

# The functions of self-injury in young adults who cut themselves: Clarifying the evidence for affect-regulation

E. David Klonsky\*

*Department of Psychology, Stony Brook University, Stony Brook, NY 11794-2500, United States*

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## Abstract

The functions of non-suicidal self-injury were examined in 39 young adults with a history of skin-cutting and other self-injurious behaviors including banging, burning, and severe scratching. Consequences, affect-states, and reasons associated with self-injury were assessed by a structured interview. Results indicate that self-injury is associated with improvements in affective valence and decreases in affective arousal. Specifically, participants tended to feel overwhelmed, sad, and frustrated before self-injury, and relieved and calm after self-injury. Further, these affective changes predict lifetime frequency of self-injury, suggesting that they reinforce the behavior. Finally, although reasons for self-injury related to both affect-regulation (e.g., to release emotional pressure that builds up inside of me) and self-punishment (e.g., to express anger at myself) were endorsed by a majority of participants, affect-regulation reasons were overwhelmingly rated as primary and self-punishment reasons as secondary.

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## 1. Introduction

Non-suicidal self-injury (henceforth *self-injury*) can be defined as intentional, direct damage to one's body tissue without suicidal intent (Herpertz, 1995; Muehlenkamp, 2005). Other terms that have been used to reference this behavior include *deliberate self-harm* (Pattison and Kahan, 1983), *superficial-moderate self-mutilation* (Favazza and Rosenthal, 1993), *self-wounding* (Tantam and Whittaker, 1992), and *parasuicide* (Ogundipe, 1999). Common forms of self-injury include

skin-cutting, scratching, burning, and self-banging or hitting (Briere and Gil, 1998; Favazza and Conterio, 1989; Herpertz, 1995; Nijman et al., 1999; Whitlock et al., 2006). Mental health professionals have long been concerned with self-injury because of the behavior's robust association with psychopathology and suicide (Skegg, 2005). Some argue that self-injury should constitute its own diagnostic syndrome in light of the behavior's clinical significance and presence across multiple disorders (Muehlenkamp, 2005).

Self-injury can be found in patients diagnosed with mood, anxiety, substance abuse and dependence, eating, and psychotic disorders, as well as each of the personality disorders, and especially borderline personality disorder (Haw et al., 2001; Herpertz et al., 1997;

\* Tel.: +1 631 632 7801; fax: +1 631 632 7876.

E-mail address: [E.David.Klonsky@stonybrook.edu](mailto:E.David.Klonsky@stonybrook.edu).

Simeon et al., 1992; Skegg, 2005; Stanley et al., 2001; van der Kolk et al., 1991; Zlotnick et al., 1999). Although self-injury is relatively common in clinical settings (Favazza, 1989; Suyemoto and MacDonald, 1995), it can also be found in non-patient populations. Approximately 4% of individuals from large community samples report a history of self-injury (Briere and Gil, 1998; Klonsky et al., 2003). Lifetime rates appear to be particularly high in adolescents and young adults, where approximately 15–17% report a history of self-injury (Laye-Gindhu and Schonert-Reichl, 2005; Whitlock et al., 2006).

Unfortunately, treatment of self-injury can be challenging (Muehlenkamp, 2006). Increasing our understanding of why people self-injure could improve treatment for these individuals. To date, studies have provided evidence for several functions of self-injury, including that self-injury is a means of regulating negative affect, punishing oneself, influence others, halting dissociative episodes, resisting urges to attempt suicide, and sensation-seeking (Briere and Gil, 1998; Brown et al., 2002; Coid, 1993; Herpertz, 1995; Kemperman et al., 1997; Nock and Prinstein, 2004; Shearer, 1994). A recent review of this literature suggests that evidence most consistently supports an affect-regulation model of self-injury (Klonsky, 2007). Specifically, three types of evidence support an affect-regulation function: (a) most participants who self-injure report that they do so to reduce negative affect; (b) self-report and laboratory studies suggest that negative affect precedes self-injury and that affect improves following self-injury; and (c) proxies for self-injury performed in laboratory settings cause reductions in negative affect. The review went on to outline several areas in need of further study (Klonsky, 2007).

