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Abstract
Nonsuicidal self-injury (NSSI) is a perplexing phenomenon that may have differing motives. The present study used experience sampling methods (ESM) which inquired explicitly about the motives for NSSI, but also enabled a temporal examination of the antecedents/consequences of NSSI; these allow us to infer other motives which were not explicitly endorsed. Adults (n = 152, aged 18–65) with borderline personality disorder (BPD), avoidant personality disorder (APD), or no psychopathology participated in a 3-week computerized diary study. We examined 5 classes of explicit motives for engaging in NSSI, finding support primarily for internally directed rather than interpersonally directed ones. We then used multilevel regression to examine changes in affect, cognition, and behavior surrounding moments of NSSI acts/urges compared with control moments (i.e., without NSSI). We examined changes in 5 scales of inferred motives, designed to correspond to the 5 classes of explicit motives. The results highlight differing motives for NSSI among individuals with BPD and APD, with some similarities (mostly in the explicit motives) and some differences (mostly in the inferred motives) between the disorders. Despite their infrequent explicit endorsement, fluctuations in interpersonally oriented scales were found surrounding NSSI acts/urges. This highlights the need to continue attending to interpersonal aspects of NSSI in research and in clinical practice. Additionally, NSSI urges, like acts, were followed by decline in affective/interpersonal distress (although in a delayed manner). Thus, interventions that build distress tolerance and enhance awareness for affective changes, and for antecedent/consequence patterns in NSSI, could help individuals resist the urge to self-injure.

Keywords
Suicide, Self-Inflicted Abuse, Mental Illness, Personality Disorders

Disciplines
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Explicit and Inferred Motives for Non-suicidal Self Injurious Acts and Urges in Borderline and Avoidant Personality Disorders

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Abstract

Non-suicidal self-injury (NSSI) is a perplexing phenomenon that may have differing motives. The present study employed experience sampling methods (ESM) which inquired explicitly about the motives for NSSI, but also enabled a temporal examination of the antecedents/consequences of NSSI, these allowed us to infer other motives which were not explicitly endorsed.

Adults (N=152, aged 18-65) with borderline personality disorder (BPD), avoidant personality disorder (APD), or no psychopathology participated in a 3-week computerized diary study. We examined 5 classes of explicit motives for engaging in NSSI, finding support primarily for internally-directed rather than interpersonally-directed ones. We then used multi-level regression to examine changes in affect, cognition, and behavior surrounding moments of NSSI acts/urges compared to control moments (i.e., without NSSI). We examined changes in five scales of inferred motives, designed to correspond to the five classes of explicit motives.

The results highlight differing motives for NSSI among individuals with BPD and APD, with some similarities (mostly in the explicit motives) and some differences (mostly in the inferred motives) between the disorders. Despite their infrequent explicit endorsement, fluctuations in interpersonally-oriented scales were found surrounding NSSI acts/urges. This highlights the need to continue attending to interpersonal aspects of NSSI in research and in clinical practice. Additionally, NSSI urges, like acts, were followed by decline in affective/interpersonal distress (although in a delayed manner). Thus, interventions that build distress tolerance and enhance awareness for affective changes, and for antecedent/consequence patterns in NSSI, could help individuals resist the urge to self-injure.

The natural impulse to maintain physical integrity and to avoid pain (Dawkins, 1989) is part of the innate drive for self-preservation (Wilson, 1978). The motives for behaviors that contradict this basic principle need to be understood. These motives may include explicit explanations but also motives that may occur outside of awareness. Here, we explore the explicit motives of individuals with borderline or avoidant personality disorders (BPD and APD, respectively), for engaging in non-suicidal self-injury (NSSI). We also examine the actual antecedents and consequences of these behaviors; these allow us to infer other motives which are not explicitly endorsed.

NSSI is defined as deliberate damage of body tissue without conscious suicidal intent (Favazza, 1998). It includes behaviors such as skin cutting, severe scratching, needle sticking, and interference with wound healing. Urges for NSSI are risk factor for NSSI acts (Miller & Smith, 2008). Thus, NSSI acts and urges require both clinical and research attention. Though NSSI may occur outside the context of diagnosable psychopathology (Nock & Mendes, 2008), it is more frequent among individuals with particular disorders (e.g., PTSD or dissociative disorders) and is a core feature of one disorder – BPD (Favazza, 1998). Nock, Joiner, Gordon, Lloyd-Richardson and Prinstein (2006) found that 67.3% of female self-injurers could be diagnosed with a personality disorder (51.7% with BPD specifically). Studies of motives for NSSI in BPD mainly focus on emotion regulation motives (Kleindienst, et al., 2008; Simeon, et al., 1992). Indeed, NSSI has been shown to moderate increases in negative affect (NA) in BPD (Selby, Anestis, Bender, & Joiner, 2009).

Less is known about self-injury in other personality disorders, including APD, yet NSSI has been found to be quite frequent among individuals with this disorder (e.g., Cawood & Huprich, 2011; Nock et al. 2006). The avoidance of relationships and social interactions in APD is often explained by high anxiety and sensitivity to rejection. The association of NSSI with both of these constructs (Klonsky, et al., 2003; Simeon, et al., 1992) might explain the high frequency of NSSI in

this disorder, yet it clearly merits greater attention.

Motives for NSSI

Most recent research on motives for NSSI relies on explicit methods and points to the involvement of aversive self-directed affect (Armey & Crowther, 2008) emotional reactivity (Najmi, Wegner, & Nock, 2007), or emotion regulation processes (Gratz, 2001). Despite the prevalence of NSSI in personality disorders, few of these focused specifically on BPD (Brown, Comtois & Linehan, 2002; Kleindienst, et al., 2008) and none have focused on APD. Nock and Prinstein (2004) proposed a model of NSSI functions defined by the intersection of two dimensions, the first distinguishing internally-directed from interpersonally-directed motives, and the second distinguishing positive and negative reinforcement motives.

