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ScienceDirect

Comprehensive Psychiatry 77 (2017) 80–88

COMPREHENSIVE PSYCHIATRY

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The relationship between non-suicidal self-injury and alexithymia in borderline personality disorder: "Actions instead of words"

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Abstract

Introduction: Borderline personality disorder (BPD) is a serious mental illness that centers on the inability to effectively regulate emotions. A large amount of BPD patients engage in non-suicidal self-injury (NSSI). Given the NSSI contributes to serious health risks, it is important to know why some BPD patients engage in NSSI and others do not. A possible associated factor of NSSI in BPD may be alexithymia, which reflects difficulties in identifying and communicating feelings. Therefore the aim of the present study was to investigate whether NSSI was associated with alexithymia and whether this association still stood when controlling for gender and depression.
Methods: The current study explored the relationship between NSSI and alexithymia in 185 BPD patients by means of the Self-Injury Questionnaire-Treatment Related and the Toronto Alexithymia Scale-20 (TAS).
Results: Of the 185 BPD inpatients, 82.7% reported life-time NSSI, of whom 52.9% were still engaging in current NSSI; and 71.3% scored in the alexithymic range (cut-off score ≥ 61). Current NSSI was significantly associated with TAS-total. Additionally, when considering the separate TAS subscales Difficulties Describing Feelings (DDF), Difficulties Identifying Feelings (DIF) and Externally Oriented Thinking (EOT), only DDF was significantly associated with NSSI, even after controlling for gender and depression.
Conclusion: These results suggest that NSSI in BPD patients is associated with alexithymia. More specific, difficulties describing feelings can lead to NSSI, independently of the depressive status of the BPD patient. The implications for clinical treatment of self-injurious BPD patients will be discussed.
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1. Introduction

The essential feature of the borderline personality disorder (BPD) is a pervasive pattern of instability in emotions, as well as impulsivity [1]. The inability to regulate emotions has been identified as the core feature of BPD [2], and underlies many associated behaviors of BPD, including non-suicidal self-injury (NSSI) [3]. In both, BPD patients and patients with NSSI, alexithymia or the incapacity to identify and communicate about emotions, is frequently described [4–6]. Therefore, it could be hypothesized that alexithymia is related to NSSI in BPD patients, however empirical evidence is needed to confirm this.

More than 70% of BPD patients report a history of multiple episodes of NSSI and the use of multiple methods of NSSI [7]. NSSI can pose serious health risks, like the risk for severe tissue damage and a higher risk for suicidal behavior [8] and death by suicide [9]. NSSI is often implicated in the high levels of health care utilization among individuals with BPD [10]. NSSI is defined as the repetitive, deliberate, direct, and socially unaccepted destruction or alteration of one's own body tissue without the intent to die [1]. Common methods of NSSI in BPD are cutting, scratching, burning, and hitting oneself as well as head-banging. More than 90% of the BPD patients use more than one method to engage in NSSI, with an average number of four methods [11]. Research indicates that NSSI can be considered as a dysfunctional emotion-regulation strategy [6]. This is particularly true for individuals with BPD, of whom more than 95% engage in NSSI for emotional relief [12] or to communicate with or influence others [13]. It still is unclear why some BPD patients engage in NSSI and others do not use this maladaptive strategy. Understanding the factors that contribute to NSSI can be an essential component in defining targets for the treatment of NSSI in BPD patients. A possible contributing factor of NSSI is the difficulties with describing

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http://dx.doi.org/10.1016/j.comppsych.2017.06.006
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emotions, as already suggested in 1981 by Doctors [14] who related NSSI with difficulties in verbal expression of emotions. The inability to describe emotions with words is also known as alexithymia, literally "no words for emotions". The definition of alexithymia according to Taylor et al. [15] includes three main factors: 1) difficulties identifying feelings and distinguishing between feelings and the body sensations of emotional arousal (DIF), 2) difficulties describing and verbalizing feelings to others (DDF), and 3) an externally oriented thinking style (EOT) [15,16]. Alexithymia has been described in different psychiatric populations including BPD. For example, in a meta-analysis of Derks et al. [17], a moderate positive relationship between Borderline Personality Pathology and alexithymia was demonstrated. The strongest associations were found between BPD and two alexithymia factors 'difficulties in identifying feelings' and 'difficulties describing feelings'. Six studies investigating alexithymia in BPD patients by means of the Toronto Alexithymia Scale (cut-off > 65) [18], and all reported a high prevalence rate of alexithymia ranging from 65 to 80% [19–24].

