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Pain perception during self-reported distress and calmness in patients with borderline personality disorder and self-mutilating behavior

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Abstract

Self-mutilation occurs in 70–80% of patients who meet DSM-IV criteria for borderline personality disorder. Approximately 60% of these patients report that they do not feel pain during acts of self-mutilation such as cutting or burning. Findings of recent studies measuring pain perception in patients with BPD are difficult to interpret since variables such as distress, dissociation or relevant psychotropic medication have not been controlled. The Cold Pressor Test (CPT) and the Tourniquet Pain Test (TPT) were administered to 12 female patients with BPD who reported analgesia during self-mutilation and 19 age-matched healthy female control subjects. All subjects were free of psychotropic medication. The patients were studied on two occasions: during self-reported calmness and during intensive distress (strong urge to cut or burn themselves). Even during self-reported calmness, patients with BPD showed a significantly reduced perception of pain compared to healthy control subjects in both tests. During distress, pain perception in BPD patients was further significantly reduced as compared with self-reported calmness. The present findings show that self-mutilating patients with BPD who experience analgesia during self-injury show an increased threshold for pain perception even in the absence of distress. This may reflect a state-independent increased pain threshold which is further elevated during stress. Interpretation of these findings is limited by their reliance upon self-reports.

Keywords: Borderline personality disorder; Pain perception; Distress

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1. Introduction

The Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV), describes the core features of borderline personality disorder (BPD) as 'a pervasive pattern of instability of interpersonal relationships, self-image, and affects, and marked impulsivity'. Self-mutilating behavior is also among the diagnostic criteria. Worldwide prevalence of this disorder is estimated at 1.5% (Torgersen, 1998). Self-injuries occur in 70–80% of cases (Clarkin et al., 1983). One-half to two-thirds of these patients report hypalgesic or analgesic phenomena in association with self-injury (Leibenluft et al., 1987).

Russ et al. (1993) reported that the absence of pain during episodes of self-injurious behavior in women with BPD was related to higher levels of anxiety, depression, dissociation, impulsiveness, trauma symptoms and suicide attempts, as compared with a group of pain-sensitive patients with BPD. Etiopathological concepts discuss stress-induced analgesia in patients with BPD and patients with dissociative disorder as a component of conditioned defensive reactions following early inescapable stress or trauma (Nijenhuis et al., 1998). Despite its clinical and etiopathological relevance, few experimental studies have been carried out to date on the perception and tolerance of pain among female patients with BPD.

Russ et al. (1992) validated the clinical experience under experimental conditions. They found, as compared with non-BPD control subjects and BPD patients who reported pain during self-injury, significantly attenuated pain perception in BPD patients who reported not feeling pain during self-injury. McCown et al. (1993) studied pain tolerance in patients with BPD, patients with other personality disorders and healthy control subjects. They found no significant differences between groups in the length of hand immersion in the Cold Pressor Test (CPT), but observed prolonged tolerance of pain in the BPD group after administration of uncontrollable stress. Patients in this study were not selected according to criteria relating to self-mutilation or self-reported analgesia.

Our own as yet unpublished studies demonstrated that BPD patients frequently develop states of intense distress under everyday conditions as well. Among BPD patients as compared with healthy control subjects, these states occur significantly more frequently, increase more rapidly and are experienced as being very intense. Furthermore, we were able to show that these intensely aversive states clearly correlate with the perceived failure to sense the body or parts thereof, as well as with the patients' perceived insensitivity to pain. However, neither Russ et al. (1992) nor McCown et al. (1993) assessed the mediating variable of subjective adaptation under test conditions, so that results found by Russ et al. could be interpreted as being epiphenomena of high stress under test conditions. Neither was the analgesic effect of psychotropic medication considered: 7 out of 20 patients in the study of McCown et al. (1993) were treated with neuroleptic medication and 8 of 11 patients who reported no pain in the first study of Russ et al. (1992) were on antidepressant or other psychotropic medication. In 1994, Russ et al. replicated their findings with a small sample of seven pain-insensitive, unmedicated BPD patients (Russ et al., 1994). Furthermore, Russ et al. (1992) employed only one pain-inducing paradigm, the CPT, which measures only superficial perception of pain.