First, although research documents that significant improvements in affect follow self-injury (Briere and Gil, 1998; Kemperman et al., 1997), the nature of these affective changes is unclear. At least two dimensions underlie affective experience, valence and arousal (Feldman, 1995; Russell, 1991). However, research has not determined whether the affective changes associated with self-injury involve changes in valence, arousal, or both. Valence refers to the pleasantness of emotion (e.g., ‘happy’ is pleasant and positive, ‘sad’ is unpleasant and negative), whereas arousal refers to the intensity of emotion (e.g., ‘excited’ is high arousal and ‘calm’ is low arousal even though both are pleasant; likewise, ‘anxious’ is high arousal and ‘hopeless’ is low arousal even though both are unpleasant).

Second, research has not specified the affect-states that are most associated with self-injury. For example, do people feel less lonely following self-injury? Less

empty? More exhilarated? More calm? Each of these outcomes is consistent with prior research indicating that affect improves following self-injury, but each would have different theoretical and clinical implications.

Third, it is not clear that the improvements in affect associated with self-injury can be conceptualized as providing motivation or reinforcement. For example, research has not addressed whether larger improvements in affect are associated with increased frequency of self-injury. An affect-regulation model of self-injury requires evidence that the affective improvements subsequent to self-injury encourage or reinforce the behavior.

Finally, it is unclear how to reconcile evidence for multiple functions. Although different functions may co-occur or overlap conceptually, some functions may be more common or fundamental than others. For example, in multiple studies reasons related to regulating affect and punishing oneself are endorsed more often than other reasons (Briere and Gil, 1998; Brown et al., 2002; Favazza and Conterio, 1989; Shearer, 1994). Other studies confirm that most individuals endorse reasons related to affect-regulation but find that self-punishment reasons are endorsed by a minority of participants (Herpertz, 1995; Nock and Prinstein, 2004). It would be useful to determine if affect-regulation reasons are indeed more fundamental than self-punishment reasons or if both types of reasons are equally prominent. Distinguishing primary and secondary reasons would inform case conceptualization and treatment planning in clinical settings, and provide a meaningful context for the design of future studies on the etiology, course, and treatment of self-injury.

The present study was conceived to address the gaps in the self-injury literature described above. Thirty-nine young adults with histories of repeated self-injury were administered a structured interview that assessed consequences, affect-states, and reasons associated with self-injury. The interview was designed to measure the affective experience of self-injury more comprehensively than previous studies and to allow participants to distinguish between more and less important reasons for self-injury.

## 2. Method

### 2.1. Participants

Participants were 39 young adults who screened positive for repeated self-injury and completed an interview about their self-injury. To ensure a clinically relevant sample, a conservative threshold was used to recruit participants. To be included in the study,

participants had to report a minimum of five instances of non-suicidal skin-cutting both on a screening measure and at a subsequent interview. For two reasons utilizing repeated skin-cutting as a minimal requirement for study inclusion ensures a clinically relevant sample. First, in clinical settings, skin-cutting is the most common form of self-injury found in between 70 and 97% of self-injurers (Briere and Gil, 1998; Favazza and Conterio, 1989; Herpertz, 1995; Langbehn and Pfohl, 1993; Nijman et al., 1999; Wilkins and Coid, 1991). Second, skin-cutting has stronger relations to psychopathology than other self-injurious behaviors (Andover et al., 2005). Although skin-cutting was used as a selection criterion, more than 90% of participants engaged in other forms of self-injury in addition to skin-cutting, such as banging body parts, severe scratching, and burning, and each of these behaviors were assessed in and of interest to the present study.

## 2.2. Procedure

Over the course of two academic years, 2776 undergraduates in lower-level psychology courses completed screening measures for course credit. A question included for the purposes of the present study assessed a history of deliberate but non-suicidal skin-cutting using the following item: “About how many times in your life have you intentionally (i.e., on purpose) cut your wrist, arms, or other areas of your body (e.g., with a knife, scissors, razor blade, etc) even though you weren’t trying to commit suicide?” Fifty-three individuals who indicated a history of five or more instances of skin-cutting and who had not yet fulfilled their research participation requirement (or alternative assignment) were sent an email inviting them to participate in a study on self-injury in exchange for course credit or \$15. Forty-eight agreed to participate. At the interview, nine of the 48 individuals denied a history of at least five skin-cutting episodes: five acknowledged fewer than five cutting episodes, two reported misunderstanding directions on the screening measure and reporting accidental instances of cutting, and the remaining two stated that they could not recall how they interpreted or responded to the screening measure.