Previous studies have reported a positive association between alexithymia and NSSI (e.g., [25]), but not yet in a BPD sample. In a systematic review of fifteen studies (7 studies in community and 8 in clinical samples) concerning the relationship between alexithymia and NSSI, Norman et al. [4] reported that all studies found significantly higher levels of alexithymia (more specifically difficulties identifying and describing feelings) among individuals with NSSI compared to individuals without NSSI, a significant correlation between alexithymia and NSSI and/or alexithymia as a significant predictor of NSSI. In sum, Norman et al. [4] stipulated that there is evidence that alexithymic individuals, who struggle to understand and communicate their feelings, might engage in NSSI to regulate their emotions, particularly in females. However, for men the results were less conclusive. For example, in students and addicted patients no differences in alexithymia were found between males with and without NSSI. Furthermore, in adolescent samples depression was found to be a partially or fully mediator between alexithymia and NSSI. So, it is suggested to investigate the link between NSSI and alexithymia in males too and also to integrate the role of confounding variables, such as depression, which may explain the relationship between alexithymia and NSSI [4].

Surprisingly, to our knowledge, no research so far has explored differences in alexithymia in BPD patients with and without NSSI. This is peculiar since NSSI and also alexithymia is highly prevalent in this patient group. Additionally, treatment for BPD patients usually focus on explicit emotion awareness and communicating emotions, as for example in Dialectic Behavior Therapy (DBT) [26]. For this reason it seems important to know the relationship between alexithymia and explicitly difficulties identifying and/or describing feelings and the current NSSI engagement in a BPD inpatient population to get a more specific target in treatment. Therefore, the aims of the present study was threefold: (1) to describe NSSI and alexithymia characteristics in an inpatient BPD sample and to look at their interrelation, their correlation with depression and differences between gender (2) to investigate if current NSSI is associated with the alexithymia total score and if so, which alexithymia factor score would be most strongly associated with NSSI (3) to investigate if current NSSI is still associated with alexithymia total and factor scores after controlling for gender and depression, because of the inconsistency in effect of gender and the confounding effect of depression on the relationship between alexithymia and NSSI [4]. Although this study was exploratory in nature, several hypotheses were developed based on prior research. First, we expected a high prevalence of life-time and current NSSI and alexithymia in the BPD inpatients. Further, we expected positive correlations between current NSSI and total alexithymia and more specifically with the factors difficulties identifying feelings and difficulties describing feelings based on previous studies [4]. Second, we hypothesized that current NSSI would be associated with total alexithymia and that this would be mostly explained by the factors difficulties identifying and difficulties describing feelings. This would mean that BPD patients who have the most difficulties with the identification and verbalization of emotions would engage the most in NSSI compared to the BPD patients who can identify and express their feelings verbally. Third, we hypothesized that the association between current NSSI and total alexithymia and also by difficulties identifying and describing feelings would still stand after control for gender and depression.

2. Methods

2.1. Participants and procedure

Data from 185 in patients with BPD were recruited, between 2014 and 2016, in two specialized treatment units for BPD in Belgium. Both units provide inpatient-treatment based on the principles of Dialectical Behavior Therapy, involving the four standard DBT modules with individual DBT psychotherapy twice a week, weekly DBT skills group training, 24-h coaching and therapist consultation team [26]. Patients admitted in the units need a normal intelligence to participate in the DBT program, and a current substance abuse or symptoms of a psychotic disorder are considered as exclusion criteria. During the first weeks of admission, all patients, were informed about the study and invited to participate. After providing written informed consent, patients received the questionnaires on paper or were asked to fill them out on a computer in the clinic or at home. Patients were included in the study when they fulfilled the diagnosis of BPD. Of the total sample of 185, 150 patients met the BPD diagnosis as assessed by means of the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II [27]; Dutch translation [28]) and cross-validated with the self-report Assessment of DSM-IV Personality Disorders - Borderline scale (ADP-IV) [29] to confirm the diagnosis. The other 35 patients were included solely based on the BPD diagnosis as assessed by means of the ADP-IV self-report ratings, i.e. they fulfilled at least 5 out of the 9 BPD diagnostic criteria

according to the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) [30].

All patients included in the study were Caucasian, between 18 and 64 years of age, and were allowed to be under pharmacological treatment. The study was developed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the allied University and the local ethical committees of the participating hospitals. Participants did not receive any remuneration, however, they could receive individual feedback concerning their own test result.

2.2. Measures

The Borderline Personality Disorder was assessed by means of the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II [27]; Dutch translation [28]). Inter-rater reliability of the SCID-II ranges from 0.90 to 0.98 for dimensional judgments and internal consistency coefficients range from 0.71 to 0.94 [31].

