Research report

Recurrent suicide attempts in patients with depressive and anxiety disorders: The role of borderline personality traits

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ABSTRACT

Background: The presence of a comorbid borderline personality disorder (BPD) may be associated with an increase of suicidal behaviors in patients with depressive and anxiety disorders. The aim of this study is to examine the role of borderline personality traits on recurrent suicide attempts.
Methods: The Netherlands Study on Depression and Anxiety included 1838 respondents with lifetime depressive and/or anxiety disorders, of whom 309 reported at least one previous suicide attempt. A univariable negative binomial regression analysis was performed to examine the association between comorbid borderline personality traits and suicide attempts. Univariable and multivariable negative binomial regression analyses were performed to identify risk factors for the number of recurrent suicide attempts in four clusters (type and severity of axis-I disorders, BPD traits, determinants of suicide attempts and socio-demographics).
Results: In the total sample the suicide attempt rate ratio increased with 33% for every unit increase in BPD traits. A lifetime diagnosis of dysthymia and comorbid BPD traits, especially the symptoms anger and fights, were independently and significantly associated with recurrent suicide attempts in the final model ($n=309$).
Limitations: The screening of personality disorders was added to the NESDA assessments at the 4-year follow-up for the first time. Therefore we were not able to examine the influence of comorbid BPD traits on suicide attempts over time.
Conclusions: Persons with a lifetime diagnosis of dysthymia combined with borderline personality traits especially difficulties in coping with anger seemed to be at high risk for recurrent suicide attempts. For clinical practice, it is recommended to screen for comorbid borderline personality traits and to strengthen the patient's coping skills with regard to anger.

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1. Introduction

Suicide attempts represent an important public health problem. The lifetime prevalence of suicide attempts is estimated at 4.6% (Kessler et al., 2005;Nock et al., 2008). The risk of suicide increases after more attempts and more unsuccessful treatments (Zahl and Hawton, 2004; Paris, 2007; Soloff and Chiappetta, 2012). Several researchers compared the characteristics of single and recurrent attempters, hypothesizing that these two groups differ. Several studies reveal that the presence of anxiety and depressive disorder increases the risk of suicide attempts and completed suicide (Angst et al., 1999; Sareen et al., 2005; Ten Have et al., 2009). Moreover, patients with severe anxiety and depression symptoms more often were recurrent attempters than patients with moderate symptoms. At the same time, the presence of comorbid personality disorders—especially borderline personality disorder (BPD)—has a negative impact on suicidal behaviors in

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these patients groups. However, the evidence for the specific influence of comorbid BPD on recurrent suicidal behavior is inconsistent: some researchers found an association between comorbid BPD and recurrent suicide attempts (Boisseau et al., 2012; Hawton et al., 2003; Brodsky et al., 2006; Soloff et al., 2000), while others did not (Forman et al., 2004). Moreover, it is unclear which borderline personality traits explain recurrent suicide attempts best. Most studies found an association with impulsivity, aggressiveness, and hostility (Soloff et al., 2000; Boisseau et al., 2012; Brodsky et al., 2006; Keilp et al., 2006), while a recent prospective study did not find confirm this association with impulsivity and aggression (Soloff and Chiappetta, 2012). While several studies found an association between hopelessness and recurrent suicide attempts (Forman et al., 2004; Berk et al., 2007; Hawton et al., 2003; Soloff et al., 2000), this same prospective study did not confirm this association (Soloff and Chiappetta, 2012). The influence of maltreatment in childhood on recurrent suicide attempts is also inconsistent, where again the prospective study of Soloff and Chiappetta (2012) did not confirm the association between maltreatment and recurrent suicide attempts (Berk et al., 2007; Forman et al., 2004; Hawton et al., 2003). Finally, the association between substance abuse on recurrent suicide attempts was found in a study of Berk et al. (2007), but not confirmed in the same prospective study of Soloff and Chiappetta (2012).

Inconsistency of previous findings may be due to methodological differences among studies. Examples are (i) differences in sample size, leading to problems with statistical power in some studies, (ii) variation in recruitment strategies, some studies recruiting only at inpatient or outpatient mental health care facilities or at emergency centres, including patients following a suicide attempt, and (iii) most studies focused on depression, not taking anxiety disorders into account.

