hypotheses with a control group matched on depression and anxiety symptoms (Miller & Chapman, 2001). Therefore, Study 4 assessed negative emotion in response to two positive emotion inductions (high and low-arousal) and two negative situations (high and low-arousal) in a sample with remitted depression – a sample in which the NSSI and control group had similarly elevated levels of depression and anxiety symptoms. Secondary analyses also statistically controlled for depression and anxiety by including depression and anxiety symptoms as covariates. In addition, Study 4 was a laboratory study, which enabled us to more carefully control the environment in which the emotions inductions took place. I hypothesize that those with a history of NSSI (versus controls) will exhibit heightened negative emotion in response to positive (but not negative) situations.

Method

Participants. Ninety-two participants (77% female) between the ages of 19 and 64 (*M*=34.84, *SD*=11.39) were recruited from the Denver Metropolitan Area through postings on online bulletins for a larger study on depression. Participants were required to (a) meet enhanced DSM-IV criteria for remission of major depressive disorder, recurrent, (b) have a history of three or more previous episodes of DSM-IV major depression, (c) indicate a Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) score between 6-19, and (d) comprehend English well. To further enhance the homogeneity of the sample, potential participants were not included in the study if they met any of the following criteria: (a) bipolar disorder, schizophrenia, or borderline personality disorder, (b) current suicidal thoughts and/or suicide attempt in last two months, (c) current anxiety disorder if it constituted the predominant aspect of the clinical presentation, (d) substance abuse or dependence within last three months, (e) dementia or subnormal intellectual potential, (f) current obsessive-compulsive disorder, (g) current eating disorder, or (h) current depressive episode. In the final sample, 53 participants (58%) indicated having a history of NSSI.

Measures. ***Demographics.*** Participants responded to questions about their age and gender.

NSSI. History of NSSI was measured with the Deliberate Self Harm Inventory (DSHI), a validated and commonly used measure assessing history of engagement in NSSI (Gratz, 2001).

Depression symptoms. Depression symptoms were measured with the Beck Depression Inventory (α=.86 in the present sample).

Anxiety symptoms. Anxiety symptoms were measured with the Beck Anxiety Inventory (α=.88 in the present sample).

Mood induction. Participants began by watching a neutral film clip, a video about how to build sandcastles, to assess baseline emotions. Low-arousal negative emotions were induced with a sad film clip, a scene depicting a man grieving over the death of his wife from *Return to Me*.

High-arousal negative emotions were induced with an anxiety-inducing speech task. Low arousal positive emotions were induced with a positive film clip, a scene from the film *Planet Earth*. High arousal positive emotions were induced with a positive film clip, a scene from the film *Sarah Hughes winning the gold medal*. Each induction was approximately 2 minutes long. After each clip, participants used a 1 (*none at all*) to 9 (*extreme*) scale to indicate the greatest amount of eight negative emotions (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness; $\alpha_{baseline}$=.91, $\alpha_{low\text{-}neg}$=.86, $\alpha_{high\text{-}neg}$=.86, $\alpha_{low\text{-}pos}$=.80, $\alpha_{high\text{-}pos}$=.79) they felt during each clip. All procedures were in compliance with the local IRB.

Results

Manipulation check. To ensure that the high-arousal negative and high-arousal positive emotion inductions induced significantly more negative and positive emotion, respectively, I conducted within-group *t*-tests to compare emotions between the low and high-arousal emotion inductions. The sad film clip induced significantly more sadness (*M*=6.38, *SD*=2.47) and less anxiety (*M*=3.99, *SD*=2.36) than the anxiety induction (*M*=2.09, *SD*=1.91; *M*=6.15, *SD*=2.27, respectively), *p*s< .01. The low-arousal positive film clip induced significantly more relaxation (*M*=6.55, *SD*=1.87) but no less happiness (*M*=6.38, *SD*=2.08) than the high-arousal positive induction (*M*=4.62, *SD*=1.91; *M*=5.87, *SD*=2.11 respectively), *p*= .07, *p*< .01, respectively.

Primary Analyses. To test the hypotheses, I conducted four GLMs with group (NSSI group, control group) as a between-subjects factor and negative emotion in responses to 1.) the low-arousal negative film clip, 2.) the high-arousal negative speech task, 3.) the low-arousal positive film clip, and 4.) the low-arousal positive film clip as the dependent variables. Analyses revealed that there was no effect of group on negative emotion during the low arousal negative film clip, $F(1, 90)=1.45$, $p=.23$, $\eta_p^2=.02$, or the high arousal negative speech, $F(1, 89)=0.62$, $p=.43$, $\eta_p^2=.01$, Analyses revealed that there was a significant effect of group on negative emotion during the low-arousal positive film clip, $F(1, 90)=4.34$, $p=.04$, $\eta_p^2=.05$, and a marginal effect of group on negative emotion during the high-arousal positive film clip, $F(1, 90)=3.20$, $p=.08$, $\eta_p^2=.03$, with the NSSI group reporting more negative emotion (see Table 4 for means). This pattern remained even after entering depression, anxiety, and baseline responding as covariates.