Internally-directed motives include *Emotion Relief* (ER) – seen in behaviors enacted to reduce tension or other negative affective states , which is at the center of one influential model of NSSI, the experiential avoidance model (Chapman, Gratz, & Brown, 2006). They also include *Feeling Generation* (FG) – seen in behaviors enacted to produce a desirable psychological state. Some self-injurers describe a cascade beginning with aversive negative tension, which leads to unreal or numb feelings (Stiglmayr, et al., 2008); this dissociative state precipitates, and is then relieved by, NSSI (Brown, Wilson, & Linehan, 2002). A third class of internally-directed motives, *Self-punishment* (SP), is seen in self-injury occurring out of self-devaluation, or a belief that one deserves punishment. As it explicitly seeks to generate an experience and not to suppress it, Nock and Prinstein (2004) conceptualized SP as a subtype of FG, Yet SP motives may actually be more similar to ER motives (Turner, Chapman, & layden, 2012), as they serve to reduce aversive states, especially self-focused NA such as shame or guilt.

Interpersonally-directed motives include *Interpersonal Avoidance* (IA) – seen in behaviors enacted to create social distance. Though individuals do endorse IA motives for NSSI (Nock & Prinstein, 2004),

these have received little theoretical or empirical attention to date. Interpersonally-directed motives also include *Interpersonal Communication* (IC) – seen in behaviors enacted to produce some desired response from others, be it attention, care, or help (Brown, Comtois, et al., 2002).

Methods for studying the motives for NSSI

Nock and Prinstein's (2004) model has received support from studies using structured interviews or self-report scales (e.g., Brown, Wilson, et al., 2002). Whereas some of the motives for NSSI are thought to be accessible to the individual, and therefore amenable to explicit investigation; other motives have been hypothesized to operate outside of conscious awareness, and therefore to require implicit methods in order to be studied (Nock, Prinstein, & Sterba, 2009). One such method is a functional assessment of changes in affect, cognition, and behavior that surround NSSI acts and urges, using experience sampling methods (ESM; Bolger, Davis, & Rafaeli, 2003). ESM have been used extensively in studying PDs, particularly when examining emotion dysregulation and instability in BPD (e.g., Jahng, Wood, & Trull, 2008; Nica & Links, 2009). However, ESM studies have only recently begun to examine NSSI (e.g., Links, et al., 2007; Selby, Franklin, Carson-Wong, & Rizvi, 2013).

Bresin and colleagues (2012) used ESM to explore the affective states that predict the urge for NSSI. For those with a propensity to act rashly while experiencing NA daily sadness, but not guilt or general negative affect, predicted urges to engage in NSSI. Nock et al. (2009) used ESM to explore thoughts and feelings associated with NSSI acts and urges in youths. Self/other-directed anger, self-hatred, and feeling rejected were elevated during NSSI acts. Additionally, worthlessness and sadness, often felt with NSSI urges, were associated with decreased odds of NSSI acts; this was not the case with other feelings. Thus, NSSI urges occurring with and without acts may inherently differ.

To our knowledge, only two studies have explored affective changes pre and post NSSI

episodes. In the first study, Muehlenkamp et al. (2009) employed ESM to examine the temporal association between positive and negative emotional states before and after NSSI acts among self-injurious bulimia nervosa patients. Results indicated significant increases in NA, and decreases in positive affect, prior to NSSI acts; post-NSSI, positive affect significantly increased while NA remained unchanged. In the second study, Armey, Crowther and Miller (2011) employed ESM to examine changes in affect surrounding episodes of NSSI (vs. non-NSSI moments) among self-injurious college students who completed diaries for seven days. The authors used a series of mixed-design repeated-measures ANOVAs, with both linear and quadratic contrasts. These analyses suggested that NA increases prior to NSSI acts and fades gradually in the subsequent hours. However, the contrast between NSSI moments and random control moments did not reach statistical significance. Importantly, the time intervals between the entries used varied between participants, but were not accounted for in the model.

ESM was employed to examine affective changes pre and post other health-risk behaviors such as binge eating (e.g., Haedt-Matt & Keel, 2011), use of tobacco (Shiffman, et al., 2002), and alcohol (Swendsen, et al., 2000). Importantly, some of these ESM findings conflict with findings based on explicit motive reports related to these behaviors. The latter emphasize ER motives, whereas the former often fail to find evidence for the expected changes in NA (for review, Haedt-Matt & Keel, 2011). Some of the discrepancy may stem from the fact that most studies assess changes only in global NA, when specific facets of NA may respond differently (e.g., following binge-eating, depression increases while anxiety decreases; Elmore & de Castro, 1990). This calls for multi-faceted measurement of antecedents/ consequences of self-harm behaviors, which would parallel the work reviewed earlier identifying multiple *explicit* motives for self-harm.

Current Investigation

The current study explores, in real time, multiple facets of both *explicit* and *inferred* motives for NSSI acts and urges among individuals with BPD and/or APD, and among a healthy control (HC) group. A 21-day experience-sampling diary was used to obtain two types of data regarding motives for NSSI. Explicit motives were assessed for each reported NSSI act /urge; direct questions addressed the four motives identified in Nock and Prinstein's functional model (2004), and also included self-punishment as an additional class of internally-directed motives. Then, data that was collected in diary entries with no direct association to the occurrence of NSSI act s/urges, enabled us to examine antecedents/consequences of these episodes, and to draw inferences about motives for NSSI which were not explicitly endorsed. Questions about distressing affect, cognition, and behavior were used to create five scales of inferred motives - general NA, dissociation, self-devaluation, avoidant behavior, and perceived rejection/isolation. These were designed to correspond to the five classes of explicit motives (i.e., ER, FG, SP, IA, and IC, respectively, see Figure 1).

With regards to the explicit motive measures, we expected ER to be most frequently endorsed. With regards to the inferred motive measures, we reasoned (along with Nock & Prinstein, 2004) that NSSI, would be flanked by a quadratic rise-and-fall pattern of affective/ interpersonal distress. Specifically, because the behaviors are driven by internal and/or interpersonal motives, we expected the five indicators of affective/interpersonal distress (the inferred motive) to increase prior to NSSI acts (presumably triggering or at least precipitating NSSI) and to fade after such acts (presumably because the NSSI act has fulfilled its purpose). In contrast, we expected these five indicators to increase prior to NSSI urges without the attendant drop following the reported urge. These predictions are based on studies of NSSI in general (Armey et al., 2011), and in BPD (Links et al., 2007); since little is known about NSSI in APD, our inclusion of this group was exploratory.

Method

Participants and Procedure

Adult individuals from the New York City area were recruited through newspaper ads, online forums, and flyers for a study on personality and mood in daily life. Ads particularly targeted at individuals with BPD or APD also described symptoms of the disorders (e.g., mood swings, shyness). Additional postings and materials were distributed through treatment clinics, disorder specific support groups, and related research projects in area hospitals.