The clinical relevance of improving our understanding of recurrent suicide attempts among patients with affective disorders seems self-evident, as this represents the best known and most accessible high risk group for suicide. Therefore, we aimed to study the role of comorbid BPD traits in relation to recurrent suicide attempts in a large sample of patients with depression and/or anxiety disorders. Our first objective was to examine the association between comorbid borderline personality traits and suicide attempts in general by exploring to what degree comorbid borderline personality traits are associated with suicide attempts in persons with lifetime anxiety or depressive disorders. Secondly, we tested whether the effect of comorbid borderline personality traits increases when moving from single to recurrent attempters and, thirdly, we tested concurrent effects on recurrent suicidal attempts of other psychopathological and socio-demographic characteristics. Finally, we tested which specific borderline personality traits explain recurrent suicide attempts best.

2. Methods

2.1. Study sample

The Netherlands Study of Depression and Anxiety (NESDA) is designed as an ongoing longitudinal cohort study, to investigate the long-term course of depression and anxiety disorders. Full details on the background of this study and its methods have been described elsewhere (Penninx et al., 2008). In short, the baseline assessments of NESDA were conducted between 2004 and 2007 and included a face-to-face assessment of demographic and personal characteristics as well as a standardized diagnostic psychiatric interview. Additionally, self-report questionnaires were conducted, which measured among others the putative risk factors, which were used in our study. Initially,

2981 respondents were recruited. To represent depression and anxiety at different levels of severity and development, participants (age 18–65 years) were recruited from diverse settings: the community (19%), primary care (54%) and specialized outpatient mental health care facilities (27%). Exclusion criteria at baseline were a primary clinical diagnosis of bipolar disorder, obsessive–compulsive disorder, substance use disorder, psychotic disorder, or organic psychiatric disorder, as reported by the participants or their mental health practitioner. Also patients were excluded in case of insufficient command of the Dutch language. The research protocol was approved by the Ethical Committee of participating universities and all respondents provided written informed consent.

Follow-up assessments were conducted 2 years ($n=2596$, 87%), and 4 years ($n=2402$, 80.6%) after baseline, including the same face-to-face interview and questionnaires as the baseline assessment. However, an important addition in the light of our study was the assessment of personality disorders during the 4-year follow-up.

The present study made use of this 4-years data and had data from the previous assessments of each respondent at its disposal. Respondents with complete data at the Composite International Diagnostic Interview (CIDI) as well as the Beck Scale for Suicidal Ideation (SSI) at both the 2- and 4-year follow-ups were selected ($n=2306$). Subsequently, respondents with lifetime depressive and/or anxiety disorder were selected. From these 2306 respondents, 1838 respondents had lifetime depressive (MDD or dysthymia) or anxiety disorders (panic disorder with or without agoraphobia, generalized anxiety disorder, or social phobia) and were included in the final sample. Of those respondents, 21% were derived from the community, 48% from primary care and 31% from specialized mental health care. For answering the second research question, only those respondents were included who reported at least one suicide attempt lifetime at one of the assessments ($n=309$).

2.2. Dependent variable

Suicide attempts. The Beck Scale for Suicidal Ideation (SSI) was used to measure suicidal ideation and suicide attempts (Beck et al., 1979, 1988). At baseline and at two-year follow-up lifetime attempted suicide was operationalized by asking respondents: *'Have you ever made a serious attempt to end your life, for instance by harming or poisoning yourself or by getting into an accident? no/yes'*. If this question was answered positively, respondents were asked for the number of serious suicide attempts during lifetime. In 6.4% of the 1838 respondents there were inconsistencies between the answers given on the lifetime suicide question at 2-year follow-up compared to baseline. This was not caused by the first incident cases at 2-year follow-up, but probably due to recall bias (Eikelenboom et al., submitted for publication). To assure that all respondents who reported that they ever conducted a suicide attempt were included, we used the broadest criterion, namely the highest reported number at baseline or 2-year follow-up. These data were made complete with the incident cases of suicide attempts at the 4-year follow-up, where suicide attempts were assessed since the 2-year follow-up interview.

The decision to use the highest reported number of suicide attempts may have led to an over-estimation. To check the impact of this decision on the results, all analyses were repeated with the strictest criterion possible, which was the lowest reported number of suicide attempts ($n=192$).

