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BRIEF REPORT

Self-Compassion, Self-Injury, and Pain

Wesley Ellen Gregory[1,2] · Jillian V. Glazer[1] · Kathy R. Berenson[1]

Abstract We conducted an experiment to examine self-compassion and responses to pain among undergraduate women with and without histories of self-injury. After a writing task that has been shown to increase self-compassion in a values-affirming condition relative to a neutral control condition, participants completed a self-report measure of state self-compassion and the cold pressor task. As predicted, participants with a history of self-injury reported lower trait self-compassion than those without such a history, and participants in the values-affirming condition reported significantly higher state self-compassion than those in the control condition. Moreover, participants with a history of self-injury demonstrated significantly less insensitivity to pain in the values-affirming condition than the control condition. Future research should investigate the possibility that interventions involving self-compassion and/or affirmation of values may help correct high-risk responses to pain among those who self-injure.

Keywords Self-harm · Self-compassion · Pain tolerance · Pain perception · Values affirmation

Introduction

Non-Suicidal Self-Injury (NSSI) is characterized by repeated and intentional acts of self-harm without intent to die (Nock 2010), and the association of NSSI with suicide risk (e.g., Guan et al. 2012) makes it especially important for further study. Research has suggested that NSSI is associated with being unusually insensitive to pain, as demonstrated in studies that expose participants to painful experiences, such as very cold temperatures or high levels of pressure, in controlled laboratory settings. That is, compared to individuals who do not engage in NSSI, those who do rate painful stimuli as less aversive (Bohus et al. 2000; Franklin et al. 2011, 2012; McCoy et al. 2010), have a higher threshold for detecting pain (Franklin et al. 2011, 2012; Hooley et al. 2010), and voluntarily endure pain longer (Franklin et al. 2012; Hooley et al. 2010; McCoy et al. 2010). Insensitivity to pain is of clinical significance because its association with suicidal behavior and suicide capability (Franklin et al. 2011; Nock et al. 2006; Nock 2010; Orbach et al. 1997) suggests a mechanism contributing to a heightened risk of death by suicide among those who self-injure.

Among people who self-injure, insensitivity to pain has been associated with several conceptually overlapping factors; including high distress (Gratz et al. 2011), emotion dysregulation (Franklin et al. 2012), negative, self-critical feelings about the self (Glenn et al. 2014; Hooley et al. 2010; Hooley and Germain 2014), and self-punishment motivations for self-harm (Hamza et al. 2014). Notably, each of these factors has also been associated with being low in *self-compassion*—a construct defined by self-kindness rather than self-criticism, a sense of one's common humanity rather than isolation, and mindfulness rather than rumination (Neff 2003). For example, self-compassion is inversely associated with distress, including negative affect and depression symptoms (Krieger et al. 2013; Neff and McGehee 2010). Self-compassion is also associated with better emotion

✉ Kathy R. Berenson
kberenso@gettysburg.edu

1 Psychology Department, Gettysburg College, Gettysburg, PA 17325, USA

2 Psychology Department, The New School for Social Research, New York, NY 10011, USA

regulation, and exercises designed to increase self-compassion effectively promote emotion regulation (Diedrich et al. 2014). Given that the construct of self-compassion explicitly involves being kind to oneself despite awareness of one's flaws, individuals who are prone to experience high levels of self-criticism, shame, and desires to punish themselves are by definition low in this key aspect of self-compassion. Indeed, self-compassion is inversely correlated with shame (Ferreira et al. 2013; Gilbert and Procter 2006), and exercises that increase self-compassion decrease both self-criticism (Lindsay and Creswell 2014) and shame (Johnson and O'Brien 2013). Yet no previous research has examined the role of self-compassion in response to pain among individuals who self-injure, and surprisingly little has examined associations between self-compassion and self-injury at all.