The current study was undertaken to test the following three hypotheses: unmedicated patients with BPD under conditions of self-reported calmness (BPD-C) differ from their healthy counterparts with regard to pain perception. Pain perception by patients with BPD further decreases during conditions of self-reported distress (BPD-D). Decreased pain perception is demonstrated both in tests measuring superficial and ischemic pain.

2. Methods and materials

2.1. Subjects

Twelve female patients participated in the study. All fulfilled DSM-IV criteria for BPD as determined by the Structured Clinical Interview for DSM-IV Personality Disorders (SCID-II; First et al., 1996) and the Diagnostic Interview of

Borderline Personality Disorder, revised version (DIB-R, 8 items; Gunderson et al., 1981). The 12 patients were a subgroup (67%) of 18 female patients with BPD who were consecutively admitted to inpatient treatment with dialectical behavior therapy (DBT; Linehan et al., 1991). Only those patients were recruited who reported at least three incidents of self-mutilating behavior, in the absence of pain, within the past 2 years. Following Kreitman (1977), self-injurious behavior was defined as self-destructive behavior causing obvious tissue damage, without lethal intent or severity. Applying these criteria led us to exclude three patients who did not report any self-injury within the last 2 years and a further three patients who reported experiencing pain during superficial cutting. All patients included in the study were free of psychotropic drugs at the time of testing, with a drug-free interval of 14 days in the case of antidepressants and 4 weeks in the case of neuroleptic medication. Patients were excluded if they had a history of peripheral vascular disease or had used alcohol or illicit drugs within 1 month before beginning the study. Axis I comorbidity of the patients is listed in Table 1.

A group of 19 healthy women served as healthy control subjects (HC). Patients in the control group were free of Axis I disorders according to DSM-IV (SCID-I) and revealed no psychiatric disorders among first-degree relatives. We further used SCID-II to rule out BPD. Other Axis II disorders were not excluded. Since there is evidence that age (Walsh et al., 1989; Zeltzer et al., 1989), nicotine abuse (Pomerleau et al., 1984) and the state of the menstrual cycle (Riley et al., 1999) all influence pain perception, BPD patients and control subjects were matched with respect to age, weight, proportion of smokers, and state of the menstrual cycle (mean age BPD: 29.1 ± 8.4; HC: 27.3 ± 7.8 [$P = 0.1$]; weight BPD: 65.8 ± 15.4; HC: 64.1 ± 6.8 [$P > 0.1$]; smokers BPD: 58%; HC: 37%; follicular phase BPD: 53%; HC 47%; luteal phase BPD: 33%; HC: 53%; unknown BPD 17%).

Table 1
Axis I — disorders of BPD patients

	N	%
Anorexia	0	0.0
Bulimia	4	36.4
Binge eating	0	0.0
Panic disorder	3	27.3
Agoraphobia	2	18.2
Social phobia	3	27.3
Spec. phobia	0	0.0
GAD	1	9.1
PTSD	2	18.2
OCD	1	9.1
Depressive disorder	3	27.3

All subjects gave written informed consent prior to participation. The study was approved by the ethical board of the University of Freiburg Medical School.

2.2. Procedure

Prior to subjects' participation in the study, basal dysfunction of the central and peripheral conduction systems was ruled out by somatosensory evoked potentials and sensory neurography of the median and ulnar nerve (Kimura, 1989).