2.3. Independent variables

(i) Characteristics of depression and anxiety
Depressive and anxiety disorders were assessed with the
Composite International Diagnostic Interview (CIDI), which

classifies diagnoses according to DSM-IV criteria (American Psychiatric Association, 2001;World Health Organization, 1998). The CIDI is frequently used worldwide and it has acceptable reliability and validity (Wittchen, 1994). Specially trained clinical staff conducted the CIDI interviews. Lifetime diagnoses of depressive disorders (major depression and dysthymia) and anxiety disorders (generalized anxiety disorder, social phobia, panic disorder, and agoraphobia) were established at baseline interview. At the 2- and 4-year follow-up assessments, diagnoses were established over the period since the last interview. Age of onset and the number of CIDI-diagnoses of depressive and/or anxiety disorders were assessed for each patient.

A life-chart interview (LCI) was used to measure the number of months with depressive or anxiety symptoms over a period of 7 years.

The Inventory of Depressive Symptomatology (IDS) was used to measure severity of depression (Rush et al., 1996). The IDS is a 28-item self-report scale (range 0–84), with higher scores indicating higher severity. Severity of the anxiety disorders was measured with the Beck Anxiety Inventory (BAI) (Beck et al., 1988). The BAI is a 21-item self-report instrument that assesses the overall severity of anxiety by summing the ratings of the 21 items (range 0–63). The IDS and BAI were established at baseline, and 2- and 4-year follow-ups. To get an impression of the severity over years, the mean score over all assessments was calculated for both inventories.

(ii) Borderline personality traits

Personality disorders (anti-social and BPD) were screened for the first time at 4-year follow-up, using the Personality Disorder Questionnaire (PDQ-4). The PDQ-4 showed high sensitivity and moderate specificity for most axis II disorders, including the borderline personality disorder (Hyler et al., 1990, 1992; Sansone et al., 2008). The cronbach's alpha of the PDQ-4 in the total sample was .97, which indicated very high reliability. Ten items of the PDQ-4 are based on the DSM-IV criteria for borderline personality disorder and were formulated as statements at which respondents had to reply with *'true/ not true'*. The sum of the positively scored items was used (range 0–10) as a measure of total borderline personality traits. A score of 5 or higher is highly suggestive of BPD (Sansone et al., 2008).

(iii) Determinants of recurrent suicide attempts

Impulsivity was measured using the shortened version of the Sensation Seeking Scale (Roberti et al., 2003). This scale was used for the first time at 4-year follow-up to assess aspects of impulsivity. One of the four subscales is 'disinhibition' and represents the desire for social and sexual impulsivity (social drinking, partying, and variety in sexual partners). This subscale consists of 8 items to be scored on a 5-points Likert scale (range 0–40). The sum score was used in our study as a measure of overall impulsivity.

Alcohol diagnoses were assessed with the CIDI Alcohol (American Psychiatric Association, 2001) of which we used the lifetime *alcohol abuse* and *dependency* diagnoses in the present study.

Childhood traumas and *childhood life events* were assessed retrospectively with the Childhood Trauma Interview as used in the Netherlands Mental Health Survey and Incidence Study (de Graaf et al., 2002). The section about childhood traumas consists of four questions about physical and sexual abuse, psychological abuse and emotional neglect (de Graaf et al., 2002). The sum of experienced childhood traumas was calculated and used as a childhood trauma index (range 0–4).

Hopelessness/suicidal ideation was measured with a subscale (4 items, range 0–20) of the Leiden Index of Depression Sensitivity— Revised (LEIDS-R), a self-report questionnaire with 17 items (Van der Does, 2002). This instrument measures reactivity of dysfunctional cognitions, such as hopelessness/ suicidal ideation, acceptance, aggression, perfectionism, risk aversion and rumination. The four items which refer to hopelessness/suicidal ideation were: (1) when I feel down, I more often feel hopeless about everything; (2) when I feel sad, I feel as if I care less if I lived or died; (3) when I feel sad, I feel more that people would be better off if I were dead; (4) when I feel sad, more thoughts of dying or harming myself go through my mind. Scoring for each question ranges from 1 (not applicable) to 5 (very strongly applicable). The LEIDS-R was established at baseline, and at 2- and 4-year follow-up. To get an impression of the hopelessness/suicidal ideation over years, the mean score of measurements at the three time points was used.

Negative life events were measured with Brugha's list of Threatening Experiences (Brugha et al., 1985). At baseline respondents were asked whether twelve possible negative life events had occurred in the past year. At 2- and 4-year follow-up these same life events were assessed over the years since the last measurement. Examples of life events were divorce, severe illnesses, accidents, loss of family or closed-by friends, financial problems, etc. The sum of negative life events was calculated over all assessments.