Though few empirical studies have assessed self-compassion in individuals who self-injure, many have identified personality characteristics conceptually relevant to low self-compassion as risk factors for NSSI. For example, NSSI is associated with perfectionistic concerns, self-critical rumination (Hoff and Muehlenkamp 2009; Hooley et al. 2010), and vulnerability to intense feelings of shame, disgust, and hatred directed at the self (Gilbert et al. 2010; Nock et al. 2009; Schoenleber et al. 2014; Xavier et al. 2016). In one of the few studies to address the relationship between NSSI and low self-compassion, the frequency of adolescent NSSI was associated with endorsing fears of being compassionate towards oneself (Xavier et al. 2016). Moreover, a study examining internet posts by individuals who have engaged in NSSI found that self-compassionate language was more likely to be used in posts made by individuals recovering from self-harm than by individuals currently engaging in it (Sutherland et al. 2014).

While examining associations among NSSI, self-compassion, and responses to pain may help shed light on risk factors involved in NSSI, experimentally testing the effects of manipulations that increase self-compassion may be especially useful for guiding the development of interventions to help people stop harming themselves. A recent study by Lindsay and Creswell (2014) showed that a values affirmation task may be effective in increasing state self-compassion. After participants rank-ordered a set of values in terms of personal importance, they were randomly assigned to write about the value they considered most important (in the values-affirmation condition) or least important (in the control condition) before completing assessments of state self-compassion. Results of Study 1 showed that those who affirmed a personally important value showed significantly higher levels of self-compassion than those in the control condition; In Study 2, more sophisticated assessments of state self-compassion replicated the beneficial effect of values affirmation on state

self-compassion among individuals who are low in trait self-compassion.

Self-Compassion Versus Self-Worth

If viewing the self in a very negative, punitive light contributes to the pain insensitivity that perpetuates risk of self-injury and suicide, intense states of self-loathing may be an important target of interventions. This idea was the basis for a recent experiment that effectively corrected pain endurance in individuals who self-injure (Hooley and Germain 2014), using a procedure designed to induce positive feelings about the self. In the experimental condition, participants first identified several positive traits about themselves from a list. Afterwards, the experimenter asked the participant to describe (for 5 min) a specific incident in which they had demonstrated one of these positive traits, and made comments intended to highlight how the described incident reflected well on the participant. This experimental condition significantly reduced the length of time for which participants with current NSSI were willing to voluntarily endure pain relative to a positive mood induction condition and a neutral control condition. While these results are promising in demonstrating that interventions to reduce states of intense self-loathing may successfully interrupt internal processes associated with NSSI and suicide risk, tasks that directly target and modify self-worth are not the only means to reduce states of intense self-loathing.

In contrast to interventions that aim to change the content of people's self-evaluations to be more positive, interventions that target self-compassion instead emphasize changing how people relate to themselves and their internal experiences (consistent with acceptance-based behavioral therapies; Roemer and Orsillo 2009). For some, this distinction may be important because exercises designed to improve self-evaluation by requiring a focus on the self's positive qualities are often ineffective for the people who are most vulnerable to feeling bad about themselves; sometimes these interventions even backfire and cause people with low self-esteem to feel worse (Wood et al. 2009; Hames and Joiner 2012). It therefore seems worthwhile to consider whether an exercise that is intended to target self-compassion via affirmation of personal values, and that appears to especially help individuals with low baseline self-compassion (Lindsay and Creswell 2014, Study 2), could be the basis for an alternative intervention strategy for individuals who self-injure.

A great deal of research has supported the efficacy of affirming personal values for increasing resilience against threats to the self (McQueen and Klein 2006). For example, these tasks successfully improve the academic performance of racial/ethnic minority students facing stereotype threat

(Cohen et al. 2006; Steele 1988). Although researchers had initially believed that increases in self-esteem might mediate the benefits of self-affirmation, accumulated evidence does not support this conclusion (McQueen and Klein 2006). Increases in self-compassion, on the other hand, remain a relatively unexplored potential mechanism for this relatively indirect way of bolstering the self's ability to cope.