The full protocol was administered to the remaining 39 participants. All interviews were conducted by the author of the present study. The same items were presented in the same order to all participants. When necessary the interviewer would ask clarifying questions if participants were unsure about the meaning of an item or how to respond to an item. Prior to participation, all participants signed informed consent agreements describ-

ing the study and informing them that participation was voluntary.

## 2.3. Measure

A structured interview was designed by the author to assess the functions of self-injury. The interview assessed the following four domains: (i) history of self-injury; (ii) consequences that occur as a result of self-injury; (iii) affect-states present before and after self-injury; and (iv) reasons for self-injury. The initial section assessed 12 self-injurious behaviors. Participants were instructed only to endorse behaviors that were “performed with the intent of causing physical harm to yourself without suicidal intent.” The behaviors assessed were: banging, biting, burning, cutting, hair-pulling, hitting oneself, interfering with wound healing, needle sticking, pinching/picking, rubbing skin against rough surfaces, severe scratching, and swallowing dangerous chemicals.

For section ii, participants were read a list of consequences “that may occur after you engage in a self-harm behavior.” After each consequence was read, participants rated its frequency using a 5-point never, rarely, sometimes, usually, always scale, and then rated whether they experienced the consequence as positive, negative, or neutral. For section iii, participants were read a list of “feelings and emotions,” and asked to rate “how often you experience the emotion before, during, and after self-harming using the same never, rarely, sometimes, usually, always scale as before [during section ii]”. For section iv, participants were read a list of potential reasons for self-injury and asked “to do your best to identify which ones apply to you”. Specifically, participants utilized a three-point scale to identify each reason as primary, secondary, or not relevant. The 48 consequences, 40 affect-states, and 37 reasons evaluated by the interview are listed in the Appendix.

Items included in the last three sections of the interview were written to elucidate the experience and functions of self-injury. Many of the items relate to functional theories described in the psychological literature, including affect-regulation, self-punishment, interpersonal-influence, anti-suicide, sensation-seeking, and anti-dissociation functions. For example, the consequence “I calm down,” the affect-state “relaxed,” and the reason “to release emotional pressure” were written to evaluate whether people self-injure to regulate affect. Similarly, the consequence “I feel more real,” the affect-state “unreal,” and the reason “to feel real” were written to assess whether participants self-

injure to halt episodes of depersonalization or dissociation. Most interview items were taken from previous studies on self-injury (e.g., Briere and Gil, 1998), or based on material from Internet websites created for or by self-injurers. Other items were created specifically for this study. To the knowledge of the author, the structured interview developed for this study to assess functions of self-injury is at least as comprehensive or more comprehensive than measures used in previous studies, both in terms of the types of information assessed (i.e., consequences, reasons, and affect-states) and the variety of functions assessed (i.e., affect-regulation, self-punishment, interpersonal-influence, anti-suicide, sensation-seeking, and anti-dissociation).

### 3. Results

#### 3.1. Participant demographics and treatment history

Participants were 77% female, 92% Caucasian, 5% African American, and 3% Hispanic. Mean age of the sample was 19.4 years (S.D.=2.4). Sixty-four percent reported having received some form of mental health treatment: 59% had participated in outpatient counseling, 38% had taken psychiatric medication, and 13% had spent time in an inpatient psychiatric hospital. Whether or not participants had received mental health treatment was not related to the number of self-injury methods used ( $t=0.83$ ,  $P=0.41$ ) or the number of instances of skin-cutting ( $t=1.65$ ,  $P=0.11$ ).