The total of different substance used during the month prior to the interview was assessed all time points. The mean of these three measurements was used as an indication of *substance use* over years.

(iv) Socio-demographic characteristics
Socio-demographic characteristics, which were examined as putative risk factors included age, sex, education (years), and living with a partner (yes/no).

2.4. Statistical analyses

The number of suicide attempts, as the dependent variable, was included in two ways: (1) as a categorical variable with three groups; no attempt, single attempt and more than one attempt and (2) as a continuous count variable. To describe the differences between the respondents with no suicide attempt, one attempt and those with more than one attempt (categorical variable), an overview was made of the psychopathological and socio-demographic characteristics (mean or percentages).

The first research objective, examining the association between suicide attempts and comorbid borderline personality traits, was answered by performing a univariable negative binomial regression analysis with the number of suicide attempts, including the no attempters, as dependent variable ($n = 1838$). The skewness of the dependent count variable indicated a non-normal distribution. Both Poisson and negative binomial regression are appropriate analyses to model count variables. Since the Poisson distribution was overdispersed (mean variance > mean), negative binomial regression was used to model the possible predictors of the number of suicide attempts. The negative binomial distribution proved to fit better than the Poisson distribution, because the deviance/df and Pearson chi-square/df were closer to 1.0. Negative binomial regression provides a Rate Ratio (RR) with a 95% confidence interval. This RR is an estimator of the increase in suicide attempts per 1 unit increase in BPD traits. Additionally, a multivariable multinomial regression analysis was performed in which the categorical variable of suicide attempts was the dependent variable (no attempts as reference category) in order to examine the association between comorbid borderline personality traits and suicide attempts, adjusted for all other characteristics.

Multinomial regression is a frequently used analysis to compare more than two groups. Here, it is used to examine whether comorbid BPD traits are independently associated with a single attempt or just with recurrent attempts.

For the second research objective, i.e. to examine the association of comorbid BPD traits with recurrent suicide attempts, the sample was reduced to the 309 respondents with at least one reported suicide attempt lifetime. Univariable negative binomial regression analyses were performed to examine which characteristics of the four different clusters were associated with recurrent suicide attempts. Subsequently, characteristics that showed a significant association in univariable negative binomial regression analyses were entered into multivariable analyses per cluster of characteristics. Finally, characteristics with a significant association in these multivariable analyses were entered into the final model. In the univariable and multivariable analyses a liberal cut-off of $p \leq .10$ was chosen to ensure all important risk factors were included in the final model. In the final model a $p \leq .05$ was considered significant.

Additionally, to identify which symptoms of the BPD explained recurrent suicide attempts best, the single items of the PDQ-4 were separately tested in univariable and multivariable regression models concerning their association with recurrent suicide attempts.

Analyses which referred to the second research objective were repeated with the strictest criterion, namely the lowest number of reported suicide attempts.

Data was analyzed using SPSS 20.

3. Results

3.1. Sample characteristics

The sample consisted of 1838 respondents with a mean age of 46.1 (SD 12.7). Sixty-eight percent of the respondents was female (Table 1). Of those 1838 respondents 1529 (83.2%) did not report a suicide attempt in their lives, 176 (9.6%) reported one suicide attempt and 133 (7.2%) reported more than one suicide attempt in their lives. Based on the cut off point of 5 or higher, 13% of the

respondents had elevated BPD scores ($n=238$). As might be expected Table 1 shows that characteristics differ mostly between no versus reported suicide attempts, and less between one and more than one reported suicide attempts.

3.2. Association between comorbid borderline personality traits and suicide attempts

In the total sample ($n=1838$) the univariable negative binomial analysis showed an increase in the suicide attempts rate ratio of 33% for every unit increase in borderline personality traits (RR 1.33; 95% CI 1.24–1.42). To visualize the relationship between comorbid BPD traits and multiple suicide attempts, Fig. 1 shows the number of suicide attempts, presented as a categorical variable number, per number of borderline personality symptoms. Among respondents with no comorbid BPD symptoms ($n=533$), 4% reported recurrent suicide attempts, while among respondents with nine out of ten BPD symptoms ($n=6$), 50% reported recurrent attempts.