The Current Study

We examined the effect of values-affirmation on state self-compassion and responses to pain during the cold pressor task among female undergraduates with and without a history of self-injury. We predicted that individuals with a history of self-injury would score lower on a measure of trait self-compassion (Neff 2003) than those without such a history. We also predicted that we would replicate previous research that used the same methods (Lindsay and Creswell 2014, Study 1) and show that the values affirmation condition leads to an increase in state self-compassion relative to a neutral control condition. Although we expected condition to have a main effect on state self-compassion, we expected that the effects of condition on responses to pain during the cold pressor task may only be significant among participants with a history of self-injury. Indeed, in Hooley and St. Germain's (2014) research, an intervention that effectively reduced pain insensitivity in participants who self-injure had no significant impact on responses to pain in a healthy comparison group. Because participants with no history of self-injury are likely to be close to the lowest reasonable level of pain insensitivity to begin with, the values-affirmation task may not be able to reduce their pain insensitivity significantly further—even if it does improve their state self-compassion, relative to the control condition. Therefore, our analyses of participants' perceptions and endurance of pain during the cold pressor task focus on the prediction that the values affirmation task would help correct high pain insensitivity among participants who self-injure.

Method

Participants

Participants were 64 female undergraduate students who had previously completed questionnaires that included a screening for self-injury, and had given consent to be notified about research studies they were eligible to take part in for pay. All participants were between the ages of 18 and 22, ($M = 19.4$), and 89.1% identified themselves as White.

Six other individuals who took part in our study were excluded from our sample because they reported regular physical contact with ice as part of athletic training, which could influence their ability to tolerate the cold pressor task. Nine others were excluded because they did not follow essential instructions for the cold pressor task (e.g., they kept moving their hand in and out of the water) or for the writing task (e.g., they did not write about the specified topic or spent far less than the required time on the task).[1]

History of Self-Injury

All participants had previously completed screening questionnaires that included a *True/False* item from the Schedule for Nonadaptive and Adaptive Personality-2 (SNAP-2; Clark 2003; item 174) assessing whether they had repeatedly engaged in deliberate physical self-injury. The 32 participants who endorsed this item were included in the self-injury group, whereas the other 32 were included in the no-self-injury comparison group.

It is important to note that our self-injury screening item does not assess participants' reasons for self-harm, hence, we cannot be certain whether these behaviors were with or without suicidal intent. Nevertheless, the association of this item with other items on the SNAP-2 suggests that the vast majority of participants in our self-injury group had a history of self-injury that was *nonsuicidal*. Specifically, in a separate survey that we conducted on the same population of undergraduate women (with many of the same participants as the current study), 83% of the 30 participants who endorsed the self-injury item described above also endorsed using self-harm to soothe/relieve negative emotions (item 30). A much smaller percentage of participants who endorsed the self-injury item (13%) endorsed having ever attempted suicide (item 142).

Materials

State Mood

After providing informed consent, participants completed a negative mood scale from an abbreviated version of the Profile of Mood States (POMS-15; Cranford et al. 2006). This scale consisted of 12 state mood descriptors; including feelings of depression, anxiety, anger, and fatigue. Participants rated the extent to which they were currently feeling each negative mood state on 5-point scales ranging from

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[1] In addition, we excluded four male participants who were accidently recruited for this study of women, and three other participants for whom the water temperature was outside the required 6°–8° temperature range due to a miscommunication of experimenter instructions.

not at all to *extremely*. Negative state mood scores were computed as the average of these ratings (α = 0.90).

Trait Self-Compassion

Participants completed the Self-Compassion Scale (Neff 2003), rating how often 26 statements are characteristic of themselves (from 1 = *almost never* to 5 = *almost always*). Items reflecting high self-compassion include "I try to be loving towards myself when I'm feeling emotional pain" and "When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people." Internal consistency (α) was 0.96.
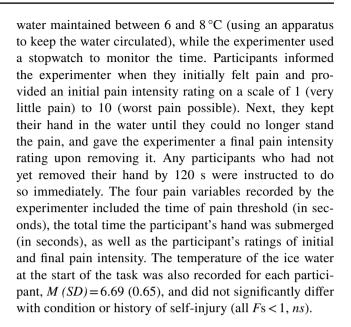
Writing Task

Participants completed a writing task previously shown to increase state self-compassion in a values-affirming condition, but not in a control condition (Lindsay and Creswell 2014). All participants, regardless of condition, rank-ordered six values (artistic skills/creativity, independence, relationships with family, religious fulfillment, sense of humor, physical health) in terms of personal importance. Then, participants in the values-affirming condition wrote a brief essay discussing their top-ranked value and why it was important to them. Those in the neutral control condition wrote a brief essay discussing their bottom-ranked value and why it might be important to someone else. Participants were instructed to spend 5 min on this task, and a clock on the computer screen displayed the remaining time in seconds. Time spent on the writing task page was recorded electronically.