Participants who were deemed potentially eligible to one of the study groups (BPD, APD or HC) were invited to the lab and completed an extensive diagnostic interview: personality disorders were assessed using the Structured Interview for the Diagnosis of Personality Disorders (SID-P-IV; Pfohl, Blum, & Zimmerman, 1997), and Axis-I disorders were assessed using the Structured Clinical Interview for DSM–IV Axis I Disorders (SCID-I; First, Gibbon, Spitzer, & Williams, 1996). Exclusion criteria for all groups were evidence of a primary psychotic disorder, current substance intoxication or withdrawal, cognitive impairment, or illiteracy. In addition, the HC group met no more than two criteria for any PD (and no more than 10 in total), had no Axis-I diagnoses for at least one year prior to the date of the interview, were not currently taking any psychotropic medications, and had a high Global Assessment of Functioning (APA, 2000) score (GAF >79). Given the high comorbidity of BPD and APD with other disorders in actual patient populations (e.g., Skodol et al., 2002), relatively few exclusion criteria were used for the BPD or APD group.

Participants who were eligible to one of the study groups were invited to a second lab visit in which they received an introduction to the experience-sampling diary. For a complete description of the study's recruitment and administration procedures, see earlier work based on this project (Berenson, Downey, Rafaeli, Coifman, & Paquin, 2011). The sample consisted of 152 adults; 56 (45 female) had a current diagnosis of BPD (14 of them with co-morbid APD), 43 (23 female) had a current diagnosis

of APD (without BPD), and 53 (39 female) were healthy controls. Participants diagnosed with both BPD and APD were included in the BPD group because BPD is usually the more robust and salient disorder of the two (McGlashan, et al., 2000)[1]. In the BPD group, 55.5% of the participants in were diagnosed with at list one additional co-morbid Axis-II disorder, compared to only 4.5% of the participants in the APD group. Table 1 presents comorbid Axis-I diagnoses for the PD groups. Table 2 presents demographics for all study groups.

The experience-sampling diary was kept for 21 days, with 5 daily prompts. The software program divides the participant's waking hours into five equal intervals and schedules a prompt to occur at randomly selected points within each interval (for more details about the ESM protocol see Gadassi, Snir, Berenson, Downey, & Rafaeli, 2014). In each diary entry, participants were asked to report their current affective, interpersonal, and behavioral experiences, including NSSI. Participants could complete up to 105 diary entries over the 3-week period (*M*=73.57, *SD*=19.55, range 28-105). The groups did not differ in the number of entries completed ($F_{(2,151)}$=.67, p=.51). We excluded 8 Participants (BPD=3, APD=1, HC=4) with less than 27 completed entries (two standard deviations below the sample average). Additionally, we removed the data of one outlying participant whose mean rates of NSSI acts and urges were more than two standard deviations above the mean. The ESM investigation of motives for NSSI included 29 participants (20 female) who reported at least 1 NSSI act (BPD=18, APD=11), and 27 participants (22 female) who reported at least 1 NSSI urge during the diary period (BPD=20, APD=7). In the HC, a single NSSI urge was reported, and no NSSI acts were reported during the diary period; therefore, analyses of NSSI motives are presented only for the two PD groups.

[1] Analyses for the BPD group conducted both with and without the 14 comorbid individuals showed no significant differences in the results.

Measures

Lifetime NSSI history. The Inventory of Statements about Self-Injury (ISAS); assesses lifetime NSSI with good reliability and validity (Klonsky & Glenn, 2009). Participants estimated how often they had ever intentionally performed each of 12 specific self-injurious behaviors without suicidal intent.

NSSI - diary indices. In each diary entry, participants were asked to report any episodes of NSSI (defined as behavior causing direct tissue damage, such as cutting, burning, scratching, or banging, not including suicide attempts) since their last diary entry. Participants indicated whether they had engaged in NSSI, experienced a strong urge they did not act on, or had no thoughts of NSSI. Reports of acts and urges were summed across the participant's diary entries, and divided by the number of entries completed by the participant to create frequency indices.

NSSI explicit motives. Any report of NSSI acts or urges automatically triggered a set of follow-up questions soliciting information regarding the explicit motives for the act/ urge. These inquired "*why did you* [*have the urge to*] *perform this action?"* The question was followed by 15 possible checkboxes responses divided into the 5 explicit motive classes (The list is available from the first author). Checkboxes were dichotomized to yes/no response for each motive and participants could check as many motives as they wanted for each episode of NSSI acts/urges.

NSSI inferred motives. In each diary entry, participants rated affects, cognitions, and behaviors composing five classes of inferred motives. Reliability coefficients for each class were computed at both the between-subject level and the within-subject level (Shrout & Lane, 2011).

General NA was assessed using six items: *disappointed, tense, afraid, sad, angry,* and *irritated,* rated on 5-point Likert scales (0 = not at all, 4 = extremely). Between- and within-subject reliability coefficients were.90 and.82 respectively. *Dissociation* was assessed using five items rated on the same 5-point scale:

empty, unreal, grounded (reversed)*, numb,* and *unsure of who I am* (reliabilities:.91 and.55, respectively). *Self-devaluation* was assessed using four items rated on the same 5-point scale: *I am bad, I deserve punishment, I am worthwhile* (reversed)*,* and *I am unhappy with self* (reliabilities:.87 and.58, respectively). *Avoidant behavior* was assessed using checkbox items indicating whether participants had engaged in these three behaviors since the previous diary: *Cancelled/avoided social plans, avoided conflict by keeping quiet,* and *isolated myself* (reliabilities:.45 and.26, respectively)[2]. *Perceived rejection/isolation* was assessed using six items rated on a 5-point scale: *lonely*, *isolated*, *abandoned*, *rejected by others*, *accepted by others* (reversed), and *my needs are being met* (reversed; reliabilities:.94 and.70, respectively).

Data Preparation

First, we identified all the diary entries in which NSSI acts or urges were reported. Of the 94 PD participants with usable data, twenty-nine reported at least 1 NSSI act (total=110 reported acts), and twenty-seven reported at least 1 NSSI urge (total=104 reported urges). Second, we randomly selected 110 non-NSSI moments, i.e., diary entries preceded and followed by at least three consecutive time-points in which no-NSSI act or urge was reported. These diary entries were obtained from the 29 participants who engaged in NSSI acts. We repeated this procedure by randomly selecting 104 non-NSSI moments to serve as a comparison for the entries in which NSSI urges were reported (obtained from the 27 relevant participants).