#### 3.2. History of self-injury

Participants cut themselves a mean of 17.2 times (S.D.=13.2) according to self-reported estimates. Most instances of cutting causes superficial tissue damage; only two participants inflicted enough tissue damage via cutting to require professional medical attention. Just over 92% of participants had performed additional self-injurious behaviors as well, including banging body parts against something (51%), severe scratching (46%), burning (38%), sticking sharp objects into skin (28%), interfering with wound healing (26%), severe skin picking or pinching (23%), biting (21%), hitting (13%), and rubbing skin against rough surfaces (3%). The mean number of methods of self-injury was 3.8 (S.D.=2.1). Mean age of onset of skin-cutting was 14.1 (S.D.=2.1), and mean duration was 3.5 years (S.D.=2.5). Seventy-two percent of participants indicated that they had self-injured within the past year.

#### 3.3. Consequences of and reasons for self-injury

Participants rated how often each of 48 consequences occurred as a result of self-injury. Each consequence could be rated as occurring “always,” “usually,” “sometimes,” “rarely,” or “never.” Table 1 presents the consequences that participants identified as occurring most frequently. The two most common consequences of self-injury were physical. These consequences, “I experience physical pain” and “marks are left on my skin,” had median ratings of “usually.” The only other two consequences with median ratings of “usually” were: “I feel more in control of myself” and “I calm down.” The next most frequent consequences were, “I feel better,” “I experience an adrenaline rush,” “anxiety is reduced,” and “my stress level decreases.” Descriptive statistics for all 48 consequences are presented in Supplementary Table 1.

Participants also identified reasons for self-injury from a list of 37 possible reasons. Each reason could be rated as “not relevant,” “secondary,” or “primary.” More than one reason could be rated as primary. Table 1 presents the reasons identified as primary by more than half of the participants. The most common reason, “to release emotional pressure that builds up inside of me,” was endorsed as primary by 85% of participants. The next most common reasons were “to control how I am feeling” and “to get rid of intolerable emotions.” Reasons related to self-punishment were also endorsed frequently, although they were most often rated as secondary reasons. For example, 69% of participants endorsed the reason “to express anger at myself,” but only 15% of participants rated this reason

Table 1  
Consequences of and reasons for self-injury endorsed by a majority of participants.

Item	% Endorsed <sup>a</sup>
<i>Consequences</i>	
I experience physical pain	85
Marks are left on my skin	74
I feel more in control of myself	59
I calm down	51
<i>Reasons</i>	
To release emotional pressure that builds up inside of me	85
To control how I am feeling	59
To get rid of intolerable emotions	56
To produce a pain that I can control	54

<sup>a</sup> These figures indicate the percentage of participants who rated each consequence as occurring either “usually” or “always”, and the percentage of participants who rated each reason as being “primary”. Participants were allowed to rate multiple reasons as “primary”. Consequences and reasons that are not included in this table were endorsed by less than 50% of participants.

as primary compared to 54% who rated it as secondary. Sensation-seeking, anti-dissociation, interpersonal-influence, and anti-suicide reasons were endorsed as primary by fewer participants, including “to feel exhilarated” (endorsed by 21% of participants as primary), “to feel real” (18%), “to let others know what I’m going through” (5%), and “to avoid the impulse to attempt suicide” (5%). Descriptive statistics for all 37 reasons are presented in Supplementary Table 2.

### 3.4. *Affect before and after self-injury*

Participants rated each of 40 affect-states for how often they occurred before and after self-injury using a five-point scale: 1 — Never, 2 — Rarely, 3 — Sometimes, 4 — Usually, 5 — Always. Table 2 lists the affect-states that most frequently occurred before and after self-injury. Before self-injury, the most common affect-states were “overwhelmed,” “sad,” “hurt emotionally,” “frustrated,” and “anxious.” After self-injury, the most common affect-states were “relieved,” “angry at self,” and “calm.” Rates of endorsement for all 40 affect-states before and after self-injury are presented in Supplementary Table 3.

To examine change in affect from before to after self-injury, “After” ratings were subtracted from “Before” ratings to yield change scores. Table 3 presents the affect-states that exhibited the most change from before to after self-injury, as well as correlations between changes in affect and lifetime frequency of skin-cutting. The affect-

Table 2  
Most common affect-states before and after self-injury.