When entering group (NSSI group, control group) as a between-subjects factor, emotion valence (low-arousal negative, low-arousal positive, high-arousal negative, high-arousal positive) as the repeated measure, and negative emotion as the outcome variable in a repeated measure ANOVA, there was a significant effect of emotion valence, $F(1, 89)=109.07$, $p<.01$, $\eta_p^2=.55$, but not group, $F(1, 89)=2.93$, $p=.09$, $\eta_p^2=.03$, or emotion valence X group, $F(1, 89)=0.25$, $p=.62$, $\eta_p^2<.01$, suggesting that the NSSI group did not differ from the control group in the extent to which their negative emotion changed between the negative and positive emotion inductions.

Table 4

Study 4: Group Means for Baseline Assessment and Response to a Positive Situation among a Sample with Remitted Depression

	NSSI		Control				
Variable	*M*	*SD*	*M*	*SD*	*Statistic*	*p*	η_p^2
Baseline Assessment	1.62	1.08	1.51	1.09	$F(1, 90) = 0.27$	.61	<.01
Negative Situation (Low Arousal)	3.93	1.60	3.49	1.88	$F(1, 90) = 1.45$	.23	.02

Negative Situation (High Arousal)	3.48	1.62	3.21	1.56	$F(1, 90) = 0.62$	.43	.01
Positive Situation (High Arousal)	1.75	1.05	1.42	0.57	$F(1, 90) = 3.20$	.08	.03
Positive Situation (Low Arousal)	1.59	0.93	1.25	0.41	$F(1, 90) = 4.34$	.04	.05

Note. Negative emotion was assessed with eight negative emotion items (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness).

Discussion

Compared to the control group, the NSSI group did not exhibit heightened negative emotion in response to the negative situations. However, compared to the control group, the NSSI group exhibited heightened negative emotions in response to the positive situations. This pattern remained even when controlling for responding at baseline, suggesting that this effect was not explained by higher baseline negative emotion, and results held when controlling for depression and anxiety symptoms, suggesting that this effect is not explained by depression or anxiety symptoms. Analyses did not reveal a significant interaction of emotion valence X group, suggesting that the effect of NSSI is not significantly different for positive relative to negative situations. Given somewhat elevated negative emotions across situations (see Table 4), this study may have been underpowered to detect differences in the effect of NSSI on positive relative to negative situations.

Study 4 provided strong support for heightened negative emotion to the positive situations in NSSI, yet, important questions remain. Specifically, why do those with a history of NSSI exhibit heightened negative emotion to the positive situations? Theory suggests heightened negative self-beliefs may explain why certain individuals experience negative emotions in positive, but not negative, situations. Therefore, I conducted a fifth study to assess whether negative self-beliefs may explain the association between NSSI and heightened negative emotion to positive situations.

Study 5

To further test the hypotheses and assess whether negative self-beliefs may be responsible for heightened negative emotion to positive situations among those with a history of NSSI, I conducted a fifth study in a community sample. Study 5 assessed negative self-beliefs and negative emotions in response to a positive film clip to examine whether heightened negative self-beliefs in positive situations explains the association between NSSI and negative emotion in positive situations. I hypothesized that those with a history of NSSI (versus controls) would exhibit heightened negative emotion in response to positive (but not negative) situations and that this association would be accounted for by heightened negative self-beliefs.

Method

Participants. One hundred and four participants (52% male) between the ages of 21 and 64 (M=37.80, SD=12.54) were recruited through Amazon Mechanical Turk. Of these participants, five participants incorrectly answered at least one attention check question asking them to select a specific response. These participants were excluded to ensure data quality throughout the study. Of the remaining 99 participants, 27 (27%) indicated a history of NSSI.

Measures. ***Demographics.*** Participants responded to questions about their age and gender.

NSSI. History of NSSI was measured with the Inventory of Statements About Self-Injury (ISAS), a validated and commonly used measure assessing history of engagement in 12 NSSI behaviors (Klonsky & Glenn, 2009).

Mood induction. Participants began by watching a neutral film clip, a video about how to make bowls, to assess baseline emotions. Participants then watched a positive film clip – a scene from *Sarah Hughes winning the gold medal*. Participants reported on a 1 (*none at all*) to 9 (*extreme*) scale the amount they felt eight negative emotions (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness; $\alpha_{baseline}$=.85, $\alpha_{positive}$=.83). All procedures were in compliance with the local IRB.