The Borderline Personality Disorder and other personality disorders were assessed by means of the Assessment of DSM-IV Personality Disorders (ADP-IV) [29], a 94-item Dutch self-report questionnaire used to assess the presence and severity of symptoms related to the 10 personality disorders defined in the DSM-IV-TR [30]. Items on the ADP-IV are rated first for the degree to which the traits apply to the respondent (1 = 'totally disagree' to 7 = 'totally agree'). For items that are rated as relevant at a moderate or higher level (score 5 till 7), participants also rated the degree to which that trait results in problems or distress for the respondent or others (1 = 'not at all', 3 = 'most certainly'). A categorical rating of a PD disorder can be obtained according to the DSM-IV threshold [30], by counting the number of items (i.e., criteria) that are scored at least 5 on the trait scale and at least 2 on the distress scale (Trait > 4, Distress > 1). Dimensional scores can be computed by summing the Trait scores on the individual items for each PD scale. The dimensional ADP-IV scales display acceptable internal consistency values, with Cronbach's alphas ranging from 0.64 to 0.88 and shows good convergent validity with the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II) [29–30,32]. The alpha coefficient for all the PD dimensional scores in the present study ranged from $\alpha = 0.61$ (schizoid PD) to $\alpha = 0.84$ (paranoid PD), with $\alpha = 0.63$ for BPD. Schotte et al. [32] indicated that the ADP-IV-Borderline scale showed acceptable concordance with the Structured Clinical Interview for *DSM*–IV Axis II borderline personality disorder section (SCID-II – Borderline section), for the BPD dimensional score (Pearson correlation = 0.57) and for the categorical diagnosis (kappa = 0.54) [32].

Clinical symptomatology was assessed by means of the translated Brief Symptom Inventory (BSI) [33,34]. The BSI consists of 53 items, to be rated on a four-point Likert-style scale ranging from 0 ('not at all') to 4 ('extremely'). Besides a global severity index (BSI – total), the BSI provides 9 symptom scales, being somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. In previous studies, the BSI has demonstrated good psychometric properties, showing satisfactory indexes of internal consistency and test-retest reliability, with internal reliability coefficients showing an average rating above 0.70 for the scales and the range for test-retest reliability 0.68 to 0.91 [35]. In the present study, the BSI scales demonstrated acceptable internal consistency coefficients (except for psychoticism, $\alpha = 0.46$), ranging from $\alpha = 0.69$ (paranoid thinking) to $\alpha = 0.84$ (depression) and $\alpha = 0.90$ for BSI – total score.

Non-suicidal self-injury was assessed by means of the Self-Injury Questionnaire-Treatment Related (SIQ-TR) [36]. Participants had to answer whether they had ever engaged in self-injury without suicidal intention (yes/no format), and if yes, to indicate if they had engaged in scraping, scratching, cutting, bruising, burning, pricking or head banging and if they currently engage in NSSI. The age of onset of NSSI and frequency of NSSI (1–5 days/during the last year, 6–10, 11–15, >15) were assessed. NSSI Versatility, which can be considered as a measure of NSSI severity, was calculated by counting the number of different methods endorsed, ranging from 1 to 7. The localization of NSSI on the body (e.g. head, arms) was also assessed. In addition, functionality of NSSI was investigated by means of 18 function items to be rated on 5 point Likert scale. Designed specifically for use in clinical populations, the reliability and validity of the measure have been demonstrated in clinical groups [36]. The alpha coefficient of the different types of NSSI was 0.62 in a previous study [36] and 0.61 in our sample.

Alexithymia was assessed by means of the Toronto Alexithymia Scale – 20 (TAS-20) [17], a standardized self-report questionnaire to assess the presence and severity of the alexithymia construct. The questionnaire included 20 items to be rated on a 5-point Likert scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'); assessing the total and three alexithymia factors, being Difficulty Describing Feelings (DDF), Difficulty Identifying Feelings (DIF), and Externally Oriented Thinking (EOT). Research using the TAS-20 demonstrates adequate levels of reliability and discriminant, convergent, and concurrent validity [37]. The present sample showed adequate alpha coefficients, except for EOT, which was similar to earlier studies [38], with total TAS-score: $\alpha = 0.83$, DDF: $\alpha = 0.79$, DIF: $\alpha = 0.81$ and EOT: $\alpha = 0.48$.