State Self-Compassion

After the writing task and before the cold pressor task (described below), all participants completed a 4-item state self-compassion measure adapted from previous research (Lindsay and Creswell 2014, Study 1). Participants rated the extent to which they were experiencing specific self-compassionate moods (*trusting, loving, grateful, joyful*) in the current moment, using a 5-point scale that ranged from *not at all* to *extremely*, with α = 0.82. Note that Lindsay and Creswell (2014) had also included three additional items—*critical* (reversed), *vulnerable* (reversed), and *sympathetic*,—which we excluded from our analyses because they were not significantly correlated with the corrected total state self-compassion scale in our sample.

Cold Pressor Task

The cold pressor task (Biederman and Schefft 1994) measured participants' responses to pain. Participants submerged their dominant hand up to the wrist in ice water maintained between 6 and 8 °C (using an apparatus to keep the water circulated), while the experimenter used a stopwatch to monitor the time. Participants informed the experimenter when they initially felt pain and provided an initial pain intensity rating on a scale of 1 (very little pain) to 10 (worst pain possible). Next, they kept their hand in the water until they could no longer stand the pain, and gave the experimenter a final pain intensity rating upon removing it. Any participants who had not yet removed their hand by 120 s were instructed to do so immediately. The four pain variables recorded by the experimenter included the time of pain threshold (in seconds), the total time the participant's hand was submerged (in seconds), as well as the participant's ratings of initial and final pain intensity. The temperature of the ice water at the start of the task was also recorded for each participant, $M (SD) = 6.69 (0.65)$, and did not significantly differ with condition or history of self-injury (all Fs < 1, *ns*).

Procedure

Participants arrived at the lab individually, and were met by an experimenter blind to their self-injury history and writing task condition. After providing informed consent, participants completed a state mood scale and a trait self-compassion scale, followed by a writing task manipulation in which they were randomly assigned to affirm a personal value (or not). Next, participants completed a measure of state self-compassion, and finally, the cold pressor task. Then they were debriefed, thanked, and compensated for their time.[2]

Our study has a 2×2 design, and therefore included 16 participants in each cell. We decided upon this sample size after noting that several previous studies of pain in individuals who self-injure have included even smaller samples (11–13 participants per cell in Bohus et al. 2000; Ludäscher et al. 2009; McCoy et al. 2010; Russ et al. 1992). All measures, conditions, and data exclusions, have been reported in this manuscript.

Results

Self-Injury and Trait Self-Compassion

A t-test was conducted to determine if levels of trait self-compassion differed with self-injury history. As predicted,

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[2] After one participant spontaneously remarked that regular ice baths were a required part of her athletic training, we started asking all participants about their use of ice baths after they had completed the study.

those with a history of self-injury reported significantly lower trait self-compassion, M $(SD) = 2.40$ (0.57), than those without a history of self-injury, M $(SD) = 3.25$ (0.63), t (62) $= -5.68$, $p < .001$, $d = -1.44$.