Negative self-beliefs. Negative self-beliefs were measured with a 10-item scale designed for this study, which measured the degree to which people experienced negative beliefs about the self in response to situations (Negative Self-Beliefs Scale; NSBS). In accordance with past research assessing trait negative self-beliefs (Neff, 2003; Thompson & Zuroff, 2004), this scale included items assessing negative self-beliefs in relation to others – "I felt like other people are probably happier than I am" and in comparison with internal personal standards – "I was disapproving and judgmental about my own flaws and inadequacies". All of the items rephrased existing, validated items used for assessing trait negative self-beliefs so that the items referred to the present situation (existing scales refer negative self-beliefs *in general*). For example, "I seldom feel ashamed of myself", was changed to, "I felt ashamed of myself." Only the items that made sense with regard to the present context were used. For example, items like "I am usually comfortable with people asking me about myself", did not make sense in the context of watching a film clip, and therefore, were not used. Given very similar items were validated in previous studies, I expected that they adequately measured negative self-beliefs.

In addition, I conducted a factor analysis to assure that the rephrased items cohered into one factor. A factor analysis of NSBS supported a one-factor solution. The first initial factor produced an Eigenvalue of 6.06 and explained 60% of the variance. When a second factor was included, this factor had an Eigenvalue of 0.90 that explained an additional 9% of the variance. Because the Eigenvalue of this factor was below 1 and because factor loadings on this factor were lower and did not yield a conceptually cohesive second factor, the one-factor solution was most appropriate. All 10 items loaded positively on one factor, with all coefficients above .61 (see Table 5 for factor loadings). The NSBS was shown to have good reliability (α=.92 in the present sample).

Table 5
Factor Loadings for the 10 Items Included in the Negative Self-Beliefs Scale (NSBS)

Item	Factor 1
1. I was disapproving and judgmental about my own flaws and inadequacies.	.85
2. I felt like other people are probably happier than I am.	.85
3. I criticized myself for having irrational or inappropriate responses.	.84
4. I felt like other people must be having an easier time of it.	.76
5. I worried what other people would think of me.	.75
6. I found myself wondering how worthwhile I am.	.73
7. I felt separate or cut off from the rest of the world.	.72
8. I felt disappointed about my achievements in life.	.68
9. I felt ashamed of myself.	.68

10. I made judgments about whether I was a good or bad person.	.61

Note. The Negative Self-Beliefs Scale was developed to assess the extent to which people experienced negative self-beliefs in response to stimuli (versus *in general*).

Free response coded negative self-beliefs. Negative self-beliefs were also assessed by having participants respond to the question, "Please describe the stream of thoughts that flowed through your mind as you watched the film clip." Two trained judges rated each of the responses for negative self-beliefs on a Likert-type scale from 1 (*none at all*) to 4 (*extreme*). Inter-rater reliability was good (α=.93).

Results

To examine whether those with a history of NSSI (versus controls) differed in their negative emotions and negative self-beliefs in response to the positive situation, I conducted two GLMs with group (NSSI group, control group) as a between-subjects factor and negative emotion in response to the positive situation and NSBS as the dependent variables. Analyses revealed that there was an effect of group on negative emotion to the positive situation, $F(1, 96)=6.29$, $p=.01$, $\eta_p^2=.06$, and on NSBS , $F(1, 93)=11.91$, $p<.01$, $\eta_p^2=.11$ (see Table 6 for means).

To examine whether those with a history of NSSI (versus controls) differed in their free responses to the positive situation, I conducted a GLMs with group (NSSI group, control group) as a between-subjects factor and coded negative self-beliefs as the dependent variable. Analyses revealed that there was no effect of group on coded negative self-beliefs to the positive situation, $F(1, 95)=0.26$, $p=.42$, $\eta_p^2<.01$.

Table 6

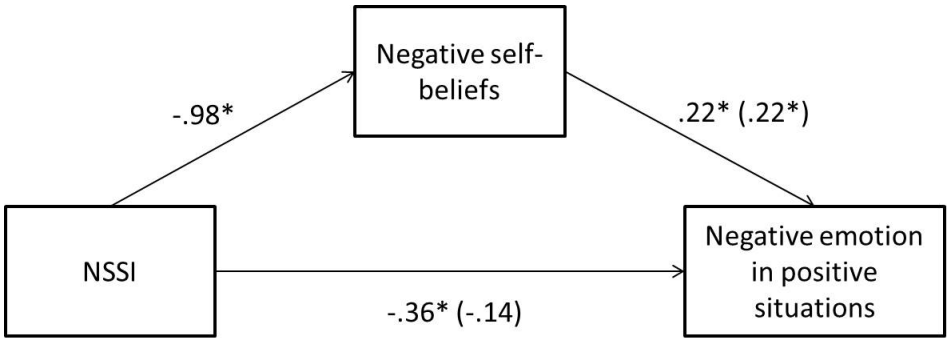
Study 5: Group Means for Baseline Assessment and Response to a Positive Situation among a Community Sample