All tests were carried out in a quiet room with a constant atmospheric temperature of 20.5°C. Test persons were introduced in detail to the test procedure to familiarize them with the test supervisor, the rooms, the apparatus and the questionnaire. Following introduction, the control group was assessed during self-reported calmness conditions. BPD patients were assessed twice during different clinical conditions: during conditions of self-reported calmness (BPD-C) and during self-reported distress (BPD-D). The patients were instructed to inform the test supervisor if they found themselves to be experiencing distress or tension, that is, if they were in a state of strong inner pressure to injure themselves. The investigation was started within 45 min after instruction. The sequence of the two measurements in BPD patients was randomly permutated.

Before and after application of the Cold Pressor Test (CPT) as well as after the Tourniquet Pain Test (TPT), a nine-item Likert self-rating scale ('How intense is your current level of distress?') with a range between 0 (very low) and 9 (maximal) was administered. The study was carried out in the German language, employing here

the widely used term 'Spannung', which describes a state of highly aversive bodily and psychic arousal. We translate this here as 'distress'. Based on the theory originated by Thayer et al. (1994), distress can be defined as a conscious component of dysphoric mood. Common strategies in mood regulation include distress- or tension-reducing behavior (Thayer et al., 1994).

In addition, the following aspects of the patient's current state were self-rated on a nine-point Likert scale: 'Do you have difficulties in experiencing your body or part of it (numbness)?'; 'Do you have problems in seeing as normal?'; 'Do you have problems in hearing as normal?'; 'Are you experiencing insensitivity to pain in the body or parts of it (anesthesia)?'. These items were derived from the SDQ-5 (Somatoform Dissociation Questionnaire) (Nijenhuis et al., 1997) and the DES (Dissociative Experience Scale) (Bernstein et al., 1986). The TPT was performed after a 30-min break following the CPT.

2.2.1. Cold Pressor Test (CPT)

The CPT was selected as an ethical, low-risk procedure to expose subjects to painful stressors. The test was administered in a modified version of the procedure standardized by Efran et al. (1989) at a temperature of 10°C instead of 1°C. The participant immersed her dominant hand (as assessed by the Edinburgh Handedness Inventory; Bryden, 1982) up to the wrist in an insulated container of cold water (10°C) that was kept in motion by means of a magnetic stirring device. The participant was required to keep pressing a button at the bottom of the container, to minimize variation with regard to the immersion and movement of the hand. Every 15 s she was asked to rate the intensity and the unpleasantness of the pain on a scale from 0 (not present) to 9 (maximal). The test was stopped after 4 min, when the participant placed her hand in a water bath that was gradually warmed over several minutes to prevent pain due to rapid change of temperature.

2.2.2. Tourniquet Pain Test (TPT)

The assessment of pain and tolerance thresholds for muscular pain is based on the fact that the muscles are performing under reduced blood circulation, namely ischemia. Using this method, pain in the muscles of the arm is provoked by pumping up a blood pressure cuff while instructing the participant to contract the hand. Prior to carrying out this test, the maximum strength of the dominant hand is measured by means of a vigorimeter (Martin Vigorimeter). The blood pressure cuff is affixed to the upper arm and rapidly pumped up to a value of 30 mmHg above the highest previous measurement. The patient is instructed to use half her hand's strength to depress the hand bellows of the vigorimeter approximately 40 times/min (paced by a metronome: Wittner taktell electronic). The time is measured in seconds from the onset of muscle performance to the point at which pain is experienced ('threshold') and up to the point where the test is terminated by the participant ('termination'). Furthermore, the intensity and unpleasantness of pain at termination (on a 0–9 scale) are assessed. If the participant does not end the test prematurely, the test supervisor stops the test at the latest after 4 min. The dominant arm is covered with a towel, since the sight of the skin turning blue is sometimes more distressing to the participant person than the pain she is feeling.