2.3. Statistical analysis

Statistical analyses were performed with SPSS – version 23. There were no missing data given that the assessment on the computer did not allow for missing values and given that the paper and pencil questionnaires were checked for missing data. To describe the characteristics of NSSI and alexithymia features (aim 1), multiple descriptive statistics were used. To detect differences in NSSI lifetime between gender the Chi-square test statistic was used. *t*-Tests were

used to compare different NSSI features (versatility, frequency, methods) and also alexithymia features (TAS – Total, DDF, DIF, EOT) between females and males. Multivariate analysis of variance's (MANOVA) with Wilks Lambda was used to detect differences between gender in functions of NSSI. To detect differences in gender, educational level, marital status and medication between BPD patients with and without current NSSI the Chi-square test statistic was used. *t*-Tests were used to detect differences in clinical symptoms (BSI) and comorbid personality disorders (ADP-IV) between BPD patients with and without current NSSI. In addition, to evaluate the interrelation between NSSI and alexithymia features and their correlation with depression, Pearson's correlations were calculated. For the second aim, binary logistic regressions were used to examine whether and to what extent first total TAS-20 score and next the three TAS-subscale scores were associated with current NSSI. Also for the third aim, hierarchical binary logistic regression models were used to investigate whether and to what extent first total TAS-20 score and next the three TAS-subscale scores were associated with current NSSI above and beyond gender and depression. Analysis were conducted to ensure no violation of the assumption of collinearity in the regression analyses and indicated that multi-collinearity was not a concern.

3. Results

3.1. BPD sample characteristics

The sample of 185 BPD patients consisted of 160 females (86.5%) and 25 males (13.5%). The mean age of the sample was 30.03 years (*SD* = 8.62, range 18 to 62). Of the 185 BPD patients 17%, (*n* = 31) followed lower secondary education; 58.9% (*n* = 109) higher secondary education, and 24.3% (*n* = 45) high school or university. Most of the BPD patients (67.6%, *n* = 125) were single, 21.6% (*n* = 40) were living together/married, or 10.8% (*n* = 20) were divorced. There was no significant relationship between gender for education [$\chi 2$ (2) = 0.90, *p* = 0.636]; however marital status was significant related to gender [$\chi 2$ (2) = 6.72, *p* = 0.035], with more females being single and males being divorced. Concerning medication use, data was available of 175 patients of whom 78.6% used medication (60.5% antidepressants, 42.2% antipsychotics, 11% anxiolytics and 8.7% mood stabilizers).

3.2. NSSI in the BPD sample

Of the 185 BPD inpatients, 82.7% (*n* = 153) reported to have engaged in at least one type of NSSI behavior during their life-time, with no differences in function of gender [$\chi 2$ (1) = 0.03, *p* = 0.85]. All the characteristics of the different NSSI features and differences between men and women who reported life-time NSSI can be seen in Table 1. Severe cutting, superficial cutting, scratching/abrading and hitting oneself were the most prevalent NSSI methods used. Looking at the NSSI methods, 22% just used one method, the others used several methods, with a mean NSSI versatility (severity) of 3.23 (SD = 1.69), with no gender differences [*t*(150) = 0.42, *ns*]. The mean age of NSSI onset was 16.5 years (*SD* = 7.2, range 4–45 years), with females [*M* (*SD*) = 15.95 (6.22)] being significant younger than males when starting with NSSI [*M* (*SD*) = 19.81 (11.45); *t*(150) = −2.30, *p* = 0.023]. Assessing frequency, 17.5% of the BPD patients reported that they did not engage in NSSI during the last year, half of the patients reported to engage in NSSI > 15 days during the last year, and the others between 1 and 15 days. The body parts that were most often injured included the arms (83%), followed by the chest, legs, head and neck. The five most reported functions of NSSI are in descending order 'to avoid or suppress negative feelings' (*M* = 3.91, *SD* = 1.24), 'self-punishment' (*M* = 3.54, *SD* = 1.55), 'to avoid negative images or memories' (*M* = 3.42, *SD* = 1.47), 'to avoid feelings of emptiness' (*M* = 3.35, *SD* = 1.38) and 'to escape from a numb state' (*M* = 3.23, *SD* = 1.43), with no significant overall gender variation [Wilks Lambda = 0.99, *F*(5146) = 0.31, *p* = 0.91].

3.3. Characteristics of the BPD sample with life-time NSSI

Of all patients ever engaging in NSSI (*n* = 153), more than half of them (52.9%, *n* = 81) were still engaging in NSSI at the moment of assessment (current NSSI). Table 2 displays the means (standard deviations) and percentages and the comparisons between the characteristics of BPD patients with and without current NSSI. Overall, both groups did not significantly differ with regard to gender, age, educational level, marital status and medication use. However, patients with current NSSI scored significant higher on some clinical symptoms (interpersonal sensitivity, depression, anxiety, phobic anxiety, paranoid ideation and psychoticism) and comorbid personality disorders (schizoid, avoidant, dependent and obsessive-compulsive disorder-dimensions) compared to patients without current NSSI (see Table 2).