	NSSI		Control				
Variable	*M*	*SD*	*M*	*SD*	*Statistic*	*p*	η_p^2
Baseline Assessment	1.52	1.01	1.15	0.38	$F(1, 97) = 7.24$	.01	.07
Positive Situation	1.55	0.93	1.18	0.49	$F(1, 96) = 6.29$	.01	.06
NSBS	2.86	1.54	1.89	1.11	$F(1, 93) = 11.91$	<.01	.11
Coded self-beliefs	1.25	1.08	1.13	0.64	$F(1, 95) = 0.26$	.42	<.01

Note. NSBS = Negative Self-Beliefs Scale. Negative emotion was assessed with eight negative emotion items (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness).

To examine whether the association between NSSI and negative emotions in response to the positive situation could be accounted for by experienced negative self-beliefs in response to the positive situation, I conducted a GLM with group (NSSI group, control group) as a between-subjects factor, negative self-beliefs in response to the positive situation as a covariate, and negative emotion in response to the positive situation as the dependent variable. Analyses revealed that the effect of group on negative emotions in response to the positive situation became non-significant, $F(1, 92)=0.99$, $p=.32$, $\eta_p^2=.01$, while the effect of state negative self-beliefs on negative emotions in response to the positive situation remained, $F(1, 92)=19.30$, $p<.01$, $\eta_p^2=.17$. Thus, negative self-beliefs accounted for the association between NSSI and negative emotion in the positive situation (See Figure 1).

Figure 1.



Discussion

Compared to the control group, the NSSI group exhibited heightened negative emotions in response to the positive situation. This effect was statistically accounted for by heightened negative self-beliefs in response to the positive situation such that when controlling for the effect of negative self-beliefs, the association between NSSI and negative emotion to positive situations disappeared. Although no group differences were found in free response coded negative self-beliefs, the present findings provide initial support that negative self-beliefs may be responsible for heightened negative emotion in positive situations among those with a history of NSSI. However, given the cross-sectional design of the present study, I could not draw conclusions about causality from the present design. Thus, although negative self-beliefs statistically mediated the association between NSSI and negative emotion in a positive situation, it is unclear whether negative self-beliefs cause heightened negative emotion in positive situations among the NSSI individuals.

Study 6

To examine causality, Study 6 experimentally manipulated self-beliefs among a sample of participants with or without a history of NSSI. Participants were randomized to either a positive self-beliefs condition or a control condition. Then, participants underwent a positive emotion induction and reported their negative emotions. I hypothesize that participants who underwent a positive self-beliefs manipulation would report lower negative emotion than those who underwent a control manipulation and that these differences would be accounted for by a reduction in negative self-beliefs.

Method

Three-hundred and thirty participants with a history of NSSI (71% female) between the ages of 17 and 50 (*M*=21.35, *SD*=3.36) were recruited from the University of California, Berkeley student research participant pool to take part in an online study in exchange for course credit. Thirty-four participants incorrectly answered at least one of three attention check questions asking them to select a specific response. These participants were excluded to ensure data quality throughout the study. Of the remaining participants, 120 (33%) indicated a history of NSSI.

Measures. ***Demographics.*** Participants responded to questions about their age and gender.

NSSI. History of NSSI was measured with the Inventory of Statements About Self-Injury (ISAS), a validated and commonly used measure assessing history of engagement in 12 NSSI behaviors (Klonsky & Glenn, 2009).

Depression symptoms. Depression symptoms were measured with the 21-item Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988). The BDI was shown to have good internal consistency (α=.78 in the present sample).

Anxiety symptoms. Anxiety symptoms were measured with the 21-item Beck Anxiety Inventory (BAI; Fydrich, Dowdall, & Chambless, 1992). The BAI has been shown to have good reliability, validity, and internal consistency (α=.85 in the present sample).

Self-beliefs manipulation. Participants began by watching a neutral film clip, a video about how to make bowls, to assess baseline emotions. Participants were then randomly assigned to one of two experimental conditions (positive self-beliefs or control) based on past research in NSSI samples (Hooley & St. Germain, 2013). Participants in the positive self-beliefs condition were instructed to complete a short checklist geared to undermine negative beliefs about the self by activating positive self-schemas. This checklist contained 21 commonly occurring positive traits or characteristics (e.g., loyal, kind, insightful, dependable) and participants were asked to select five that they thought applied to them. When they finished, they were asked to provide specific examples of a time when the participant behaved in those five particular ways (Hooley & St. Germain, 2013). Participants in the control condition were instructed to complete a short checklist containing 21 commonly occurring activities that they engaged in recently (e.g., going out to eat, watching movies, talking to friends). When they finished, they were asked to provide specific examples of a time when the participant engaged in those five activities. All procedures were in compliance with the local IRB.