Since diary entries were collected at random intervals, we created a variable that represents the time (in hours) before and after the target behavior (act or urge) or control moment. This variable ranged from -10 to 10 hours surrounding the target time. Because the target behavior may have occurred anytime between the previous diary entry and the one in which it is reported, the zero point was set as the mid-point between the two entries. We chose to remove from the temporal analyses cases in which more than

[2] The weak reliability probably stems from the use of several dichotomous items.

one NSSI act or urge occurred during the 20 hour window. In such "runs" of self-injurious acts or urges, it would be difficult to define a reference zero-point surrounding which affective changes could be examined. Additionally, they may be characterized by different affective patterns and therefore demand a separate investigation. Our final analyses included the time windows surrounding 67 acts (N=29) and 47 urges (N=27).

Data Analytic Strategy

We made use of multi-level (hierarchical linear) modeling, an approach that appropriately handles the repeated measurements (i.e., auto-correlation) and missing data characteristic of diary data (Bolger, et al., 2003), accounts for the non-independence of day-level data, and prevents inflation of the effects. We used multi-level regression (PROC MIXED, SAS, 1997) to model the antecedents/consequences of NSSI acts and urges (vs. non-NSSI moments). Three separate analyses were conducted for each of the 5 scales: NSSI acts (vs. non-act moments) in the BPD and APD groups, and urges (vs. non-urge moments) in the BPD group. No analyses of the antecedents/consequences of NSSI urges were conducted for the APD group because only 7 participants in this group reported any NSSI urge moments.

Each regression model included an intercept, dummy-coded variable distinguishing moments of NSSI (coded 1) from non-NSSI control moments (coded 0), linear (time), quadratic ($time^2$), and cubic ($time^3$) effects, and interactions of NSSI with each temporal effect[3]. All predictors were considered to be random, therefore allowed to vary from one participant to another. Additionally, the within-person error was assumed to have an auto-regressive structure (i.e., AR1). This model allowed us to obtain

[3] To ensure that the affective changes that were found surrounding NSSI urges were not the result of a subsequent act but of the urge itself, all analyses of NSSI acts were adjusted for concurrent and lagged NSSI urges. Similarly, all analyses of NSSI urges were adjusted for concurrent and (immediately) subsequent NSSI acts. These adjustments did not alter the pattern of results obtained, so for clarity of interpretation, we present the results of analyses conducted without these adjustments.

simultaneous estimates of the temporal patterns under control moments (β_2,β_3,β_4) and under NSSI (β_5,β_6,β_7).

$$Y = \beta_0 + \beta_1 * NSSI + \beta_2 * time + \beta_3 * time^2 + \beta_4 * time^3 +$$

$$\beta_5 * time * NSSI + \beta_6 * time^2 * NSSI + \beta_7 * time^3 * NSSI + e$$

Results

Group Differences in Frequencies of NSSI

NSSI - background measure (ISAS). The three groups showed significantly different rates of life-time NSSI (73.2% BPD, 51.2% APD, and 9.4% HC; $\chi^2_{(2,N=150)}=45.8$,$p<.001$; all pairwise comparisons were also significant). The majority of participants in both PD groups (69.6% BPD; 69.0% APD) reported that less than an hour elapses from the time of urge for self-harm till they act on the urge. No group differences were found in the age-of-onset of NSSI ($F_{1,94}=2.52$; n.s). The groups did not differ in the methods used for *NSSI - Banging/hitting self,* was most frequently reported as the main method for NSSI, followed by cutting and wound picking.

NSSI - diary indices. One-way ANOVA (followed by Tukey post-hoc comparisons) showed that more frequent NSSI acts were reported by the BPD group (M=.01, SD=.02), compared to the HC group (M =.00, SD=.00; $F_{(2, 149)}=5.11$, $p<.001$). The APD group (M=.009, SD=.02) fell between the two other groups and was not statistically distinguishable from either. Similarly, higher mean levels of NSSI urges were reported by the BPD group (M=.01, SD=.03) compared to the HC group (M=.00, SD=.00; $F_{(2, 149)}=4.59$, $p<.05$). The APD group (M=.007, SD=.03) again was not statistically distinguishable from either group.

Explicit Motives for NSSI

Table 3 presents the mean rates of the five classes of explicit motives for NSSI in the PD groups. A repeated measures ANOVA within the BPD group showed that participants reported engaging in

NSSI acts and urges primarily for internally-directed (i.e., ER, FG, SP) motives, more than for interpersonally-directed (IA, IC) motives. Within the APD group, these differences were not significant; however, the pattern of frequencies was similar to that found in BPD.

Inferred motives for NSSI

Before examining temporal patterns of fluctuation in the 5 affective/interpersonal states corresponding to the 5 explicit motives, we first examined group differences in each scale's mean across the entire diary period. On all five scales (i.e., general NA, dissociation, self-devaluation, avoidant behavior, and perceived rejection/isolation) the BPD and the APD groups did not differ significantly (see Table 4).

Antecedents and consequences of NSSI acts. Table 5 presents multi-level coefficients for fluctuations in each of the five states surrounding NSSI acts vs. control moments in the BPD group. From here on, we note only fluctuation patterns that were significant, and present their plots in Figures 2-3. This group reported increases in *dissociation* and *perceived rejection/isolation* prior to NSSI acts, feelings that gradually faded following the episode in a quadratic curve. No such fluctuations were found surrounding non-NSSI moments. These change patterns are presented in Figure 2a. The same analyses were then conducted for the APD group (see Table 6 and Figure 2b). As they did in BPD, *dissociation* and *perceived rejection/isolation* followed a quadratic pattern in APD as well. Unique to the APD group were quadratic patterns in *avoidant behavior* and *self-devaluation*. No such fluctuations were found surrounding non-NSSI moments.

Antecedents and consequences of NSSI urges (in the BPD group). Table 7 presents analyses for fluctuations in each the five states surrounding NSSI urges vs. control moments in the BPD group. Unlike the quadratic patterns found surrounding NSSI acts, a more complex pattern emerged surrounding NSSI urges. Specifically, individuals with BPD experienced increases in *general NA*, *self-*

devaluation and *perceived rejection/isolation* prior to the urge, feelings that continued rising after the reported urge and then faded in a combined linear-quadratic-cubic pattern. A similar pattern (though with no significant cubic effect), was found for changes in *dissociation*. Again, no such fluctuations were found when examining randomly selected non-NSSI moments. The patterns are presented in Figure 3.