Affect-state	Before		After	
	% <sup>a</sup>	Median <sup>b</sup>	Affect-state	% <sup>a</sup> Median <sup>b</sup>
Overwhelmed	85	Usually	Relieved	77 Sometimes
Sad	82	Usually	Angry at self	77 Sometimes
Hurt emotionally	82	Usually	Calm	72 Sometimes
Frustrated	80	Usually	Hurt emotionally	66 Sometimes
Anxious	77	Usually	Lonely	64 Sometimes
Lonely	74	Sometimes	Sad	64 Sometimes
Angry at self	72	Sometimes	Isolated	62 Sometimes
Empty inside	69	Sometimes	Ashamed	59 Sometimes
Isolated	67	Sometimes	Relaxed	59 Sometimes
Hopeless	63	Sometimes	Guilty	59 Sometimes

<sup>a</sup> Indicates the percentage of participants who rated the affect-state as occurring at least sometimes (i.e., sometimes, usually, or always).

<sup>b</sup> Indicates the median of participants’ ratings for how often the affect-state occurred before and after self-injury on a five-point scale: 1 (never), 2 (rarely), 3 (sometimes), 4 (usually), and 5 (always).

Table 3  
Changes in affect from before to after self-injury.

Type of affect	Cohen’s <i>d</i> <sup>a</sup>	Correlation with frequency of skin-cutting <sup>b</sup>
<i>Individual affect-states showing greatest change</i>		
Relieved	2.25	0.31
Calm	1.39	0.10
Satisfied	1.24	0.47
Relaxed	1.21	0.33
Overwhelmed	−0.89	−0.39
<i>Changes in affect-states</i>		
Grouped by valence and arousal <sup>c</sup>		
Negative valence, high arousal	−0.36	−0.43
Negative valence, low arousal	−0.19	−0.21
Positive valence, high arousal	0.55	0.07
Positive valence, low arousal	1.92	0.40

<sup>a</sup> Cohen’s *d* values indicate the magnitude of change in affect-states from before to after self-injury. Negative values indicate that the affect-state decreased from before to after self-injury. All Cohen’s *d* values in this table are statistically significant at an alpha level of 0.001, except for the value of −0.19 which has a *P*-value of 0.02. Cohen’s *d* values above 0.8 are generally considered large, between 0.2 and 0.8 moderate, and below 0.2 small.

<sup>b</sup> Correlations were computed between changes in affect and lifetime number of skin-cutting episodes. The number of lifetime cutting episodes was rank-transformed for these calculations because this variable was not distributed normally. Correlations of 0.31 and 0.40 were statistically significant at alpha levels of 0.05 and 0.01, respectively.

states “relieved,” “calm,” “satisfied,” and “relaxed,” demonstrated the most substantial increases from before to after self-injury, whereas “overwhelmed” exhibited the largest decrease following self-injury. Changes in each of these affect-states, except “calm,” exhibited moderate correlations with lifetime frequency of skin-cutting. Changes in all 40 affect-states from before to after self-injury are presented in Supplementary Table 4.

In addition, affect-states were organized into four mutually exclusive groups on the basis of two dimensions: valence (positive vs. negative) and arousal (higher vs. lower). Thus, the four groups of affect-states analyzed were: 1. *negative valence — high arousal* (e.g., “overwhelmed and frustrated”), 2. *negative valence — low arousal* (e.g., “sad” and “empty inside”), 3. *positive valence — high arousal* (e.g., “excited” and “euphoric”), and 4. *positive valence — low arousal* (e.g., “relieved” and “relaxed”). Each affect-state was independently rated by experts in emotions research (J.A. Coan, G. Hajcak) on two dimensions: valence (positive vs. negative) and arousal (higher vs. lower). Valence and arousal ratings for each affect-state are indicated in the Appendix. Change

scores for the affect-states assigned to each valence-arousal group were summed to produce a single change score for each group. As indicated in Table 3, affect-states from the *positive valence — low arousal* group demonstrated the largest changes, increasing substantially from before to after self-injury. These increases, along with decreases in *negative valence — high arousal* affect-states, most strongly predicted lifetime frequency of skin-cutting.