Mood induction. After completing the experimental manipulation, all participants watched a positive film clip – a scene from *Sarah Hughes winning the gold medal*. Participants reported on a 1 (*none at all*) to 9 (*extreme*) scale the amount they felt eight negative emotions (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness; $\alpha_{baseline}$=.74, $\alpha_{positive}$=.82).

Negative self-beliefs. Negative self-beliefs were measured with a 10-item scale designed in Study 5, which measured the degree to which people experienced negative beliefs about the self in response to the positive situation (Negative Self-Beliefs Scale; NSBS). The NSBS was shown to have good reliability (α=.95 in the present sample).

Analyses

Manipulation check. To test whether my positive self-beliefs condition induced greater positive self-beliefs than the control condition, I assessed participants' responses to the item "How positive did the activity make you feel about yourself?" Analyses revealed that there was no effect of condition on positive self-beliefs immediately after the manipulation, $F(1, 118)=0.15$, $p=.70$, $\eta_p^2<.01$. This suggests that my manipulation was likely ineffective at inducing positive self-beliefs.

Negative emotion and negative self-beliefs. Given a failure to manipulate positive self-beliefs, I tested the hypothesis that negative self-beliefs would statistically mediate the association between NSSI and negative emotions in response to a positive situation by conducting a series of correlational GLMs.

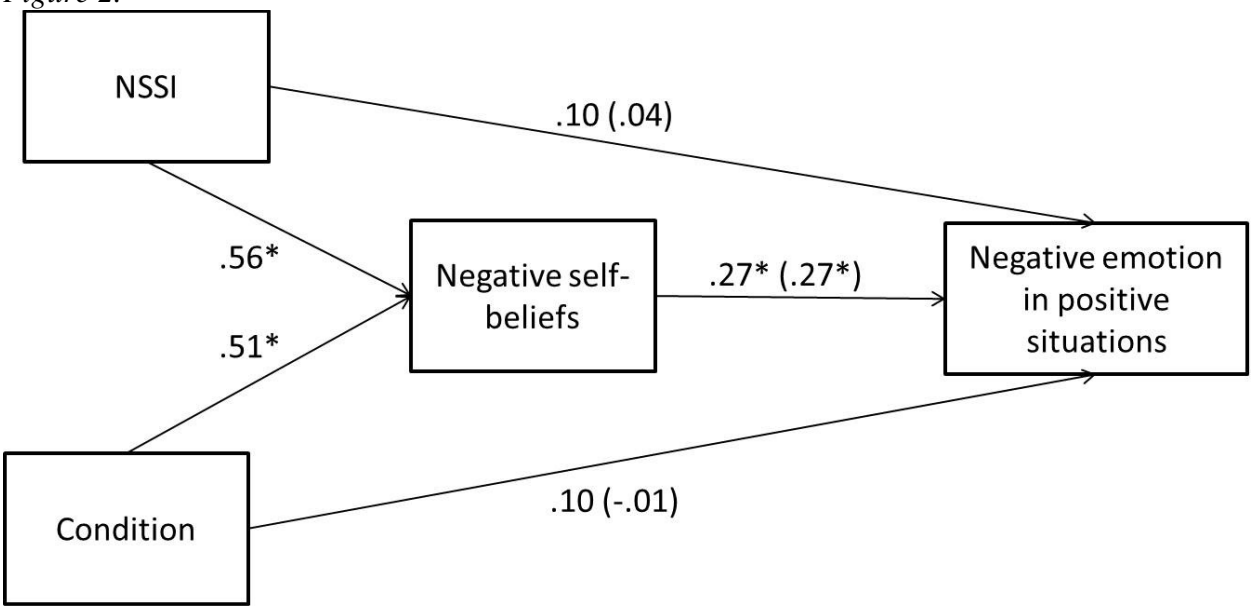
Did NSSI predict negative self-beliefs? The first GLM included group (NSSI group, control group) and as between-subjects factors and negative self-beliefs in response to the positive situation as the dependent variable. Despite the manipulation failure, I additionally included condition (positive self-beliefs, control) as a covariate to account for variation that may have emerged as a result of experimental condition. Analyses revealed that there was an effect of NSSI on negative self-beliefs, $F(1, 280)=17.05$, $p<.01$, $\eta_p^2=.06$, such that NSSI participants

showed more negative self-beliefs. There was also an effect of condition on negative self-beliefs, $F(1, 280)=8.21$, $p<.01$, $\eta_p^2=.03$, such that participants in the positive self-beliefs condition showed more negative self-beliefs. The interaction between NSSI and condition was not significant, $F(1, 280)=0.23$, $p=.63$, $\eta_p^2<.01$, suggesting that the association between NSSI and negative self-beliefs was not affected by experimental condition.