2.2.3. Determination of skin conductance and heart rate

Physiological data were recorded using the Kölner Vitaport I System (Becker Ingenieurbüro, Karlsruhe, Germany). The system is capable of recording 16 channels and includes amplifier, analog and digital filters, an analog-to-digital converter, a microprocessor, and memory. An electrocardiogram was obtained (400-Hz sample rate) from three electrodes (Blue sensor, Medicotest) attached to the chest. Two electrodes were active, placed over the middle of the right collarbone and below the left lowest rib, and one was ground. Skin conductance (6-Hz sample rate) was recorded from thenar and hypothenar of the non-dominant hand. Disposable Ag/AgCl electrodes with a contact surface area of 0.7 cm^2 and an isotonic electrode paste were used. Evaluation of data was done with a software package of the Forschungsgruppe Psychophysiologie Universität Freiburg.

2.2.4. Data analysis

Statistical analysis of the data was carried out with SPSS for Windows, Version 7.5, and SAS. Data for the CPT were analyzed using a two-factor multivariate analysis of variance (MANOVA) with repeated measurements on log-transformed data of rated pain intensity and unpleasantness. Since the study involved both between-subjects (HC vs. BPD) and within-subjects (BPD-C vs. BPD-D) comparisons, it was not possible to include all the required tests within a single statistical model. Rather, three tests were run on each dependent measure: BPD-D vs. HC and BPD-C vs. HC were between-subjects analyses; BPD-D vs. BPD-C was a within-subjects analysis. Main effects and interactions were determined for the factors group and time, i.e. 15-s intervals. Data for the TPT were analyzed by means of a survival analysis according to Kaplan-Meier. Comparison of the groups was done by a log-rank test (Mantel-Haenszel). Group differences in psychopathological variables were assessed via non-parametric tests for paired or unpaired observations, as appropriate.

3. Results

3.1. Self-ratings

Before performing the CPT, control subjects and BPD patients had to rate their current conditions on the nine-item self-rating scale which assessed the level of distress, numbness, difficulties in optic or acoustic perception, and anesthesia. The mean values for the BPD-C group and the control group did not reveal any significant difference. During distress (BPD-D), however, patients rated themselves higher than during calmness on all items except for numbness (see Table 2).

All items were re-rated after the CPT and after the TPT. Ratings did not change significantly as compared to pre-test self-ratings.

3.2. Cold Pressor Test (CPT)

All subjects completed the CPT. The two-factorial multivariate analysis of variance (MANOVA) with repeated measurements found significant differences between groups for rated pain intensity and unpleasantness of pain (see Figs. 1 and 2). Comparison of control subjects and BPD-C revealed significant main effects for group on pain intensity ($F_{1,29} = 38.8,\ P < 0.001$) and unpleasantness ($F_{1,29} = 23.3,\ P < 0.001$) as well as significant main effects for time on pain intensity ($F_{15,435} = 10.9,\ P < 0.001$) and unpleasantness ($F_{15,435} = 7.4,\ P < 0.001$). As expected, the interaction term group $\times$ time was not significant for both pain intensity ($F_{15,435} = 0.7,\ P = 0.789$) and unpleasantness ($F_{15,435} = 1.1,\ P = 0.0.39$) which is illustrated in a rather parallel curve course (Figs. 1 and 2). Similar significant main effects for group and time were observed when control subjects and BPD-D patients were compared (Figs. 1 and 2). However, whereas the interaction term group $\times$ time on unpleasantness was not significant ($F_{15,435} = 1.1,\ P = 0.5$), the interaction term was

Table 2
Pre-test self-ratings in 19 control subjects and 12 BPD patients during self-reported calmness (C) and distress (D)[a]

	Controls (HC)		BPD-C		BPD-D		*P*-values		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	HC-BPD-C	HC-BPD-D	BPD-C-BPD-D
Distress	1.37	1.07	2.09	1.14	6.58	1.38	0.91	0.00	0.00
Numbness	0.21	0.54	0.75	2.95	2.67	2.84	0.39	0.01	0.11
Optic system	0.11	0.32	0.00	0.00	2.00	3.22	0.16	0.07	0.05
Acoustic syst.	0.05	0.23	0.25	0.62	1.92	2.78	0.31	0.04	0.04
Anesthesia	0.16	0.50	0.42	1.00	3.58	2.54	0.42	0.00	0.00

[a] Rating values are given as mean and S.D. from the nine-point Likert scale.