Discussion

The present study utilized experience-sampling methods to examine the motives for NSSI acts/urges among individuals with personality disorders (BPD and APD) in daily life. Specifically, we examined *explicit motives* for NSSI (indicated by participants when reporting the act/urge), as well as affective/interpersonal antecedents and consequences which enabled us to infer about motives that were not explicitly endorsed. We were inspired by an earlier study by Armey et al. (2011), who also examined temporal affective changes surrounding episodes of NSSI acts compared to control moments, but went beyond this earlier study in several respects. We examined two clinical samples and a matched control group, who completed 3 weeks of ESM entries an average of 3.5 times a day. Our participants reported both NSSI acts and urges. We included indices of 5 theoretically derived classes of motives, and compared them to explicit measures of the same motives. Finally, we used multi-level modeling to analyze these data.

Group Differences in NSSI Frequencies

Consistent with previous studies (e.g.,Nock, et al., 2006) we found high rates of lifetime NSSI in BPD and APD (albeit higher rates for the former group). The point-prevalence rates of NSSI acts and urges during the 3-week diary period were also considerable. Clearly, the presence of self-harm behaviors in APD merits greater attention.

Explicit vs. inferred motives for NSSI

Explicit reports indicated that NSSI occurred during the diary period primarily for internally-directed motives rather than interpersonally-directed ones. The frequencies with which the five explicitly-reported categories were endorsed were similar for both NSSI acts and urges, and for both PD groups. Despite the apparent differences between the PD groups, NSSI acts/ urges are explicitly thought to serve similar purposes by individuals with either disorder.

When examining antecedents/consequences for NSSI, participants in both PD groups reported significant changes in feelings of *dissociation* and *perceived rejection/isolation* surrounding NSSI acts, consistent with the FG and IC motives. The rise and subsequent fall in *dissociation* surrounding NSSI acts in both the PD groups speaks to the possibility that NSSI helped generate some (non-dissociated) feelings. Similarly, the rise and fall in perceived rejection/isolation speaks to the possibility that NSSI somehow broke through a communicative inter-personal barrier, at least in the participant's subjective experience. Participants with APD also reported significant changes in feelings of *self-devaluation* and *avoidant behavior*, consistent with the SP and IA motives. The rise and fall of *self-devaluation* speaks to the possibility that the NSSI act created a way out of feeling blame-worthy and deserving of punishment. Similarly, for this group, the rise and fall of reported *inter-personal avoidance* speaks to the possibility that the NSSI act may substitute for other forms of avoidance (such as withdrawal and self-silencing). This finding might suggest that self-injurious acts among individuals with APD are related to the most salient characteristic of this disorder: the tendency to avoid interpersonal interactions (APA, 2000). The discrepancy between explicit and inferred reports of interpersonal motives suggest that even when individuals with PDs do not report deliberately using NSSI for interpersonally-directed motives, interpersonal factors do influence (and are influenced by) NSSI.

Moreover, whereas both groups endorsed relief of negative emotions such as sadness, and

anxiety as explicit motives for NSSI, neither group showed significant change in *general NA* surrounding NSSI acts. The discrepancy observed between explicit and inferred measures of emotional relief as a motive for NSSI is consistent with research on other self-harm behaviors. For example, participants who retrospectively described binge-eating as relieving negative emotions actually reported increased NA during binge episodes in experience-sampling reports (Stickney & Miltenberger, 1999). Taken together, these findings highlight the importance of examining a spectrum of NSSI motives using multiple methods.

Comparison of NSSI Acts and Urges in inferred motives

In the BPD group, *general NA* and *self-punishment* changed surrounding NSSI urges but not surrounding NSSI acts. Though this finding might seem surprising, it coheres with recent work in the field. For example, Nock et al. (2009) found NSSI acts to be inversely associated with sadness. It appears that low-activation NA, which reflects an avoidance or negative reinforcement state, does not precipitate NSSI acts, which seem to require more of an approach or positive reinforcement state. Indeed, in the current study NSSI acts were associated predominantly with the fluctuations in *dissociation* and *perceived rejection/isolation* affective scales that correspond to positive reinforcement motives (i.e., FG, IC). In contrast, NSSI urges were also associated with fluctuation in *general NA* and *self-devaluation* affective scales that correspond to negative reinforcement motives (i.e.; ER, SP). Prior studies suggest that negative/depressive affective states are associated with avoidance motivation, whereas states such as anger are associated with approach motivation (Carver & Harmon-Jones, 2009). If this is the case, we may need to consider feelings linked to *approach* strategies as more imminent risk markers for subsequent NSSI acts in BPD than feelings linked to avoidance strategies.

An alternative explanation for the differences in affective changes surrounding NSSI acts vs. urges, is that feelings of *dissociation* replace other kinds of NA when these are too aversive. This

phenomenon has been found to occur in BPD (Stiglmayr, et al., 2008), and might explain why neither general NA nor self-focused NA fluctuated significantly surrounding NSSI acts.

Importantly, we found affective/interpersonal distress to decrease following NSSI urges even in the absence of an act, approximately two hours following the estimated time of reported urges. This finding has important clinical ramifications for individuals who self-harm. Such individuals may believe in the durability of an intense negative state, and therefore see the act of self-injury as the only possible way to put a stop to their mental pain and obtain emotional relief. In actuality, since distress does tend to decrease even in the absence of NSSI acts, it appears that psycho-education and distress tolerance skills could help reduce self-harm.

Finally, our findings reveal that changes in affective/interpersonal distress associated with NSSI acts and urges were detectable several hours prior to these events. This is noteworthy, in light of the explicit reports of most participants who noted recognizing urges to self-harm only one hour or less before NSSI acts. It also suggests that early signals to these dangerous behaviors might be detectable and consequently allow targeted intervention or even prevention of NSSI acts. However, the degree of specificity of these signals to NSSI (vs. other harmful behaviors), and an estimation their appearance time, should be further examined.

Limitations and future research

Our results reveal both similarities and differences in the motives for NSSI in BPD vs. APD. This should caution us against generalizing our findings to other populations characterized by self-harm. The small number of participants who engaged in NSSI in each study group (and specifically NSSI urges in the APD group) further restricts the ability to generalize these findings, although the ability to aggregate across multiple measurements allays this concern somewhat. Furthermore, our sample sizes were comparable to prior NSSI experience sampling studies (Armey, et al., 2011; Nock,

et al., 2009).