Did negative self-beliefs predict negative emotions in a positive situation? The second GLM included negative self-beliefs in response to the positive situation as the predictor and negative emotion in response to the positive situation as the dependent variable. Analyses revealed that there was an effect of negative self-beliefs on negative emotion, $F(1, 280)=87.17$, $p<.01$, $\eta_p^2=.23$, such that greater negative self-beliefs was associated with more negative emotion.

Did negative self-beliefs mediate the association between NSSI and negative emotions in a positive situation? A third GLM included group (NSSI group, control group) and condition (positive self-beliefs, control) as between-subjects factors, negative self-beliefs in response to the positive situation as a continuous predictor, and negative emotion in response to the positive situation as the dependent variable. Analyses revealed that the effect of negative self-beliefs on negative emotions in response to the positive situation remained, $F(1, 280)=78.51$, $p<.01$, $\eta_p^2=.22$ (See Figure 2).

Figure 2.



Discussion

Study 6 attempted to experimentally manipulate positive self-beliefs by randomly assigning people with a history of NSSI to either a positive self-beliefs condition (Hooley & St. Germain, 2013) or a control activity. The positive self-beliefs condition (compared to a control condition) failed to increase positive beliefs about the self. One potential explanation for these findings may be that self-beliefs are not easily changed. It may be that reflecting on one's positive traits – when one believes that they have many negative traits – only serves to highlight

negative self-beliefs. Future studies may benefit from manipulating self-beliefs in more implicit ways so as not to draw attention to any perceived lack of positive traits.

Although the positive self-beliefs condition (compared to a control condition) appeared to result in no improvement in positive self-beliefs, the results left it unclear as to whether the positive self-beliefs condition had detrimental effects on outcomes or, rather, that the control condition actually had positive effects on outcomes. To explore this question further, I combined data from participants with a history of NSSI across all six studies and conducted a GLM with condition (positive self-beliefs condition, control condition, no condition) as a between-subjects factor and negative emotion in response to the positive situation as the dependent variable. Analyses revealed that participants with a history of NSSI reported lower negative emotion in the positive self-beliefs condition (N=58, M=1.42, SD=0.87) and the control condition (N=62, M=1.34, SD=0.60) compared to no condition (assessed in Studies 1-5; N=347, M=1.75, SD=1.20), $F(1, 464)=4.44$, $p=.04$, $\eta_p^2=.01$, and , $F(1, 464)=7.18$, $p=.01$, $\eta_p^2=.02$, respectively. These data suggest that both the positive self-beliefs condition and the control condition may have reduced negative emotion in positive situations among NSSI participants. Importantly though, these data suggest that having individuals list and describe their positive personality traits is likely not the most effective way to reduce negative self-beliefs. Interestingly, a control condition where people recalled and wrote about recent *activities* was more effective at improving self-beliefs.

With regard to NSSI, correlational analyses also revealed that heightened negative self-beliefs in response to the positive situation statistically mediated the association between NSSI and negative emotion to the positive situation. These findings provide additional support that negative self-beliefs may be responsible for heightened negative emotion in positive situations among those with a history of NSSI. In combination, these results suggest that decreasing negative self-beliefs may contribute to reduced negative emotion in positive situations, regardless of whether these negative self-beliefs arose as a result of syndromes like NSSI or as a result of other environmental conditions (e.g., the self-beliefs manipulation).

Table 7

Study 6: Group Means for Baseline Assessment and Response to a Positive Situation among a College Sample by Condition

	Positive Condition		Control Condition				
Variable	*M*	*SD*	*M*	*SD*	*Statistic*	*p*	η_p^2
Baseline Assessment	1.44	0.69	1.36	0.65	$F(1, 119) = 0.42$	.51	<.01
Positive Situation	1.42	0.87	1.35	0.60	$F(1, 119) = 0.33$	.57	<.01
NSBS	2.62	1.59	2.12	1.32	$F(1, 119) = 3.38$	.07	.03

Note. NSBS = Negative Self-Beliefs Scale. Negative emotion was assessed with eight negative emotion items (i.e., anger, anxiety, contempt, frustration, fear, sadness, hopelessness, loneliness).