3.4. Alexithymia in the BPD sample

Using the alexithymia cut-off score (≥61) for the TAS-20 [18], 71.3% (*n* = 132) of the BPD inpatients were found to be alexithymic. The mean total TAS score was 65.66 (*SD* = 11.6), DDF 19.51 (SD = 4.3), DIF 25.85 (SD = 5.7) and EOT 20.3 (SD = 4.6) and was unrelated to gender [resp. *t*(183) = −0.49, *p* = 0.62; *t*(183) = −0.80, *p* = 0.030; *t*(183) = −0.48, *p* = 0.63; *t*(183) = 0.12, *p* = 0.90].

3.5. Associations between depression, NSSI features and alexithymia

Depression was positively related with current NSSI (*r* = 0.17; *p* < 0.05). Table 3 lists the correlations between depression and NSSI features and alexithymia. Positive correlations were found between depression and NSSI versatility (*r* = 0.26; *p* < 0.01) and frequency of NSSI

Table 1
Characteristics of NSSI features of 185 BPD patients (153 with lifetime NSSI) (numbers and percentages).

NSSI Characteristics	Total NSSI sample n = 153 (of n = 185; 82.7%)	Females with NSSI n = 132 (of n = 160; 82.5%)	Males with NSSI n = 21 (of n = 25; 84%)	Difference		
	n (%)	*n (%)*	*n (%)*	χ^2	*p*	*Phi*
Current NSSI	81 (52.9)	68 (51.5)	13 (61,9)	0.78	0.37	0.072
Methods						
Scraping	85 (556)	75 (56.8)	10 (47.6)	0.62	0.434	−0.064
Scratching/abrading	98 (64.1)	84 (63.6)	14 (66.7)	0.07	0.790	0.022
Cutting	113 (73.9)	99 (75.0)	14 (66.7)	0.65	0.423	−0.065
Bruising	80 (52.3)	69 (52.3)	11 (52.4)	0.01	0.993	0.001
Burning	51 (33.3)	46 (34.8)	5 (23.8)	0.99	0.320	−0.081
Pricking	52 (34.0)	44 (33.3)	8 (38.1)	0.18	0.671	0.035
Head banging	62 (40.5)	53 (40.2)	9 (42.9)	0.05	0.816	0.019
Body parts injured						
Arms, hands, fingers	127 (83)	111 (84.1)	16 (64)	0.80	0.374	−0.072
Legs, feet, toes	39 (25.5)	36 (27.3)	3 (14.3)	1.60	0.207	−0.103
Belly, torso, thights	38 (24.8)	32 (24.2)	6 (28.6)	0.18	0.672	0.034
Head, neck	35 (22.9)	34 (25.8)	1 (4.8)	4.53	0.001	−0.172
Genitals, breasts	5 (3.3)	5 (3.8)	0	0.82	0.368	−0.073
Frequency (days last year)						
0	27 (17.6)	25 (18.9)	2 (9.5)			
1–5	26 (17.0)	22 (16.7)	4 (19)			
6–10	10 (6.5)	9 (6.8)	1 (4.8)			
11–15	11 (7.2)	10 (7.6)	1 (4.8)			
>15	79 (51.6)	66 (50)	13 (61.9)			
Total numbers of methods						
1 method	34 (22.4)	31 (23.5)	3 (14.3)			
2 methods	27 (17.6)	21 (15.9)	6 (28.6)			
3 methods	24 (15.8)	19 (14.4)	5 (23.8)			
4 methods	28 (18.4)	26 (19.7)	2 (9.5)			
5 methods	25 (16.5)	21 (15.9)	4 (19)			
6 methods	15 (9.9)	14 (10.6)	6 (4.8)			

Phi = measure of degree of association.

(r = 0.23; $p < 0.01$). Positive correlations were also found between depression and TAS-total (r = 0.27; $p < 0.01$), DIF (r = 0.26; $p < 0.01$), DDF (r = 0.24; $p < 0.01$) and EOT (r = 0.15; $p < 0.05$). In addition, frequency of NSSI was positive correlated with DDF (=0.16; $p < 0.05$).

3.6. Current NSSI is associated with total alexithymia and by alexithymia factors

First, logistic regression analysis was performed with current NSSI as dependent variable and total TAS-20 score as independent variable (see Table 4). Total TAS-20 score seems to have a significant positive association with current NSSI [Exp(B) = 1.03, p = 0.041]. Next, we estimated a logistic regression with current NSSI as dependent variable and the three TAS-subscale scores of DDF, DIF and EOT as independent variables to investigate which subscale had the strongest association with current NSSI, when all subscales were entered simultaneously (see Table 4). This analysis revealed that only difficulties describing feelings had a significant positive association with current NSSI [Exp(B) = 1.16, p = 0.017].