This study was the first to examine both explicit and inferred motives for NSSI under the same theoretical framework in order to enable a comparison between them. As such, we embarked on a first attempt to create measures of inferred motives that would correspond to the explicit motive classes, though most of the scales were internally consistent, they should undergo further examination and validation, and future studies need to further refine them.

Implications and Summary

Experiences sampling enabled us to look closely at the affective/interpersonal antecedents and consequences of NSSI acts/urges (vs. randomly-selected control moments), and to compare these to the motives explicitly given for these acts. Clinically, the results highlight unique patterns of self-harm in the APD group. First, the high rates of NSSI found in this group call clinical attention to these dangerous but often underreported behaviors. Second, a focus on the antecedents/consequences whose fluctuations were found to be unique to APD could help better understand and treat self-injury among individuals this disorder.

The discrepancies found between explicitly stated and inferred motives for the same NSSI acts and urges should encourage clinicians and researchers to go beyond patients' explicit reports. One way to do this is by utilizing ongoing monitoring (e.g., daily or event-based diaries), already common in approaches such as DBT (Linehan, 1993) and schema therapy (Rafaeli, Bernstein, & Young, 2011). The relative absence of explicit endorsement of interpersonally-directed motives for NSSI (compared to the evidence for the influence for interpersonal aspects) is noteworthy, specifically among individuals with PDs characterized with difficulties in interpersonal relationships. It seems that the interpersonal triggers and motives of NSSI are underestimated in the explicit reports of those who self-injure, but that prevention and treatment strategies should target these aspects and

enhance awareness to their importance.

Finally, we found that NA does decrease following NSSI urges in BPD, albeit in a delayed manner. Psycho-educational and distress-tolerance interventions, similar to those used in treating anxiety disorders (Sánchez-Meca, Rosa-Alcázar, Marín-Martínez, & Gómez-Conesa, 2010) might help individuals delay their behavioral responses in times of intense NA, resist the NSSI urge, and avoid subsequent dangerous acts.

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Table 1

Axis I Diagnoses

	BPD N = 56(%)	APD N = 43(%)	χ^2(2, N = 99)
Major Depressive Disorder	24(42.9)	13(30.2)	1.65, n.s.
Bipolar disorder	7(12.5)	2(4.7)	1.81, n.s.
Dysthymic Disorder	12(21.4)	11(25.6)	.23, n.s.
Social Phobia	24(42.9)	42(97.7)	.32.89***
Posttraumatic Stress Disorder	18(32.1)	1(2.3)	13.94***
Panic Disorder	5(8.9)	3(7.0)	.12, n.s.
Agoraphobia Without History of Panic Disorder	3(5.4)	1(2.3)	.57,n.s.
Obsessive-Compulsive Disorder	5(8.9)	3(7.0)	.12, n.s.
Generalized Anxiety Disorder	27(48.2)	14(32.6)	2.45, n.s.
Bulimia	1(1.8)	0(0)	.37, n.s.
Binge Eating Disorder	2(3.6)	2(4.7)	.07, n.s.
Substance Dependence	11(19.6%)	2(4.7%)	4.79*

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

Table 2

Participant Demographics

	BPD N=56	APD N=43	HC N=53	
Age M(SD)				
	30.9(10.1)	32.9(11.4)	35.08(11.9)	F(2,148)=1.87, n.s.
Gender	N(%)	N(%)	N(%)	χ^2(3, N=152)=8.47*
Female	45(80.4%)	23(53.5%)	38(71.7%)	
Male	11(19.6%)	20(46.5%)	15(28.3%)	
Race				χ^2(2,N=152)=4.4, n.s.
Asian	4(7.1)	5(11.6)	7(13.2)	
Black/African	11(19.6)	9(20.9)	16(30.2)	
White	34(60.7)	22(51.2)	29(54.7)	
Other	8(14.2)	7(16.2)	1(1.8)	
Current Psychiatric Treatment				
Psychotherapy	32(57.1)	23(53.1)	2(3.8)	χ^2(2,N =152)=39.6***
Medication	24(42.9)	16(37.2)	0(0)	χ^2(2,N=99)=29.46***

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

Table 3

Explicit motives for NSSI

		ER	FG	SP	IA	IC	F	Eta square	df
BPD									
act(N=18)	Mean	.52[a]	.47[a]	.43[a]	.06[b]	.12[b]	10.105***	.373	4,13
	Sd	.36	.28	.44	.18	.21			
urge(N=20)	Mean	.64[a]	.34[b]	.61[a]	.12[c]	.20 [bc]	17.40**	.478	4, 15
	Sd	.34	.22	.33	.21	.25			
APD									
act(N=11)	Mean	.27[a]	.18[a]	.18[a]	.09[a]	.17[a]	1.27	.113	4,7
	Sd	.43	.31	.34	.30	.29			
urge(N=7)	Mean	.51[a]	.26[a]	.33[a]	.20[a]	.16[a]	2.93*	.328	4,3
	Sd	.35	.27	.39	.37	.100			

Note. Explicit motivation scores are averaged across all instances of the acts (or urges) for each person, and then averaged for the entire group.

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

Table 4

Comparison of Mean rate of Affective/Interpersonal states across the entire diary

	BPD (N=56)		APD (N=43)		HC (N=53)		F Df(2,149)
	M	SD	M	SD	M	SD	
General NA	1.12[a]	.66	1.11[a]	.72	.20[b]	.18	F=45.83**
Dissociation	1.41[a]	.80	1.33[a]	.79	.42[b]	.21	F=37.50**
Self-devaluation	1.22[a]	.68	1.13[a]	.66	.27[b]	.24	F=45.06**
Avoidant behavior	.17[a]	.14	.17[a]	.17	.03[b]	.03	F=22.40**
Perceived rejection/isolation	1.76[a]	.85	1.81[a]	.78	.53[b]	.27	F=58.61**

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

Table 5

Changes in Affective/Interpersonal states surrounding NSSI acts among individuals with BPD (N=18)