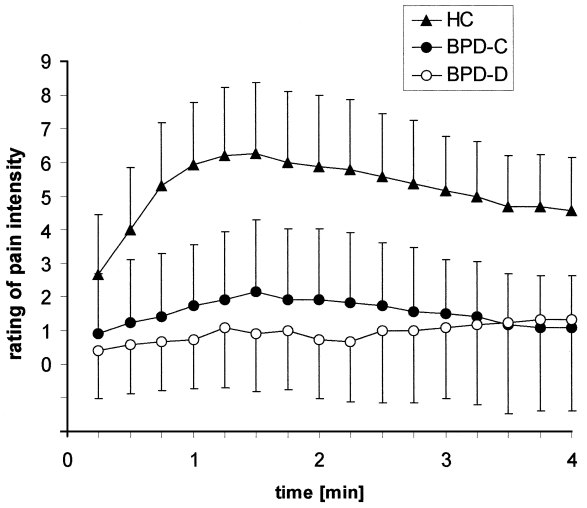

Fig. 1. Rating of pain intensity during the Cold Pressor Test (CPT) for control subjects as well as BPD patients during calmness and distress conditions. Rating values are given as mean ± S.D. and stem from the nine-item Likert Scale with a range between 0 (not present) and 9 (maximal).

significant on pain intensity ($F_{15,435} = 2.6$, $P < 0.001$) indicating a divergent curve course between control subjects and BPD-D patients. Comparison of BPD patients during calmness and distress conditions showed a further reduction in unpleasantness and reported pain intensity during distress. Significant main effects were revealed for group on pain intensity ($F_{1,11} = 7.0$, $P < 0.05$) and unpleasantness ($F_{1,11} = 17.8$, $P < 0.01$) as well as significant main effects for time on pain intensity ($F_{15,165} = 2.0$, $P < 0.05$) and unpleasantness ($F_{15,165} = 2.5$, $P < 0.01$). The interaction term status × time was significant for pain intensity ($F_{15,165} = 1.8$, $P < 0.05$) reflecting a divergent curve course during the two different conditions.

3.3. Tourniquet Pain Test (TPT)

The TPT was analyzed by means of a survival analysis according to Kaplan-Meier due to the frequent lack of reported pain by BPD patients. Single case analysis revealed that all control subjects reported pain during the test. In contrast, under calmness conditions (BPD-C) only 8 of 12 and during distress (BPD-D) only 4 of 12 BPD patients reported the experience of pain during the test. Furthermore, all control subjects terminated the test because of intolerable pain. In contrast, 10 of 12 BPD patients during calmness and 9 of 12 BPD patients during distress terminated the test because of exhaustion but not because pain was present or no longer tolerable.

'Pain threshold' is defined as the time from onset of muscle performance to the point when pain is reported. To apply strong criteria for those subjects who did not report any pain at all (only BPD patients), we used the time to termination as an estimate of time to onset of pain. Statistical analysis revealed that pain started significantly later in BPD patients during calmness and distress than in control subjects as well as between the two different conditions in BPD patients ($P < 0.05$; $P < 0.01$; $P < 0.05$) (HC mean: 63.1 s; S.D. 17.2; BPD-C mean s: 83.3; S.D. 24.8; BPD-D mean 119.3 s; S.D.: 61.0; HC; $P < 0.01$; Fig. 3a). Time until termination of the test was not different between groups (Fig. 3a) (HC: mean 111.7 s; S.D. 51.6; DBT-C: mean 111.0 s; S.D. 34.1; DBT-D: mean 131.1; S.D. 55.0).