#### 4. Discussion

Consistent with previous research (Klonsky, 2007), converging evidence suggests that self-injury functioned to regulate affect for the majority of participants. Nearly all participants indicated that they self-injured with the primary intent of alleviating negative affect. Moreover, retrospective reports about consequences and affect-states indicated that self-injury was often, although not always, associated with marked improvements in affect. Non-affect-regulation motivations were also apparent, such as the intent to punish oneself and the desire to influence others, but results suggested that these motivations were relevant for fewer participants and, when relevant, were most often considered to be secondary reasons.

Three aspects of the present study help address gaps in the self-injury literature. First, affective experience was assessed in sufficient detail so that changes in both affective valence and arousal could be measured. Previous studies measuring the affective experience of self-injurers offered important contributions to the literature but did not take the extra step to examine arousal in addition to valence (e.g., Briere and Gil, 1998). Laboratory studies had linked self-injury proxies to arousal reduction but not actual self-injury (Haines et al., 1995; Russ et al., 1992). The present study found substantial changes in both affective valence and arousal from before to after self-injury. High arousal negative affect-states decreased (e.g., overwhelmed), and low arousal positive affect-states increased (e.g., calm, relaxed, relieved). Notably, Watson and Tellegen's two-dimensional model of affect (Watson and Tellegen, 1985; Watson et al., 1999) views affect-states such as calm, relaxed, and relieved as reflecting low negative affect rather than high positive affect. From this perspective, results suggest that self-injury is predominantly associated with reductions in negative affect as opposed to increases in positive affect, and thus likely to be a negatively rather than positively reinforced behavior.

Second, the present study helps clarify whether the affective changes observed to follow self-injury help motivate and encourage the behavior, a step not taken in previously published studies. It was found that the re-

ductions in negative valence and arousal predicted lifetime frequency of skin-cutting. In other words, participants who experienced the greatest affective benefits were the ones who had most often cut themselves. These data indicate that the affective changes associated with self-injury may provide reinforcement and increase the chances that the behavior will be repeated. Moreover, findings suggest that self-injury may be primarily motivated by a desire to alleviate high arousal negative affect-states, such as frustrated, overwhelmed, and anxious, as opposed to lower arousal negative affect-states, such as sad, lonely, and empty inside.

Finally, the present study helps reconcile evidence for affect-regulation and self-punishment reasons for self-injury. Several studies have reported that a majority of participants endorsed both affect-regulation and self-punishment reasons (Briere and Gil, 1998; Brown et al., 2002; Shearer, 1994). Likewise, in the present study, these two types of reasons were endorsed by a majority of participants. However, these same participants overwhelmingly considered affect-regulation reasons primary and self-punishment reasons secondary. The dichotomous measurement scales used in previous studies did not assess this possibility. Results help explain why some previous studies found heavy endorsement of self-punishment reasons (Briere and Gil, 1998; Brown et al., 2002; Shearer, 1994) whereas others found that self-punishment reasons were endorsed by a minority of participants (Herpertz, 1995; Nock and Prinstein, 2004). Future studies should utilize ordinal or dimensional scales for measuring reasons. Allowing participants to distinguish between more and less important reasons will help clarify the relative pervasiveness and importance of different motivations for self-injury.

Results of the present study have implications for diagnosis and treatment. First, findings help clarify why self-injury is correlated with borderline personality disorder but not pathognomonic of this or other diagnoses. Findings from both the current study and past research suggest that self-injury is most often performed to cope with acute negative affect. Because high negative affect is a feature of numerous disorders, it follows that self-injury can be found in a variety of psychiatric disorders, including personality, mood, anxiety, eating, psychotic, and substance disorders (Haw et al., 2001; Skegg, 2005; Zlotnick et al., 1999). At the same time, because affective lability and dysregulation are central features of borderline personality disorder, it follows that self-injury disproportionately occurs in this disorder.

A second implication of findings is that therapists should assess the functions of their patients' self-injury and

use the results to inform case conceptualization and treatment planning. Many clinicians emphasize interpersonal-influence or attention-seeking motivations (Bancroft and Hawton, 1983; Gough and Hawkins, 2000) despite mounting evidence that these motivations occur less frequently than others. For most self-injurers, it appears that self-injury is usually performed to cope with acute negative affect and arousal. For these patients treatment should seek to reduce negative affect and foster the development of alternative strategies for affect-regulation. For example, dialectical behavior therapy (DBT) was designed in part to improve skills for regulating intense and labile emotions, and has been shown to reduce self-injury (Linehan, 1993). Supplementary interventions that specifically help patients manage negative affective arousal, such as relaxation training and progressive muscle relaxation, may also help patients avoid self-injury.