Multinomial regression analysis, adjusted for all other characteristics, provided a non-significant odds ratio for a single attempt versus no attempts (OR 1.02; 95% CI .92–1.13) and a significant odds ratio for recurrent attempts versus no attempt (OR 1.28; 95% CI 1.14–1.43) per 1 BPD trait increase (data not shown).
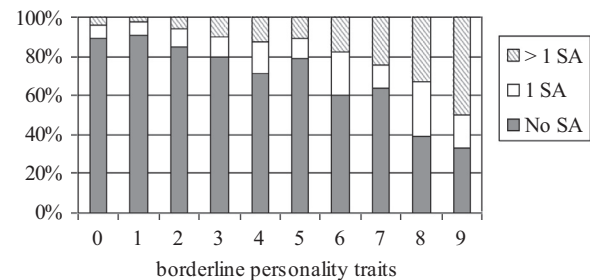

Fig. 1. The relationship between comorbid BPD traits and suicide attempts.

Table 1
Sample characteristics across suicide attempts.

Characteristics	Total sample ($N=1838$)	0 attempt ($N=1529$)	1 attempt ($N=176$)	> 1 attempt ($N=133$)
(i) Characteristics of depression and anxiety				
Lifetime index disorders (N, %)				
Depressive disorder only	387 (21.1)	355 (23.2)	20 (11.4)	12 (9.0)
Anxiety disorder only	224 (12.2)	220 (14.4)	2 (1.1)	2 (1.5)
Depressive and anxiety disorder	1227(66.8)	954 (62.4)	154 (87.5)	119 (89.5)
Mean IDS score (mean, SD)	19.72 (10.8)	18.31 (10.0)	26.55 (11.7)	26.89 (12.1)
Mean BAI score (mean, SD)	10.77 (7.9)	9.96 (7.4)	14.58 (9.0)	14.91 (9.4)
Number of life-time CIDI diagnoses (mean, SD)	2.72 (1.4)	2.57 (1.4)	3.34 (1.3)	3.68 (1.31)
Number of months Anxiety symptoms (mean, SD)	26.14 (24.7)	24.49 (24.3)	32.77 (24.8)	36.35 (25.8)
Number of months Depressive symptoms (mean, SD)	18.61 (20.2)	16.30 (18.9)	28.41 (22.5)	32.16 (22.8)
Age of onset (mean, SD)	22.20 (13.1)	23.09 (13.2)	17.16(11.3)	18.75 (13.0)
(ii) Comorbid BPD traits (mean, SD)	2.01 (2.0)	1.80 (1.8)	2.72 (2.2)	3.40 (2.5)
(iii) Determinants of suicide attempts				
CIDI diagnosis Alcohol dependency (LT) (N, %)	366 (19.9)	283 (18.5)	43 (24.4)	40 (30.1)
CIDI diagnosis Alcohol abuse (LT) (N, %)	277 (15.1)	238 (15.6)	21 (11.6)	18 (13.5)
Childhood Trauma Index	.98 (1.14)	.84 (1.0)	1.66 (1.3)	1.72 (1.4)
Impulsivity	16.16 (5.5)	16.31 (5.6)	15.34 (5.3)	15.50 (5.2)
Hopelessness/suicidal ideation	4.66 (3.67)	4.17 (3.3)	6.82 (4.3)	7.68 (4.1)
Negative life events	4.21 (2.8)	4.01 (2.7)	5.06 (2.8)	5.40 (3.5)
Polydrugs use	.07 (.26)	.067 (.25)	.081 (.27)	.12 (.33)
(iv) Socio-demographic characteristics				
Age (mean, SD)	46.06 (12.7)	45.98 (12.8)	46.48 (11.9)	46.40 (12.7)
Female (%)	1250 (68)	1030 (67.7)	129 (71.3)	91 (68.4)
Education level (years)	12.43 (3.3)	12.65 (3.3)	11.59 (3.3)	11.10 (3.0)
Partner (% yes)	821 (44.7)	683 (44.7)	81 (46)	57 (42.9)

3.3. Putative risk factors for recurrent suicide attempts

Cluster i: Characteristics of anxiety and depression
Concerning the sample of respondents with at least one reported suicide attempt lifetime (*n*=309), Table 2 shows that in univariable analyses dysthymia, social phobia, mean IDS score, number of months with both depression and anxiety symptoms, and the number of depressive or anxiety disorders are significantly associated with recurrent suicide attempts. In the multivariable analysis only a diagnosis of lifetime dysthymia remained significant. The recurrent suicide attempt rate ratio for respondents with a lifetime dysthymia was 1.8 times the rate ratio of those with no lifetime dysthymia (RR 1.78; 95% CI 1.06-3.00).