Differences in intensity and unpleasantness of

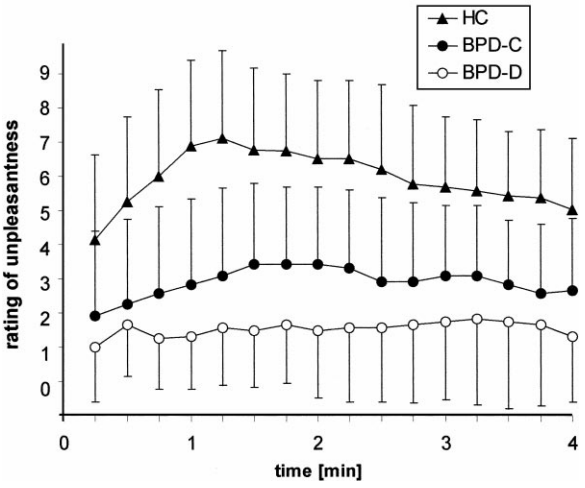

Fig. 2. Rating of unpleasantness during the Cold Pressor Test (CPT) for control subjects as well as BPD patients during calmness and distress conditions. Rating values are given as mean ± S.D. and stem from the nine-item Likert Scale with a range between 0 (not present) and 9 (maximal).

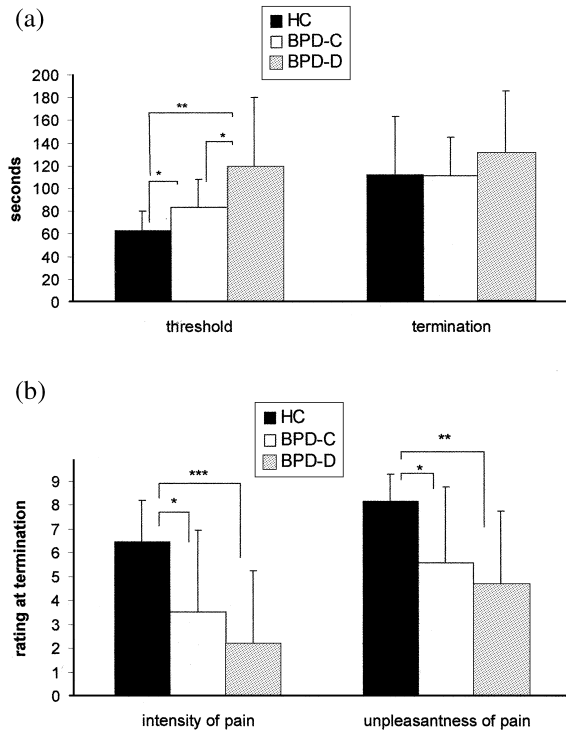

Fig. 3. Tourniquet Pain Test (TPT). (a) Mean ± S.D. for 'threshold' (time in s until start of pain) and 'termination' (time in s until termination of the test). (b) Intensity of pain and unpleasantness of pain at termination. $^{*}P < 0.05$; $^{**}P < 0.01$; $^{***}P < 0.001$.

pain at termination were analyzed by non-parametric tests for unpaired or paired samples, as appropriate. As shown in Fig. 3b, pain at termination was rated significantly lower as compared to control subjects in BPD-C patients ($P < 0.05$) and BPD-D patients ($P < 0.001$), but did not differ significantly between BPD-C and BPD-D patients. Unpleasantness of pain at termination was also significantly lower as compared to control subjects in BPD-C patients ($P < 0.05$) and BPD-D patients ($P < 0.01$), but again did not differ for BPD patients under the two conditions (Fig. 3b).

3.4. Physiological measures

Data for physiological base rates and autonomic responses are given in Table 3. Before the CPT (base rates), heart rate was significantly different in BPD-D patients and control subjects [$t(16,8) = 3.857$; $P < 0.01$], but did not differ between the two conditions for BPD patients. SCRF in patients during distress differed significantly from SCRF in BPD patients when calm [$t(11) = -2.95$; $P < 0.02$] and in control subjects [$t(12,2) = -2.546$; $P < 0.05$].