Limitations of this study should be addressed in future research. One limitation is a reliance on retrospective, self-reports. Participants' recollections could have been incomplete or inaccurate. Moreover, it can be difficult for people to accurately describe their mental processes (Nisbett and Wilson, 1977). For example, in some cases when self-injury serves a particular function (e.g., self-punishment), awareness of this function may be limited. Confidence in the validity of results from the present study can be somewhat higher because participants were asked separately about consequences, affect-states, and reasons associated with self-injury and responses to these different sets of questions produced a coherent pattern. Nevertheless, future studies should utilize ecological momentary assessment techniques that obtain real-time data and informant and laboratory investigations that provide alternatives to self-report.

In addition, the design used in the present study does not allow for causal conclusions or explanations. Additional research should strive to establish a causal link between self-injury and subsequent affective changes, and between these affective changes and repetition of self-injury in the future. The possible mechanism by which self-injury improves affect is also of considerable interest. The reductions in arousal documented in the present study may suggest a physiological mechanism, by which the physiological effects of physical injury inhibit the physiology underlying negative affective arousal. Psychophysiological measurement and experimental designs can be used to examine the influence of self-injury proxies on affect and arousal under various conditions (e.g., Haines et al., 1995; Russ et al., 1992). Such studies could verify that self-injury reduces negative affect, and illuminate possible mechanisms by which self-injury influences affect.

A third limitation is the nature of the study's sample. Because the current study examined self-injury in young adults from a college sample, findings may generalize less to clinical samples with more severe psychopathology. However, for many reasons the study's sample is quite useful for studying self-injury. Research suggests that self-injury occurs disproportionately in college populations (Whitlock et al., 2006), and the study's inclusion criteria ensured that data were obtained only from individuals who had repeatedly engaged in clinically significant forms of self-injury. In addition, many people who self-injure are not in treatment or not yet in treatment. For example, more than a third of participants in the present study reported never having received treatment despite a history of repeated self-injury. A complete understanding of self-injury requires studying the behavior wherever it occurs, including treatment and non-treatment samples.

A fourth limitation is the relatively small sample. Larger samples yield more precise findings and maximize power for achieving statistically significant results. Fortunately, effect-sizes in the present study were large and robust, and there was therefore sufficient power to detect them despite the modest size of the sample.

Finally, it is unfortunate that a standardized instrument that is both empirically valid and comprehensive in its assessment of self-injury functions is not available. Numerous functions have been theorized (Suyemoto, 1998), but instruments used to measure functions in previous studies examine only a few potential functions, do not have established psychometric properties, or contain scales that are difficult to interpret (Klonsky, 2007). An ideal instrument would measure a wide variety of possible functions, contain multiple items for each function, and have psychometric properties and a factor structure that have been examined in large and diverse samples. The development of such a measure would be of great use to clinicians and researchers alike, and would make a worthy aim of future research.