Cluster ii: BPD traits
As can be seen from Table 2, in a univariable analysis the increase in the rate ratio of recurrent suicide attempts was 14% for every unit increase in BPD traits. This indicates that borderline personality traits were significantly associated with recurrent suicide attempts (RR 1.14; 95% CI 1.04–1.25).

Cluster iii: Determinants for recurrent suicide attempts
Of the known determinants of suicide attempts only hopelessness/suicidal ideation showed a *p*-value below .10 and was therefore included in the multivariable analyses (Table 2). The increase in the RR of recurrent suicide attempts was 5% for every unit increase in hopelessness/suicidal ideation (RR 1.05; 95% CI .99–1.12).

Cluster iv: Socio-demographics
None of the socio-demographic characteristics showed significant RR's (Table 2).

3.3.1. Final model

Of the characteristics which were significantly associated within their clusters, lifetime dysthymia, and comorbid BPD traits remained significantly associated with recurrent suicide attempts in the final model, as shown in Table 2. Hopelessness/suicidal ideation was not significantly associated with recurrent suicide attempts in the final model.

In the additional univariable analyses with the separate BPD symptoms, several symptoms were significantly associated with recurrent suicide attempts (Table 3). In the multivariable analysis parasuicidal behavior was excluded, because of confounding with the dependent variable. After excluding parasuicidal behavior, the symptoms fights, boredom/emptiness and anger remained significantly associated with recurrent suicide attempts. These symptoms were included in the additional final model. From Table 3 it can be seen that of the comorbid BPD traits, specifically the symptoms fights and anger explain recurrent suicide attempts best. Fights had a RR smaller than one (RR .25), indicating a protective factor, while anger had a RR above one (RR 2.05), indicating a risk factor.

Repeating the analyses with the lowest reported number of suicide attempts as outcome measure yielded similar results. However, due to the decreased sample size the separate BPD symptoms became non-significant in the final model, although RRs were of similar magnitude as in the larger sample (data not shown).

4. Discussion

As was to be expected, borderline personality traits were strongly associated with suicide attempts within this large cohort of persons with lifetime depressive and anxiety disorders. The risk of suicide attempts increased by 33% for every unit increase in borderline personality traits (RR 1.33; 95% CI 1.24–1.42). However, this risk was unevenly distributed across the developmental

Table 2
Putative risk factors for recurrent suicide attempts.

	Univariable analyses			Multivariable analyses			Final model		
	RR	95%-CI	*p*	RR	95%-CI	*p*	RR	95%-CI	*p*
Cluster i									
Life time MDD	1.644	.43–6.34	.471						
Life time Dysthymia	**2.018**	1.28–3.19	**.003**	**1.780**	1.06–3.00	**.030**	**1.808**	1.12–2.91	**.015**
Life time Social Phobia	**1.730**	1.12–2.68	**.014**	1.300	.73–2.31	.372			
Life time GAD	1.453	.90–2.35	.125						
Life time Panic	1.105	.65–1.88	.714						
Mean IDS	**1.017**	1.00–1.04	**.092**	1.00	.97–1.03	.997			
Mean BAI	1.013	.99–1.03	.220						
Months ANX symptoms	**1.011**	1.00–1.02	**.030**	1.009	1.00–1.02	.166			
Months DEP symptoms	**1.011**	1.00–1.02	**.069**	.999	.98–1.02	.926			
Number of ANX/DEP diagnoses	**1.288**	1.10–1.51	**.002**	.999	.74–1.36	.997			
Age of onset	.994	.98–1.01	.401						
Cluster ii									
Comorbid BPD traits	**1.144**	1.04–1.25	**.004**				**1.126**	1.08–1.25	**.021**
Cluster iii									
Alcohol dependency	.908	.59–1.41	.665						
Alcohol abuse	.936	.51–1.72	.830						
Childhood Trauma Index	.993	.86–1.15	.928						
Impulsivity	.974	.93–1.02	.288						
Hopelessness/ suicidal ideation	**1.053**	.99–1.12	**.093**				1.005	.95–1.07	.859
Negative life events	1.043	.97–1.12	.256						
Polydrugs use	1.297	.77–2.19	.332						
Cluster iv									
Age	.994	.98–1.01	.508						
Sex	1.213	.76–1.93	.414						
Education	1.010	.92–1.10	.835						
Living with a partner	1.284	.78–2.10	.321						

Univariable and multivariable negative binomial regression analyses with recurrent suicide attempts as dependent variable (*N*=309). In univariable and multivariable analyses a cut-off of *p*≤.10 was chosen to include characteristics in the final model.