3.7. Current NSSI is associated with alexithymia controlled for gender and depression

Next, using a hierarchical logistic regression analysis, we estimated the association between TAS scores and current NSSI, also controlling for gender and depression (see Table 5). In the first step, we added gender as independent variable. In the second step, we added depression, and in the last step we entered the total TAS-20 score. This first analysis revealed that gender had no significant association with NSSI [Exp(B) = 1.53, p = 0.378] in contrast to depression [Exp(B) = 1.68, p = 0.014]. The total TAS-20 significant did not have an association with current NSSI above and beyond gender and depression [Exp(B) = 1.02, p = 0.153]. The same analysis was used to investigate the influence of the TAS-20 subscales in the association with current NSSI after control for gender and depression. This second analysis, showed that DDF did remain

Table 2
Demographic and clinical information of BPD patients with/without current NSSI (n = 153).

	Current NSSI	No current NSSI	Difference		
	n = 81	n = 72	χ^2(df)	p	Phi
Gender – Female (%)	84.0	88.9	0.03 (1)	0.854	0.014
Education (%)			0.68 (2)	0.713	0.067
Lower secondary	17.3	18.1			
Higher secondary	59.3	63.9			
High school/university	23.4	15.3			
Marital status (%)			5.43 (2)	0.066	0.188
Single	65.4	70.8			
Living together/married	28.4	15.3			
Divorced	6.2	13.9			
	n = 78	n = 68			
Medication (%)	85.9	74.6	3.49 (1)	0.062	0.155
Antidepressants	66.7	56.9	1.27 (1)	0.259	0.094
Antipsychotics	46.2	43.3	0.18 (1)	0.671	0.035
Anxiolytics	14.1	11.9	0.17 (1)	0.675	0.035
Mood Stabilizers	10.3	7.5	0.38 (1)	0.539	0.051
	M (SD)	*M(SD)*	*t*	*p*	Cohen's *d*
Age	27.99 (8.3)	30.49 (7.9)	1.89	0.060	0.308
BSI-TOT	114.54 (34.1)	100.61 (29.9)	−2.63	0.008	0.434
BSI-SOM	11.49 (6.8)	11.56 (5.6)	0.06	0.952	0.011
BSI-COG	15.53 (4.9)	14.00 (5.0)	−1.90	0.059	0.309
BSI-INT	11.70 (3.3)	9.56 (3.4)	−3.95	0.000	0.638
BSI-DEP	17.63 (4.9)	15.51 (5.0)	−2.64	0.009	0.428
BSI-ANX	15.46 (5.2)	13.74 (5.0)	−2.07	0.040	0.337
BSI-HOS	8.73 (5.1)	7.97 (5.0)	−0.92	0.361	0.150
BSI-FOB	10.89 (4.7)	8.50 (4.7)	−3.13	0.002	0.508
BSI-PAR	11.10 (4.5)	9.65 (3.9)	−2.08	0.039	0.344
BSI-PSY	12.01 (4.0)	10.13 (3.2)	−3.17	0.002	0.519
ADP-TOT	281.74 (52.7)	265.93 (50.6)	−1.90	0.059	0.306
ADP-BDL	57.96 (7.3)	54.65 (7.4)	−2.77	0.006	0.450
ADP-PAR	31.35 (10.2)	29.50 (8.4)	−1.21	0.228	0.198
ADP-SZ	24.57 (8.1)	21.92 (5.7)	−2.34	0.021	0.378
ADP-ST	36.74 (10.2)	36.19 (10.4)	−0.32	0.744	0.053
ADP-AS	24.91 (9.1)	24.44 (8.6)	−0.32	0.745	0.053
ADP-HIS	31.91 (8.9)	33.13 (8.7)	0.84	0.399	0.138
ADP-NAR	25.00 (10.1)	25.06 (9.0)	0.03	0.972	0.006
ADP-AV	36.04 (7.5)	30.72 (7.9)	−4.24	0.000	0.690
ADP-DEP	36.72 (8.2)	33.97 (8.7)	−1.99	0.048	0.325
ADP-OC	34.51 (8.1)	31.00 (8.2)	−2.65	0.009	0.430
ADP-DE	35.79 (7.4)	34.14 (10.1)	−1.16	0.249	0.186
ADP-PA	27.02 (8.7)	25.25 (7.1)	−1.38	0.169	0.223

M = Mean; SD = Standard Deviation; Phi = measure of degree of association; BSI = Brief Symptom Inventory SOM = somatization; O-C = obsessive-compulsive; I-S = interpersonal sensitivity; DEP = depression; ANX = anxiety; HOS = hostility; FOB = phobic Anxiety; PAR = paranoid ideation; PSY = psychoticism. ADP = Assessment of DSM-IV Personality Disorders (dimensional scores); BDL = borderline; PAR = paranoid; SZ = schizoid; ST = schizotypal; AS = antisocial; HIS = histrionic; NAR = narcissistic; AV = Avoidant; DEP = dependent; OC = obsessive-compulsive; DE = depressive; PA = passive-aggressive personality disorder.

significant associated with current NSSI [Exp(B) = 1.15, p = 0.023] after control for gender and depression.