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## Appendix A

Consequences	Reasons	Affect-states <sup>a</sup>
1. I experience an adrenaline rush	1. To express to others how I am feeling	1. <b>Angry (at others)</b>
2. Distracts me from memories	2. To fit in with my peer-group	2. <b>Angry (at self)</b>
3. Marks are left on my skin	3. To let others know what I am going through	3. <b>Sad</b>
4. Family members become concerned for me	4. To cope with/avoid memories of negative childhood experiences	4. <b>Afraid</b>
5. Close friends become concerned for me	5. To release emotional pressure that builds up inside of me	5. <i>Excited</i>
6. People ask about scars on my body	6. To control how I am feeling	6. <i>Happy</i>
7. I feel my emotions more strongly	7. To feel exhilarated	7. <b>Guilty</b> <sup>b</sup>
8. I feel my emotions less strongly	8. To regain focus	8. <b>Lonely</b>
9. I require medical attention	9. To feel real	9. Relieved
10. I am reminded of memories from the past	10. To avoid the impulse to attempt suicide	10. <b>Ashamed</b>
11. Keeps others at a distance	11. To bond with friends	11. <b>Empty inside</b>
12. Brings me closer to others	12. To punish myself	12. <b>Hopeless</b>
13. Sexual arousal increases	13. To diminish feeling empty	13. <i>Hopeful</i>
14. Flashbacks are stopped	14. To show that I am responsible for my well-being	14. <b>Worthless</b>
15. I feel more alive	15. To get reactions out of people	15. <b>Overwhelmed</b>
16. I feel less alive	16. To avoid being isolated	16. <b>Anxious</b>
17. I experience physical pain	17. To distract myself from uncomfortable sexual impulses/fantasies	17. Calm
18. Makes my body less attractive	18. To help control how others treat me	18. <b>Frightened</b>
19. I feel more in control of myself	19. To take care of myself	19. <b>Hurt emotionally</b> <sup>b</sup>
20. Anxiety is reduced	20. To cause physical pain which can be enjoyable or comforting	20. <b>Disgust with body</b> <sup>b</sup>
21. Anxiety increases	21. To get rid of intolerable emotions	21. <b>Isolated</b>
22. I cry	22. To create a physical mark or sign of what I am feeling	22. <b>Stupid</b>
23. I stop crying	23. To produce a pain that I can control	23. Relaxed
24. I feel more real	24. To express anger at myself	24. <b>Useless</b>
25. I feel safe	25. To get those around me to understand what I am going through	25. <b>Rejected</b> <sup>b</sup>
26. I feel less safe	26. To feel like myself again	26. <b>Embarrassed</b> <sup>b</sup>
27. My stress level increases	27. To create physical reminders of important events	27. <b>Bored</b>
28. My stress level decreases	28. To provide a physical release that feels much like sexual release	28. Indifferent <sup>c</sup>
29. I feel more like myself	29. To create a symbolic boundary between myself and others	29. In a trance <sup>c</sup>
30. I feel less guilty	30. To keep my self from feeling fragmented or not whole	30. Satisfied
31. I feel guilty	31. To assert control over myself	31. <b>Out of control</b>
32. I avoid fights with friends/family	32. To see if I can stand the pain	32. <b>Unreal</b>
33. It causes fights with friends/family	33. To express disgust with my body/attractiveness	33. <i>Aroused sexually</i>
34. It causes suicidal thoughts	34. To cope with loneliness	34. Outside my body <sup>c</sup>
35. It stops suicidal thoughts	35. To cope with boredom	35. <i>Mesmerized</i> <sup>c</sup>
36. I become less angry	36. To know I am capable of feeling physical pain	36. <b>Frustrated</b>
37. I become more angry	37. Out of curiosity about what it will feel like	37. <i>Euphoric</i>
38. I feel more separate from others		38. <b>Unaware of surroundings</b> <sup>b</sup>
39. I calm down		39. <b>Grief</b>
40. I feel independent/autonomous		40. <i>Restless</i> <sup>c</sup>
41. I feel like I've lost control of myself		
42. People take me more seriously		
43. I am distracted from traumatic memories		
44. I feel less attractive		
45. Romantic partners act differently around me		
46. Friends behave differently around me		
47. I feel bad		
48. I feel better		

<sup>a</sup> Affect-states were coded by two-raters on dimensions of valence and arousal. Bold indicates negative valence; no bold indicates positive valence. Italics indicates higher arousal; no italics indicates lower arousal.

<sup>b</sup> Valence ratings agreed for 39/40 and arousal ratings for 35/40 affect-states. Raters disagreed on whether “Unaware of Surroundings” had a neutral or negative valence. Arousal ratings were discrepant for “Guilty”, “Hurt emotionally”, “Disgust with body”, “Rejected”, and “Embarrassed”.

<sup>c</sup> The affect-states “Indifferent,” “In a trance,” “Outside my body,” “Mesmerized,” and “Restless” were coded as having neutral valences.



## Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.psychres.2008.02.008](https://doi.org/10.1016/j.psychres.2008.02.008).

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