State Self-Compassion

To determine if the values affirmation task was successful in increasing state self-compassion relative to the control condition, we conducted an analysis of variance with condition and self-injury group as factors. Consistent with the results previously reported for trait self-compassion, state self-compassion was significantly predicted by self-injury group, F (1, 60) $= -6.69$, $p = .012$, $d = -0.66$, in that participants with a history of self-injury reported lower state self-compassion, M (SD) $= 3.08$ (0.89), than participants without such a history, M (SD) $= 3.60$ (0.84). Importantly, the main effect of condition was also statistically significant, F (1, 60) $= 8.84$, $p = .004$, $d = 0.71$. Participants in the values affirmation condition had significantly higher state self-compassion scores post-manipulation. M (SD) $= 3.64$ (0.81), than participants in the neutral control condition, M (SD) $= 3.04$ (0.89). No significant condition × self-injury group interaction was present, F (1, 60) $= 1.83$, $p = .18$. Although the direction of differences in cell means is consistent with previous research suggesting that the values affirmation task may produce the greatest gains in state self-compassion among individuals who are low in trait self-compassion (Lindsay and Creswell 2014, Study 2), the values-affirmation condition was characterized by higher state self-compassion than the control condition, both among participants with a history of self-injury, M (SD) $= 3.52$ (0.70) versus M (SD) $= 2.64$ (0.85), and among participants with no history of self-injury, M (SD) $= 3.77$ (0.92) versus M (SD) $= 3.44$ (0.75).[3]

Although definitively demonstrating a within-person change in state self-compassion would have required

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[3] Compassion is a complex but positive state, so it is not surprising that the words used to assess it overlap with positive feelings. Nevertheless, because one item in our state self-compassion scale ('joyful') stands out from the others for its connotations of pleasure, we conducted supplementary analyses to evaluate the role that this item played in the previous results. First, we repeated our analyses of state self-compassion while omitting the 'joyful' item, and found the same significant effect of condition, $F(1, 60) = 6.33$, $p = .015$, $d = 0.63$. Then, we added 'joyful' as a covariate, and found that the effect of condition was no longer significant, $F(1, 59) = 0.19$, $p = .667$, $d = 0.11$. These analyses suggest that the values-affirmation manipulation had a significant effect on state self-compassion even when no words reflecting simple positive affect were included in our state self-compassion scale. Nevertheless, state self-compassion after the manipulation was clearly associated with pleasurable feelings, and we are unable to demonstrate that effects on self-compassion occurred independent of effects on these feelings.

measuring it at baseline as well as after the manipulation, we found the same significant effect of condition when we repeated our analysis controlling for baseline trait self-compassion as a proxy for baseline state-self-compassion, F (1, 59) $= 9.14$, $p = .004$, $d = 0.76$.

Pain Variables

We conducted analyses for each of the pain variables in order to determine if those who completed the values-affirming writing task showed less insensitivity to pain than those who completed the neutral control task. We also included self-injury group as a factor in these analyses because we expected the effects of the manipulation on pain responses to be stronger for those with a history of self-injury than for those without. Hence, each analysis was a 2 (condition) × 2 (self-injury group) analysis of covariance with water temperature and state mood as covariates. The adjusted cell means, standard errors, and 95% confidence intervals resulting from these analyses are presented in Table 1.

There were no statistically significant main effects of self-injury group or condition for any of these analyses. However, significant interaction effects emerged as expected, and were further examined with planned contrasts of adjusted marginal means focusing on the prediction that values affirmation would reduce elevated pain insensitivity in the self-injury group. As described below, these contrasts used the mean square error from the omnibus analysis (in order to yield more stable estimates than would be obtained with piecemeal analyses). All tests of statistical significance were two-tailed.

Initial Pain Intensity

The analysis of participants' ratings of initial pain intensity (at threshold) revealed a significant interaction between condition and self-injury group, F (1, 58) $= 4.38$, $p = .04$, $\eta_p^2 = 0.07$. Contrasts to examine the effect of condition ($MSE = 1.80$) showed that among participants with a history of self-injury, those in the values affirmation condition perceived their initial pain as significantly more intense than did those in the neutral control condition, t (28) $= 2.34$, $p = .03$, $d = 0.79$, whereas the effect of condition was not significant for participants with no history of self-injury, t (28) $= -0.74$, $p = .47$, $d = -0.26$. In the control condition, participants with a history of self-injury rated their initial pain as significantly less intense than participants without such a history, t (28) $= -2.76$, $p = .01$, $d = -0.94$, but the values affirmation condition raised initial pain perception in the self-injury group, making it not significantly different from the pain levels reported in the no-self-injury group, t (28) $= 0.32$, $p = .75$, $d = 0.11$.