		Non-NSSI			NSSI			NSSI vs. non-NSSI		
		ES	SE	T	ES	SE	T	ES	SE	T
General NA										
	Intercept	0.96	0.19	5.10***	1.34	0.20	6.74***	0.39	0.13	3.05**
	Linear	-0.02	0.02	-0.80	0.02	0.03	0.73	0.04	0.03	1.13
	Quadratic	0.00	0.00	-0.95	0.00	0.00	-1.25	0.00	0.00	-0.38
	Cubic	0.00	0.00	1.36	0.00	0.00	-0.54	0.00	0.00	-1.32
Dissociation										
	Intercept	1.36	0.21	6.47***	1.65	0.22	7.60***	0.29	0.09	3.10**
	Linear	-0.01	0.01	-0.82	0.01	0.02	0.68	0.03	0.02	1.07
	Quadratic	0.00	0.00	0.37	-0.01	0.00	-1.86*	-0.01	0.00	-1.61*
	Cubic	0.00	0.00	0.45	0.00	0.00	-0.37	0.00	0.00	-0.59
Self-Devaluation										
	Intercept	1.36	0.18	6.86***	1.48	0.18	8.05***	0.25	0.105	2.40**
	Linear	0.00	0.02	0.38	0.00	0.02	-0.08	-0.01	0.03	-0.29
	Quadratic	0.00	0.00	-0.12	0.00	0.00	-0.87	0.00	0.00	-0.58
	Cubic	1.81	0.00	0.01	0.00	0.00	-0.04	0.00	0.00	-0.04
Avoidant behavior										
	Intercept	0.15	0.04	3.79**	0.28	0.05	5.78***	0.14	0.05	3.04**
	Linear	0.01	0.01	1.30	0.01	0.01	1.58	0.01	0.01	0.54
	Quadratic	0.00	0.00	-0.51	0.00	0.00	-1.43	0.00	0.00	-0.91
	Cubic	0.00	0.00	-1.42	0.00	0.00	-1.70	0.00	0.00	-0.55
Perceived rejection/isolation										
	Intercept	1.81	0.21	8.51***	2.24	0.22	10.37***	0.43	0.13	3.38 ***
	Linear	-0.01	0.02	-0.85	-0.03	0.02	-1.26	-0.01	0.03	-0.48
	Quadratic	0.00	0.00	0.12	-0.01	0.00	-2.13*	-0.01	0.00	-1.73*
	Cubic	0.00	0.00	0.92	0.00	0.00	1.09	0.00	0.00	0.23

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

Table 6

Changes in Affective/Interpersonal states surrounding NSSI acts among individuals with APD (N=11)

		Non-NSSI			NSSI			NSSI vs. non-NSSI		
		ES	SE	T	ES	SE	T	ES	SE	T
General NA										
	Intercept	1.03	0.26	4.02**	1.37	0.28	4.96***	0.34	0.14	2.39**
	Linear	0.05	0.02	2.17*	0.04	0.03	1.37	-0.01	0.04	-0.26
	Quadratic	0.00	0.00	0.59	0.00	0.00	-1.08	-0.01	0.00	-1.45
	Cubic	0.00	0.00	-1.30	0.00	0.00	-0.69	0.00	0.00	0.25
Dissociation										
	Intercept	1.28	0.21	6.17***	1.65	0.20	8.34***	0.37	0.13	2.81**
	Linear	0.02	0.02	1.35	0.01	0.02	0.46	-0.01	0.02	-0.45
	Quadratic	0.00	0.00	-0.26	-0.01	0.01	-2.27*	-0.01	0.00	-1.74*
	Cubic	0.00	0.00	-0.87	0.00	0.00	-0.21	0.00	0.00	0.37
Self-Devaluation										
	Intercept	1.23	0.14	8.61***	1.84	0.17	10.80***	0.62	0.19	3.26***
	Linear	0.01	0.02	0.38	0.04	0.02	1.71	0.03	0.03	1.12
	Quadratic	0.00	0.00	0.32	-0.01	0.00	-2.57*	-0.01	0.00	-2.51*
	Cubic	0.00	0.00	-0.32	0.00	0.00	-1.22	0.00	0.00	-0.80
Avoidant behavior										
	Intercept	0.14	0.05	2.97*	0.29	0.06	4.52**	0.15	0.07	2.21**
	Linear	-0.01	0.01	-0.78	0.02	0.01	1.96*	0.03	0.01	2.04*
	Quadratic	0.00	0.00	0.31	-0.01	0.00	-2.21*	-0.01	0.00	-2.16*
	Cubic	0.00	0.00	1.84*	0.00	0.00	-0.92	-0.01	0.00	-1.86
Perceived rejection/isolation										
	Intercept	1.86	0.17	10.66***	2.32	0.22	10.69***	0.47	0.17	2.78**
	Linear	0.00	0.02	-0.22	0.04	0.02	1.93*	0.05	0.03	1.80*
	Quadratic	0.00	0.00	-1.33	-0.01	0.00	-2.71**	0.00	0.00	-1.62
	Cubic	0.00	0.00	1.22	0.01	0.00	-1.43	0.01	0.00	-1.94*

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

Table 7

Changes in Affective/Interpersonal states surrounding NSSI urges among individuals with BPD (N=20)

		Non-NSSI			NSSI			NSSI vs. non-NSSI		
		ES	SE	T	ES	SE	T	ES	SE	T
General NA										
	Intercept	1.12	0.14	7.80***	1.76	0.16	11.04***	0.64	0.14	4.45***
	Linear	-0.02	0.02	-0.95	0.10	0.03	3.43***	0.13	0.04	3.46***
	Quadratic	0.00	0.00	0.36	-0.01	0.00	-2.10*	-0.01	0.00	-2.01*
	Cubic	0.00	0.00	1.04	0.00	0.00	-2.85**	0.00	0.00	-3.01**
Dissociation										
	Intercept	1.57	0.18	8.89***	2.00	0.19	10.24***	0.43	0.13	3.46***
	Linear	0.00	0.02	0.06	0.04	0.02	1.93*	0.05	0.03	1.63
	Quadratic	0.00	0.00	1.15	0.00	0.00	-2.22*	-0.01	0.00	-2.67**
	Cubic	0.00	0.00	-0.42	0.00	0.00	-0.89	0.00	0.00	-0.56
Self-Devaluation										
	Intercept	1.52	0.15	9.86***	2.01	0.17	11.90***	0.49	0.12	4.06***
	Linear	0.00	0.02	-0.17	0.09	0.03	3.48***	0.09	0.03	3.00**
	Quadratic	0.00	0.00	0.54	-0.01	0.00	-2.03*	-0.01	0.00	-2.40*
	Cubic	0.00	0.00	-0.44	0.00	0.00	-1.97*	0.00	0.00	-1.45
Avoidant behavior										
	Intercept	0.21	0.04	4.78***	0.35	0.05	6.71***	0.13	0.04	3.28**
	Linear	0.00	0.01	-0.40	0.01	0.01	0.72	0.01	0.01	0.82
	Quadratic	0.00	0.00	0.25	0.00	0.00	-0.85	0.00	0.00	-0.86
	Cubic	0.00	0.00	0.12	0.00	0.00	0.37	0.00	0.00	0.25
Perceived rejection/isolation										
	Intercept	1.89	0.18	10.50***	2.52	0.18	14.09***	0.62	0.12	5.06***
	Linear	0.00	0.02	-0.18	0.07	0.02	3.11**	0.08	0.03	2.74**
	Quadratic	0.00	0.00	0.40	0.00	0.00	-1.73*	-0.01	0.00	-1.85*
	Cubic	0.00	0.00	0.87	0.00	0.00	-1.90*	0.00	0.00	-2.11*