4. Discussion

In this study, our main aim was to investigate the relationship between NSSI, alexithymia and depression in a sample of 185 BPD inpatients. First, we hypothesized that the majority of the BPD patients would have a high level of NSSI and alexithymia. Not surprisingly more than four out of five patients reported NSSI during lifetime, and half of them still engaged in current NSSI, which is comparable with other studies (e.g., [7]). In the present sample 71.3% of the BPD patients were alexithymic, meaning that most of the BPD inpatients have difficulties identifying and communicating their feelings, a prevalence rate which was also found in previous research [17]. We found significant correlation between depression and current NSSI, NSSI frequency and NSSI versatility and also with all alexithymia scales. The frequency at which patients engage in NSSI was also positive correlated with difficulties describing feelings. So

Table 3
Bivariate correlations among alexithymia and NSSI and depression (n = 185 BPD inpatients).

	1. TAS - total	2. TAS - DDF	3. TAS - DIF	4. TAS - EOT	5. NSSI versatility	6. NSSI frequency	7. DEP
1. TAS - total	–	0.86**	0.86**	0.64**	0.10	0.08	0.27**
2. TAS - DDF		–	0.72**	0.32**	0.13	0.16*	0.24**
3. TAS - DIF			–	0.26**	0.12	0.06	0.26**
4. TAS - EOT				–	−0.01	−0.04	0.15*
5. NSSI versatility					–	0.32**	0.26**
6. NSSI frequency						–	0.23**
7. DEP							–

TAS-total = Toronto Alexithymia Scale total score; TAS-DDF = difficulty describing feelings; TAS-DIF = difficulty identifying feelings; TAS-EOT = externally oriented thinking; NSSI versatility/frequency = versatility/frequency of non-suicidal self-injury; DEP = BSI - Depression scale.
* $p < 0.05$.
** $p < 0.01$.

for this BPD sample, difficulties in verbally expressing emotions and finding the right words to describe feelings seems to be linked with depression and also with an increased tendency to engage in NSSI.

Regarding the second research question, current NSSI seems to be associated with alexithymia. This main finding suggests that if BPD patients are confused about their feelings and have problems to give words to them, they are more likely to engage in NSSI. More specific, it is the subscale difficulties describing which is most associated with current NSSI. So, in BPD inpatients particular the problems with the verbalization and communication about emotions and not the identification or distinguishing of them seems to be related to the engagement in NSSI. Difficulties describing emotions is related to inhibited emotional expression and consistent with ambivalence over emotional expression [39], which may lead to NSSI instead of the verbally communication of feelings 'actions instead of words'. These finding also support previous studies, which show that low levels of reflective functioning or hypo-mentalisation (often related to alexithymia), are associated with NSSI [40].

Negative affectivity such as depression seems to be linked to alexithymia [41], as also shown by the results in our sample. Furthermore, since depression might mediate the association between alexithymia and NSSI [42,43], we took depression into account. We investigated whether current NSSI is associated with total alexithymia score and by the three TAS-subscale scores above and beyond gender and depression. Our results revealed that the subscale difficulties describing feelings is still associated with current NSSI even after controlling for gender and depression. This findings suggests that the main problem, namely problems with verbalizing and communicating feelings, can lead to NSSI, independently of the depressive status of the BPD patient.

Table 4
Logistic Regression Analysis with TAS-total/TAS-subscales as independent variables and the presence/absence of current NSSI as dependent variable (n = 153).

Current NSSI	β	*SE* β	Odds ratio	95% CI
R^2 = 0.028 (Cox &Snell), R^2 = 0.038 (Nagelkerke)				
TAS - total	0.03*	0.01	1.03	1.00–1.06
R^2 = 0.057 (Cox &Snell), R^2 = 0.076 (Nagelkerke)				
TAS - DDF	0.15*	0.06	1.15	1.03–1.30
TAS - DIF	−0.03	0.04	0.97	0.89–1.06
TAS - EOT	−0.01	0.04	0.98	0.91–1.06

TAS-TOT = Toronto Alexithymia Scale total score; TAS-DDF = difficulty describing feelings;
TAS-DIF = difficulty identifying feelings; TAS-EOT = externally oriented thinking; Depression = BSI Depression scale;
* $p < 0.05$.