Table 1 Means, standard errors, and 95% confidence intervals for pain variables as a function of condition and group, adjusting for temperature and state mood

Condition	Self-injury		No self-injury	
	M (SE)	[95% CI]	M (SE)	[95% CI]
Initial pain intensity				
Values affirmation	3.75 (0.34)	[3.08, 4.43]	3.60 (0.34)	[2.92, 4.28]
Neutral control	2.64 (0.36)	[1.92, 3.36]	3.95 (0.34)	[3.26, 4.63]
Final pain intensity				
Values affirmation	6.84 (0.38)	[6.09, 7.59]	6.26 (0.38)	[5.51, 7.02]
Neutral control	5.39 (0.40)	[4.59, 6.19]	6.51 (0.38)	[5.74, 7.27]
Pain threshold				
Values affirmation	14.53 (2.99)	[8.55, 20.50]	16.57 (3.02)	[10.53, 22.61]
Neutral control	19.07 (3.18)	[12.70, 25.44]	21.46 (3.05)	[15.35, 27.58]
Pain endurance				
Values affirmation	25.60 (6.87)	[11.85, 39.35]	37.99 (6.94)	[24.11, 51.88]
Neutral control	55.21 (7.33)	[40.55, 69.88]	32.70 (7.02)	[18.65, 46.76]

Final Pain Intensity

Ratings of pain intensity at the moment the participant removed their hand from the ice water were predicted by a significant interaction effect between condition and NSSI group, $F (1, 58) = 4.72$, $p = .03$, $\eta_p^2 = 0.08$. Comparisons to examine the effect of condition ($MSE = 2.23$) showed that among participants with a history of self-injury, those in the values affirmation condition rated their pain as significantly more intense than did participants in the control condition, $t (28) = 2.74$, $p = .01$, $d = 0.93$. For participants without a history of self-injury, the effect of condition was not significant, $t (28) = -0.47$, $p = .64$, $d = -0.16$. In the control condition, participants with a history of self-injury rated their final pain levels as significantly less intense than participants without such a history, $t (28) = -2.12$, $p = .04$, $d = -0.72$. In contrast, the values affirmation condition increased these pain intensity ratings among participants in the self-injury group, such that they were not significantly different from the pain intensity reported by their peers with no history of self-injury, $t (28) = 1.10$, $p = .28$, $d = 0.38$.

Pain Threshold

The analysis with pain threshold (the latency of pain onset) as the dependent variable showed no interaction between condition and self-injury history, $F (1, 58) = 0.003$, $p = .96$, $\eta_p^2 = 0.00$, and no main effects of these variables.

Pain Endurance

Defined as the amount of time participants were willing/able to experience pain, an index of *pain endurance* was computed by subtracting pain threshold time from the total time that participants kept their hand submerged

(as recommended by Hooley et al. 2010; see also; Glenn et al. 2014; Hooley and Germain 2014; Pavony and Lenzenweger 2014; Germain and Hooley 2013). A significant interaction between condition and self-injury group, $F (1, 58) = 6.03$, $p = .02$, $\eta_p^2 = 0.09$, was examined with t tests (with $MSE = 750.48$). Condition had a large effect in the self-injury group, with the values affirmation task significantly reducing pain endurance, $t (28) = -3.05$, $p = .005$, $d = -1.04$, whereas no such effect of condition was present in participants with no history of self-injury, $t (28) = 0.54$, $p = .59$, $d = 0.19$. In the control condition, participants with a history of self-injury showed significantly greater pain endurance than their peers with no such history, $t (28) = 2.32$, $p = .03$, $d = 0.78$, whereas in the values-affirmation condition, comparison of these groups revealed no significant difference in pain endurance, $t (28) = 1.28$, $p = .21$, $d = -0.45$.

Pain and State Self-Compassion

Correlations among the pain variables are presented in Table 2. In both groups (with and without a history of self-injury), the two intensity ratings were inter-correlated. Correlations between intensity ratings and pain endurance also emerged among participants with a history of self-injury. Pain threshold was not significantly related to intensity or endurance in either group.