General Discussion

The present studies examined when and why individuals with a history of NSSI (versus controls) experience greater negative emotion. In previous research, reliance on global (situation unspecific) questionnaire measures, confounding of NSSI with elevated depression and anxiety symptoms, and a lack of reliable associations between NSSI and heightened negative emotion to negative situations made it difficult to evaluate when and why NSSI is associated with

heightened negative emotion. I addressed these limitations by assessing negative emotional responses to a variety of positive and negative situations across community, clinical, and college samples and by statistically controlling for depression and anxiety symptoms. These situations included both low and high-arousal positive situations and both high and low-arousal negative situations. Findings revealed that those with a history of NSSI (versus controls) do not experience heightened negative emotions in negative situations when statistically controlling for confounds such as depression and anxiety (Studies 1, 2, and 4). However, they do experience heightened negative emotions in positive situations (Studies 1-5) even when controlling for baseline negative emotion, depression, and anxiety symptoms (Studies 2-4), and across both high and low arousal positive situations (Studies 3-4). Furthermore, the association between NSSI and negative emotion in positive situations was explained by negative self-beliefs (Studies 5-6). Importantly though, the data suggest that face-valid interventions targeting self-beliefs may not be the best way to reduce negative self-beliefs and negative emotion to positive situations among NSSI samples. Thus, further research is needed to examine which types of interventions should be used to improve self-beliefs and subsequent negative emotions to positive situations among those who engage in NSSI.

NSSI and Negative Emotion in Response to Negative Situations

Studies consistently show increased depression and anxiety symptoms are associated both with engagement in NSSI (Crowell et al., 2005; Klonsky et al., 2003) and with emotional dysfunction (Aldao et al., 2010); therefore, it is essential to control for these symptoms. By controlling for depression and anxiety in the present investigation, I was able to rule out the possibility that NSSI is a proxy for these related syndromes and I could, therefore, make more internally valid claims about the associations between NSSI specifically and negative emotion in response to negative situations. Importantly, when controlling for key confounds, NSSI was not associated with negative emotion during negative emotional situations (and effect sizes were small) regardless of what stimuli were used (i.e., recalling a fight, a stressful speech, or a sad film clip; Studies 1, 2, and 4). Despite the difficulty of interpreting null effects, the small effect sizes give some confidence in the conclusion that negative emotion during negative emotional situations is not reliably related to NSSI.

These findings appear to diverge from some earlier studies that did find greater negative emotional responding in general to be associated with NSSI. For example, some studies that found an association between NSSI and negative emotional responding measured emotional responding with relatively general questions (e.g., “I experience emotions very strongly”; Nock, Wedig, Holmberg, & Hooley, 2008). *Generally* feeling strong emotions can result from heightened negative emotion across contexts or only in response to specific contexts. Thus, this approach left it unclear whether NSSI is associated with heightened negative emotion in general, or only in response specific contexts. The present investigation shows that it is more likely that negative emotion during negative situations is not involved in NSSI, is involved only in severe cases of NSSI, or is involved only in specific negative emotional contexts not tested in the present investigation. For example, it is possible that situations that are theoretically related to NSSI (e.g., an abandonment scenario) may result in group differences in negative emotion (Linehan, 1993). However, given the comorbidity between NSSI, depression and anxiety, it would be essential to control for these confounding syndromes in subsequent assessments of negative emotion in response to negative situations.

NSSI and Negative Emotion in Response to Positive Situations

Across five studies, I provided some of the first evidence to suggest that NSSI is associated with greater negative emotions in positive situations. Findings were consistent across community, clinical, and college samples. Findings were not moderated by the arousal of the positive situations – heightened negative emotion persisted in both low and high-arousal positive situations. Moreover, these effects were largely consistent when controlling for depression and anxiety symptoms suggesting heightened negative emotion in positive contexts is not explained by heightened depression and anxiety among NSSI samples.

One potential reason why those with a history of NSSI might experience elevated negative emotions in positive (but not negative) situations could be that they seek to self-verify the negative feelings they have about themselves. Self-verification theory proposes that individuals with greater negative self-beliefs respond more negatively to positive situations – situations which are inconsistent with the negative beliefs they have about themselves. However, these individuals may not respond more negatively to negative situations – situations which are consistent with the negative beliefs they have about themselves. Given the present investigation strongly supports that those with a history of NSSI experience heightened negative emotion in positive (but not negative) situations, these data support self-verification theory and suggest self-verification plays a role in NSSI.

Overall, the present investigation provides crucial empirical support for theories suggesting that heightened negative emotion is characteristic of NSSI (Chapman et al., 2006; Linehan, Bohus, & Lynch, 2007; Nock, 2009; Selby & Joiner, 2009). However, importantly, negative emotion is only notably elevated in positive contexts. Given NSSI is often used to regulate emotions (see Klonsky, 2007, for a review), heightened negative emotion may lead these individuals to regulate emotions "by any means necessary," including by deliberately harming themselves. Thus, the present investigation is also consistent with theories suggesting that people engage in NSSI to regulate heightened negative emotions (Selby & Joiner, 2009).