Table 5
Hierarchical Logistic Regression Analysis with TAS-total/TAS-subscales as independent variables and the presence/absence of current NSSI as dependent variable controlling for gender and depression (n = 153).

Current NSSI	β	*SE* β	Odds ratio	95% CI
Step 1 R^2 = 0.005 (Cox &Snell), R^2 = 0.005 (Nagelkerke)				
Gender	0.42	0.48	1.53	0.59–3.93
Step 2 R^2 = 0.046 (Cox &Snell), R^2 = 0.062 (Nagelkerke)				
Gender	0.57	0.49	1.77	0.67–4.68
Depression	0.52*	0.21	1.68	1.11–2.55
Step 3 R^2 = 0.059 (Cox &Snell), R^2 = 0.079 (Nagelkerke)				
Gender	0.53	0.50	1.70	0.64–4.52
Depression	0.44*	0.22	1.56	1.01–2.40
TAS - total	0.02	0.01	1.02	0.99–1.05
Step 1 R^2 = 0.005 (Cox &Snell), R^2 = 0.005 (Nagelkerke)				
Gender	0.42	0.48	1.53	0.59–3.93
Step 2 R^2 = 0.046 (Cox &Snell), R = 0.062 (Nagelkerke)				
Gender	0.57	0.49	1.77	0.67–4.68
Depression	0.52*	0.21	1.68	1.11–2.55
Step 3 R^2 = 0.087 (Cox &Snell), R^2 = 0.115 (Nagelkerke)				
Gender	0.52	0.50	1.69	0.63–4.50
Depression	0.45*	0.22	1.57	1.01–2.48
TAS - DDF	0.14*	0.06	1.15	1.02–1.30
TAS - DIF	−0.04	0.04	0.96	0.88–1.05
TAS - EOT	−0.02	0.04	0.98	0.91–1.05

TAS-TOT = Toronto Alexithymia Scale total score; TAS-DDF = difficulty describing feelings;
TAS-DIF = difficulty identifying feelings; TAS-EOT = externally oriented thinking; Depression = BSI Depression scale;
* $p < 0.05$

The results emphasize the importance of targeting emotion regulation by improving alexithymia, and specifically to express feelings in an adaptive way. Therefore, it is not surprisingly that all evidence-based treatments for BPD such as DBT, mentalisation-based therapy (MBT) [44] and transference focused psychotherapy (TFP) [45] focus on the improvement of emotion regulation. In DBT the first step to increase emotion regulation skills is learning to observe and describe one's own emotions and react to the emotions in a more constructive way instead of engaging in NSSI [46–48]. The act of labeling an emotional experience in itself decreases the intensity of that emotion, meaning this is a powerful emotion regulation function and may help to prevent the perceived need to engage in NSSI [49]. Fortunately, patients with alexithymia have been shown to benefit from psychotherapeutic treatment and to be able to improve their emotional processing [50], so emotion regulation skills training to identify, but even more important, to verbalize the emotions can be an important value in treating NSSI in BPD patients. Follow-up assessment during DBT-training is set up to investigate the impact of skill-training on alexithymia in BPD patients and to test this assumption.

Several limitations of our study should be mentioned. First, the key limitation of this study is its exclusive reliance on self-report measures with its well-known advantages and disadvantages, such as response biases, a distorted or lack of self-knowledge [51]. So, although the use of self-report measures is a meaningful start to investigate this topic, future research using a wider range of measurements, such as structured interviews or observer's rating scales to have a more detailed assessment of Axis-I and Axis-II diagnoses, and alexithymia. Additionally, we did not include an intelligence measure of our BPD patients, given that a normal IQ was a prerequisite to be included in the study. However, future studies could include a standardize measured of intelligence to take IQ into account. Second, although the study population is a large sample with 'real-world' inpatients diagnosed with BPD, the majority was female and the male sample consisted of only 25 males. It should also be kept in mind that most of the patients were under medication, which may influence self-reporting. This context limits generalization to other BPD patients. In addition, unfortunately, it is not possible, in the absence of longitudinal data, to make conclusions about the causality of the relation between alexithymia, difficulties describing feelings, depression and NSSI. Longitudinal studies are needed to establish the nature of these interactions.

In conclusion, the results of this study confirm that most BPD inpatients engage in NSSI and are alexithymic. Above this, it suggests that BPD patients who have problems describing and verbalizing their feelings have the tendency to engage in NSSI and this independently from the depressive status. So, in therapy focus on the identification of emotions is needed, but even more important is the improvement of the communication about the emotions in a more adaptive way.

Acknowledgment

This study was funded by the Research Foundation – Flanders (FWO 1901317N) thanks to a Special PhD fellowship.

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