During and after the CPT (autonomic responses), there were no significant differences, owing to individual response patterns (Rachman and Hodgson 1974) causing high variances in each group. Because of the small sample size, further statistical analysis was not possible.

4. Discussion

This study shows that self-mutilating patients with BPD who report analgesia during self-injury reveal highly significantly reduced sensitivity to pain compared to healthy control subjects, despite there being no difference in self-reported distress during the experimental procedure between the two groups. When experiencing high levels of distress and a strong urge for self-injury, this difference in pain perception is further

Table 3
Mean ± S.D. for heart rate (HR) and skin conductance response fluctuations (SCRF) before, during, and after the Cold Pressor Test (CPT) in control subjects ($n = 19$) and BPD patients ($n = 12$) during distress and calmness conditions

	Before CPT		During CPT		After CPT	
	HR	SCRF	HR	SCRF	HR	SCRF
Control subjects	68.8 ± 6.9	0.6 ± 0.9	72.8 ± 7.2	3.1 ± 2.9	65.2 ± 6.2	0.5 ± 1.1
BPD calmness	75.9 ± 15.8	0.8 ± 1.3	77.9 ± 16.4	2.0 ± 2.6	74.2 ± 14.7	1.5 ± 1.8
BPD distress	79.7 ± 10.8	2.2 ± 2.1	79.6 ± 12.0	1.7 ± 2.0	76.6 ± 11.2	1.0 ± 1.5

enhanced. Differences in pain perception were seen both in the CPT, measuring superficial pain, and the TPT, measuring deeper (ischemic) pain.

Our results concerning pain perception confirm and extend previous findings made by Russ et al. (1992). Since the study by Russ et al. (1992) did not assess the parameter 'stress', it was so far unclear whether the findings obtained were the result of strong test stress leading to test-stress-induced analgesia. Since the self-ratings of current distress did not reveal any difference between BPD-C and healthy control subjects, the present results rule out this artifact. In addition, these data demonstrate that pain insensitivity is not necessary correlated with the subjective awareness of stress, as usually reported by BPD patients. In contrast to conditions of subjective stress, during conditions of calmness, patients did not expect to be hyposensitive to pain. Therefore, and due to the randomized order of testing, it is unlikely that the differences in reported pain experience are results of patients' biased expectations.

A further problem in the first study by Russ et al. (1992) was that many patients had received psychotropic medication. Twelve of 22 patients were on antidepressants, which themselves have analgesic properties. Since all of our patients were free of psychotropic medication, the difference in the pain ratings by BPD patients and those by healthy control subjects are most likely due to the pathology of BPD and not to a non-specific medication effect. These findings confirm the data of Russ et al. (1994) in a small sample of unmedicated pain-insensitive patients.

Discrepant with both our study and the study by Russ et al. (1992), McCown et al. (1993) found no significant differences between BDP patients and control subjects in pain perception under non-stress conditions as measured by the maximal tolerated length of hand immersion in the CPT. This discrepancy may be attributed to the different experimental designs or to the fact that McCown et al. (1993) included BPD patients in their study irrespective of whether or not they reported pain during self-injurious behavior.

We further evaluated pain perception in a second pain model, the Tourniquet Pain Test (TPT). Interestingly, a significant proportion of BPD patients did not perceive pain at all during the test, whereas all control subjects terminated the test because of intolerable pain. Furthermore, the time until the occurrence of pain was longer in patients with BPD and longest in patients during stress. This test further documented the lower pain perception in BPD patients as compared to control subjects in a test which measures deep (ischemic) pain.

As the curves in Fig. 1 demonstrate, there is a significant interaction between status and time for pain intensity reflecting a divergent curve course during distress compared to calmness conditions. That might mean that exposure to pain may increase the sensitivity for pain in BPD patients experiencing distress. These findings are in line with experiments of Buchsbaum et al. (1983) who reported that pain enhances naloxone-induced hyperalgesia in humans and with the clinical observation that BPD patients use ice to develop stress-tolerance skills during states of analgesia.