Correlations between pain variables and state self-compassion are also shown in Table 2. Among participants with a history of self-injury, higher state self-compassion was associated with higher ratings of pain intensity, but not with either of the timed measures of threshold or endurance. State self-compassion was not significantly related to any pain variables among participants with no history of self-injury.

Table 2 Correlations among post-manipulation measures by group

	1	2	3	4
Self-injury				
1. Initial pain intensity	–			
2. Final pain intensity	0.65***	–		
3. Pain threshold	−0.14	−0.16	–	
4. Pain endurance	−0.46*	−0.50**	0.35	–
5. State self-compassion	0.46**	0.36*	−0.07	−0.15
No self-injury				
1. Initial pain intensity	–			
2. Final pain intensity	0.52**	–		
3. Pain threshold	0.28	0.07	–	
4. Pain endurance	−0.08	0.22	0.18	–
5. State self-compassion	−0.02	−0.23	−0.09	−0.10

*$p < .05$, **$p < .01$, ***$p < .001$

Discussion

As predicted, participants with a history of self-injury reported lower trait self-compassion than those without such a history, and the values-affirming writing task led to significantly higher state self-compassion relative to the control condition. Moreover, participants with a history of self-injury demonstrated significant reductions in pain insensitivity (increased intensity of pain perception and decreased pain endurance) in the values-affirmation condition than in the control condition, and their intensity ratings of perceived pain were positively correlated with their state self-compassion.

For the three pain variables that showed significant interactions between condition and self-injury group (initial intensity, final intensity, and pain endurance), the pattern of means was such that individuals with a history of self-injury in the neutral control condition showed elevated pain insensitivity relative to the other three cells. By contrast, in the values affirmation condition, these pain variables were not significantly different on the basis of self-injury history. These results suggest that values affirmation helped correct the elevated pain insensitivity that is typically found in those who self-harm. Interestingly, whereas pain intensity ratings were associated with state self-compassion (in the self-injury group), pain endurance was not. Perhaps this is because intensity ratings are more similar to state self-compassion in that they involve deliberate self-assessment and verbalization of an inner experience, rather than being a strictly behavioral measure.

While intensity ratings and the endurance variable showed the predicted results, pain threshold did not show any significant differences as a function of self-injury or condition. Several previous studies have been similarly unable to detect differences in pain threshold (McCoy et al.

2010; Hooley and Germain, 2014; Hamza et al. 2014), and others have been unable to detect differences in intensity ratings at threshold (Franklin et al. 2011, 2012; Hamza et al. 2014), while the reasons for such between-study variability in results remain unknown. Our study adds to accumulating evidence that the later round of measurements taken in pain-induction studies of people who self-injure may be more robust than the initial/threshold ones.

Limitations and Future Directions

Our small sample size limits the conclusiveness of our study because of its impact on statistical power. Low power reduces our ability to detect true effects, so it is quite possible that nonsignificant effects (such as the interaction between group and condition predicting state self-compassion) may not actually be absent. Studies with low power also increase the frequency of spurious results and inflated effect sizes in the literature. The promising results we observed in this small study require further investigation in a larger sample.

Participants were college students and results may not be generalizable to clinical or population samples of individuals who self-harm. Moreover, our small sample was low in racial/ethnic diversity, and restricted to women. Girls and women have lower self-compassion, on average, than their male counterparts (Neff 2003; Neff and McGehee 2010) and they more readily enroll in intervention programs to increase self-compassion (Neff and Germer 2013). It therefore makes sense that research has mainly focused on female self-compassion, but as a consequence much less is known about self-compassion in males. Likewise, much of the existing research on NSSI has only focused on females, and this is especially unfortunate because NSSI is nevertheless common in males, and manifests in sex-specific ways (Whitlock et al. 2011).