NSSI and Negative Self-Beliefs

The association between NSSI and heightened negative emotions in response to positive situations appears to be at least partially explained by heightened negative self-beliefs. Correlational analyses revealed that heightened negative self-beliefs in response to positive situations statistically mediated the association between NSSI and negative emotion to positive situations (Studies 5 and 6). These findings suggest self-verification plays a role in the emergence of negative emotions in NSSI. Given negative emotions are one of the key correlates of NSSI, the present evidence has important implications for understanding what mechanisms result in these negative emotions. The present study has highlighted a robust association between NSSI and negative emotion in response to positive situations, and has provided initial support suggesting that these emotions arise due to negative self-beliefs. Moreover, these data support self-verification theory and suggest this theory applies to NSSI.

Although the present study provided consistent support for a theoretical model by which negative self-beliefs contribute to heightened negative emotion in positive situations among NSSI samples, experimentally manipulating positive self-beliefs in face-valid ways – as done in past research (Hooley & St. Germain, 2013) – was found to be an ineffective way to improve self-beliefs and reduce negative emotion in positive situations (Study 6). One potential explanation for these findings may be that self-beliefs are not easily changed. It may be that reflecting on one's positive traits – when one believes that he/she has many negative traits – only serves to highlight or enhance negative self-beliefs. Given past research has shown that empirically supported treatments (e.g., Cognitive Behavioral Therapy and Dialectical Behavior

Therapy) are often ineffective for reducing NSSI (Washburn et al., 2012), there is reason to believe that the processes underlie NSSI are resistant to these types of cognitive therapeutic techniques.

Importantly though, the present investigation found that recalling and reflecting on recent events and activities predicted lowered negative self-beliefs (Study 6). This effect remained regardless of whether or not participants had a history of NSSI. However, this finding is consistent with past research suggesting that behavioral activation (i.e., engagement in activities) predicts improved emotion regulation (Moltrecht, Davis, Shallcross, Visvanathan, & Mauss, 2014), reduced NSSI urges (Klonsky & Glenn, 2008), and reduced engagement in NSSI (Wallenstein & Nock, 2007). Thus, these data suggest that behavioral activation interventions for NSSI may be more effective than cognitive interventions. However, further research is still needed to examine which types of interventions are best for reducing negative self-beliefs and negative emotion in NSSI samples.

Limitations and Future Directions

The present investigation addressed multiple limitations of existing research; however, it is not without its own limitations. First, while my investigation took an important first step towards assessing a causal model of negative emotion in NSSI, it cannot definitely speak to whether there are causal associations between negative self-beliefs, negative emotion in positive situations, and NSSI. Longitudinal and intervention designs are needed to draw causal conclusions about the role of these processes in NSSI. Second, I had a smaller sample size than some previous studies on NSSI (Whitlock et al., 2006). However, my results replicated across numerous studies and diverse samples which suggests a robust association between NSSI and negative emotion in positive situations. Third, although I assessed multiple positive contexts, I only used film-clip stimuli. Thus, there may still be other positive contexts in which NSSI groups do not differ from control groups. Fourth, I assessed NSSI with different measures across studies. However, past research has shown that different measures of NSSI are comparable and yield comparable convergent and discriminant validly (Gratz, 2001). Moreover, by using two different measures, I can be more certain that my results are not an artifact of the particular NSSI measure I used. Fifth, although I assessed one mechanism (negative self-beliefs) that may contribute to heightened negative emotion in NSSI, the manipulation for self-beliefs failed in Study 6. Therefore, it is hard to be certain whether negative self-beliefs play a causal role in negative emotion in response to positive situations. Further, I did not test other potential mechanisms (e.g., rumination). Exploring these mechanisms could further clarify why those with a history of NSSI experience heightened negative emotion in positive situations.

Concluding Comment

Theoretical models suggest that NSSI is related to heightened negative emotion. The present studies examined when and why individuals with a history of NSSI (versus controls) experience greater negative emotion. Findings revealed that, when controlling for depression and anxiety, those with a history of NSSI (versus controls) do not experience heightened negative emotions in negative situations (Studies 1, 2 and 4). However, they do experience heightened negative emotions in positive situations (Studies 1-5) even when controlling for baseline negative emotion, depression, and anxiety symptoms (Studies 2-4). The association between NSSI and heightened negative emotions in positive situations appears to be explained by heightened negative self-beliefs (Studies 5 and 6). These findings provide some of the first experiential evidence to suggest that negative emotions in NSSI may be explained by heightened negative self-beliefs and emerge primarily in positive situations.

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