Experience of pain consists of a number of discriminative and attitudinal components (Clark et al., 1995). Clark distinguishes between two major dimensions: the neurosensory aspect and the psychological/attitudinal aspect. It remains unclear which components are primarily responsible for the decreased pain sensitivity in this subgroup of BPD patients. Russ et al. (1996) reported that BPD patients who reported analgesia during self-injury were less able to discriminate between imaginary painful and mildly painful situations than were both BPD patients who experienced pain and normal control subjects. This might be interpreted as evidence for involvement of cognitive/affective factors. On the other hand, the influence of state factors that hamper neurosensory discrimination should also be taken into account. Our self-rating data suggest that lowered pain perception during stress is part of a more general stress-induced dissociative process. During subjective distress, patients not only showed increased physiological activation as measured by heart rate and SCRF, but most of them also reported attenuated sensitivity to touch, alterations of their optical and acoustical sensitivities

as well as a loss of the inner representation of the body or parts thereof. Again, these data confirm previous results of Russ et al. (1993), who found a strong correlation between self-reported pain insensitivity and dissociative features. In addition, there is evidence for a positive correlation between dissociation and self-reported traumatic experience, post-traumatic symptoms, behavioral dyscontrol, self-injurious behavior and alcohol abuse (Shearer, 1994).

Seventy-five percent (9 out of 12) of the BPD patients participating in the present study reported continuous sexual abuse while younger than the age of 12 years. This may well fit with the hypothesis that stress-induced analgesia and dissociative experiences are part of a defence mechanism to cope with traumatic experiences (Nijenhuis et al., 1998). In line with that is the observation that stress-induced analgesia has also been shown in individuals with post-traumatic stress disorder (PTSD). For example, Van der Kolk et al. (1989) compared Vietnam veterans with PTSD to a matched cohort of veterans without PTSD and found that their sensitivity to pain decreased significantly after having watched a combat videotape.

However, our data do not fully support this appealing hypothesis. Under conditions of calmness, BPD patients did not differ from healthy control subjects in experiencing dissociative features, but nevertheless revealed a highly significantly increased pain threshold. Thus, these findings give some support for a state-independent neurosensory alteration which may become accentuated when the patient experiences stress or stress-related dissociative features. The underlying neurobiological mechanisms remain to be elucidated. There is some evidence that alterations of the opioid system might play a role (Buchsbaum et al., 1977; Bohus et al., 1999), but this suggestion is controversial (Russ, 1994).

Some limitations of this study must be acknowledged. As previously shown, aberrations of pain perception also occur in other psychiatric disorders such as affective disorders, anxiety disorders and eating disorders (for review, see Lautenbacher and Krieg, 1994). Therefore, the parallel investigation of clinical control groups (e.g. with self-destructive behavior) is required. In addition, both tests, the CPT and the TPQ, depend on self-reports. It cannot be ruled out that patients who report experiencing no pain during self-mutilation may be biased to report a lower sensitivity under laboratory conditions. Evaluation of the current state of experiencing insensitivity just before the experiments might also have been problematic. Assessing pain sensitivity with somatosensory evoked potentials will clarify this problem.

We further stress that these data were collected from a clinical subgroup of female BPD patients. Taking into account that approximately 60–70% of patients with BPD are engaged in self-mutilation and only 50–70% report analgesia, approximately 30–50% of patients who meet the criteria of DSM-IV are represented by this subgroup. But, as previously noticed, this subgroup of patients seems to experience more severe psychopathology on several dimensions than the pain-sensitive subgroup. This is reflected in our clinical sample at a center for the treatment of severely disturbed patients, where the investigated subgroup covers approximately 65% of all admitted female patients with BPD. In addition, taking into account the widespread and heterogeneous symptomatology of BPD, neurobiological investigations of pathophysiological mechanisms only make sense if they focus on operationalized distinguished subgroups. The results of this study underline the relevance of pain sensitivity as a discriminating variable in the search for such subgroups.

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