There are also potential limitations to the generalizability of our measures of pain during the cold pressor task to pain experienced during real acts of self-injury. First, because self-injury usually occurs under intense emotional stress rather than routine laboratory conditions, some researchers administer a stressful task prior to assessing pain in the lab (e.g., Gratz et al. 2011; Hamza et al. 2014). Even if there may be some benefit to not restricting investigations of pain in individuals who self-injure to conditions of high emotional stress, concerns about the external validity of our procedures are certainly worthy of further consideration. Another issue is how best to simulate the type of pain experienced during self-injury in a laboratory. Studies using the cold pressor task to assess responses to pain in NSSI have employed a range of temperatures, from 1° to 4° (Franklin et al. 2012; Hamza et al. 2014) to 10° (Bohus et al. 2000). The temperature that we employed, 6°–8°, fell

somewhere in between. It has been argued that the quicker and more immediate pain induced by colder temperatures would be more comparable to the pain experienced during self-injury (Franklin et al. 2012), and to the extent that this is true, our use of a warmer temperature may be another potential limitation for the external validity of our study.

Our use of a relatively broad screening question to identify participants with a history of self-injury is another limitation of our study. Because our screening question did not rule out individuals who had stopped engaging in self-injury years ago, or whose repeated self-injurious behaviors had always involved suicidal intent, between-group differences in our study are likely to be smaller than they would be if we had used a more strictly defined sample of individuals with current NSSI based on the proposed criteria in the DSM-5 (American Psychiatric Association 2013). Beyond this, future research should obtain more detailed information about the current frequency, methods, and motives for self-harm, as well as information about trauma history, psychiatric diagnoses, and mental health treatment.

Finally, more extensive studies would be necessary to answer questions about the specific mechanisms of the effects we observed. While a temporary increase in self-compassion may make sense as an explanation for the effect of values-affirmation on responses to pain among people who self-harm, the present study does not provide conclusive evidence for it. Future research should aim to clarify whether the effect of values-affirmation on responses to pain was mediated by increases in self-compassion (rather than changes in related or co-occurring phenomena) and if so, what aspects of self-compassion are most relevant. We did find that values-affirmation increased state self-compassion relative to the control condition, and that within the self-injury group, state self-compassion was positively correlated with pain intensity ratings. However, the measure that we used to assess effects on self-compassion in the present study is relatively indirect and incomplete. Demonstrating a within-person change in state self-compassion would have required measuring it at baseline as well as after the manipulation. Moreover, the self-compassionate mood states assessed in this study did not fully capture the construct of self-compassion nor did they allow us to distinguish whether particular aspects of the self-compassion construct (such as reductions in self-criticism, perceived isolation, or rumination) are more associated with pain insensitivity than others. Finally, because we did not administer any other questionnaires, we cannot rule out the possibility that the effect of the manipulation on pain tolerance may have an alternative explanation, such as general improvements in mood, improvements in self-worth, or a reduction in dissociation. However, we do not believe that positive mood is a likely explanation,

as a previous study by Hooley and St. Germain (2014) found that positive mood induction did not have a significant effect on pain endurance. Given that the construct of self-compassion overlaps with several inter-related constructs, including maladaptive perfectionism, self-criticism, and shame, it will be important for future studies to further examine the specific roles these constructs play in responses to pain.

Concluding Comments

Though the brief effects observed in our small study are certainly not the basis for recommending interventions, our results indicate the potential clinical utility of additional research on this topic. The results of the current study are consistent with the results of the study conducted by Hooley and St. Germain (2014) in indicating that interventions aimed at decreasing negative feelings about the self may reduce willingness/ability to endure pain. Our study further extends this previous work, by suggesting that interventions focusing on personal values and/or self-compassion (e.g., Gilbert 2009; Johnson and O'Brien 2013; Smeets et al. 2014; Van Vliet and Kalnins 2011) may similarly help reduce the unusually high pain insensitivity characteristic of individuals who self-injure.

Compliance with Ethical Standards

Conflict of Interest Wesley Ellen Gregory, Jillian V. Glazer, and Kathy R. Berenson declare that they have no conflict of interest.

Informed Consent All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

Animal Studies No animal studies were carried out by the authors for this article.

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