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

Figure 1

Five classes of explicit/implicit motives for NSSI by the intersection of the two dimensions

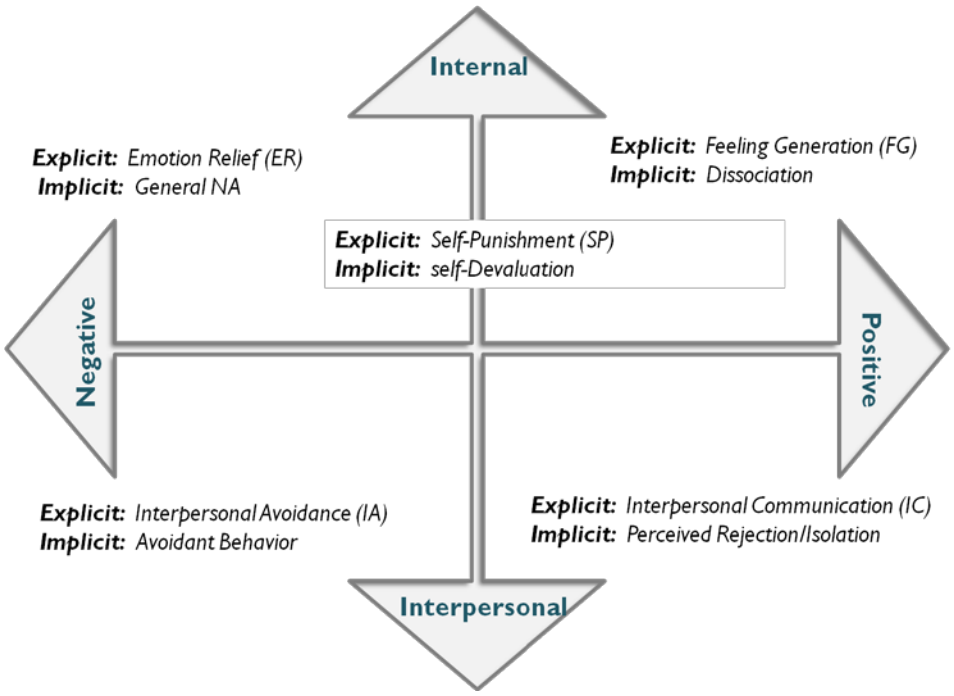

Figure 2.a

Changes in Affective/Interpersonal states surrounding NSSI acts among individuals with BPD

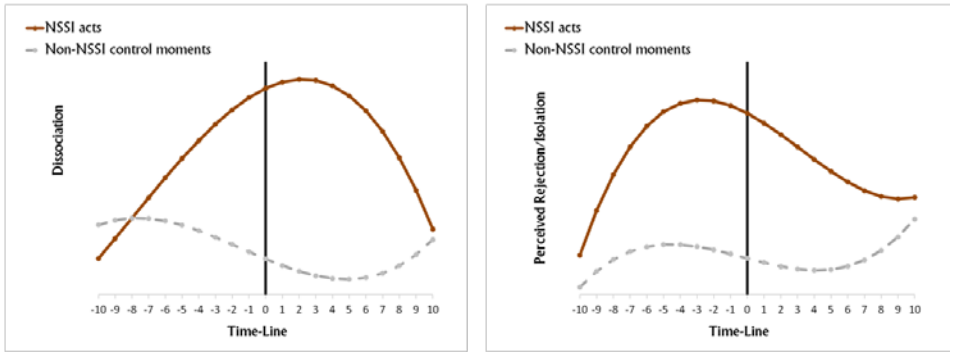

Figure 2.b

Changes in Affective/Interpersonal states surrounding NSSI acts among individuals with APD

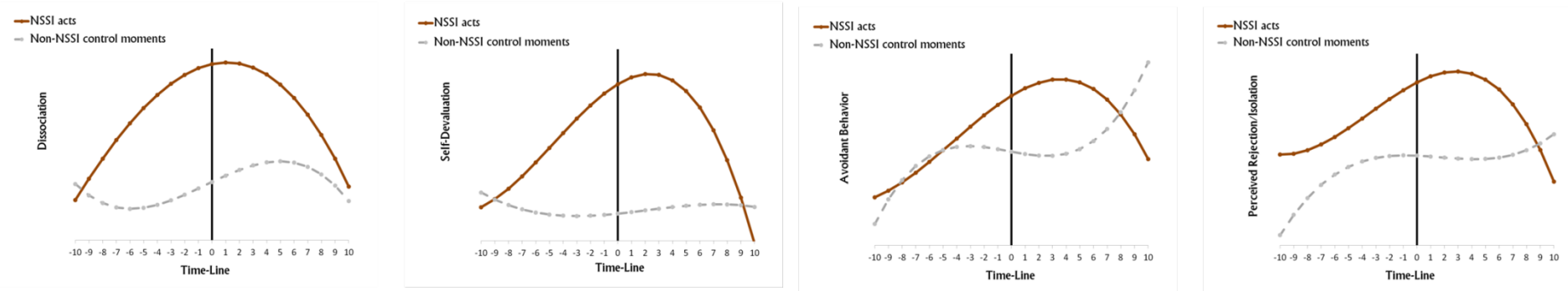

Figure 3

Changes in Affective/Interpersonal states surrounding NSSI urges among individuals with BPD