Table 3
The influence of the separate BPD symptoms on recurrent suicide attempts.

	Univariable analyses			Multivariable analyses			Additional final model		
	RR	95%- CI	p	RR	95%-CI	p	RR	95%-CI	p
Cluster i									
Life time MDD	1.644	.43–6.34	.471						
Life time Dysthymia	2.018	1.28–3.19	.003	1.780	1.06–3.00	.030	1.877	1.13–3.12	.015
Life time Social Phobia	1.730	1.12–2.68	.014	1.300	.73–2.31	.372			
Life time GAD	1.453	.90–2.35	.125						
Life time Panic	1.105	.65–1.88	.714						
Mean IDS	1.017	1.00–1.04	.092	1.00	.97–1.03	.997			
Mean BAI	1.013	.99–1.03	.220						
Mnts ANX symptoms	1.011	1.00–1.02	.030	1.009	1.00–1.02	.166			
Mnts DEP symptoms	1.011	1.00–1.02	.069	.999	.98–1.02	.926			
Number of ANX/DEP diagnoses	1.288	1.10–1.51	.002	.999	.74–1.36	.997			
Age of onset	.994	.98–1.01	.401						
Cluster ii									
Separate BPD symptoms: Fear of abandonment	1.540	.92–2.57	.099	1.226	.78–1.93	.379			
Love/ hate	.958	.57–1.60	.871						
Self identity	1.074	.63–1.82	.792						
Parasuicidal behavior	2.653	1.60–4.39	.000	Excluded*					
Fights	.401	.14–1.14	.086	.277	.11–.70	.007	.247	.09–.67	.006
Emotional instability	1.226	.72–2.08	.447						
Boredom/emptiness	1.859	1.05–3.28	.032	1.767	1.06–2.95	.029	1.599	.87–2.92	.127
Anger	1.966	1.15–3.35	.013	2.115	1.18–3.80	.012	2.046	1.20–3.50	.009
Dissociation	1.794	.96–3.34	.065	1.016	.52–1.97	.962			
Impulsivity	1.183	.73–1.92	.495						
Cluster iii									
Alcohol dependency	.908	.59–1.41	.665						
Alcohol abuse	.936	.51–1.72	.830						
Childhood Trauma Index	.993	.86–1.15	.928						
Impulsivity	.974	.93–1.02	.288						
Hopelessness/ suicidal ideation	1.053	.99–1.12	.093				1.009	.95–1.07	.762
Negative life events	1.043	.97–1.12	.256						
Polydrugs use	1.297	.77–2.19	.332						
Cluster iv									
Age	.994	.98–1.01	.508						
Sex	1.213	.76–1.93	.414						
Education	1.010	.92–1.10	.835						
Living with a partner	1.284	.78–2.10	.321						

Univariable and multivariable negative binomial regression analyses with recurrent suicide attempts as dependent variable ($N=309$). In univariable and multivariable analyses a cut–off of $p \leq .10$ was chosen to include characteristics in the additional final model.

* excluded because of confounding with the dependent variable.

history of suicidal behavior. The contribution of borderline traits seems to increase with more suicide attempts. This may be due to selection bias or to a reciprocal reinforcing effect of suicidal behavior and borderline traits on their mutual development. In a naturalistic study, such as the current study, these two effects cannot be disentangled. However, whatever the underlying process, the fact remains that borderline traits become progressively more important in patients with increasing numbers of suicide attempts. This is consistent with previous work (Soloff et al., 2000; Brodsky et al., 2006; Boisseau et al., 2012). The present study is unique in that it was able not only to consider depression, but also to include patients with anxiety disorders. Moreover, by using suicide attempts as a continuous count variable, we were able to analyze the additional risk of each subsequent attempt.

Of the different comorbid BPD traits, particularly the symptoms anger and fights were significantly and independently associated with *recurrent* suicide attempts. The other characteristic that showed a significant and independent association with recurrent suicide attempts was a lifetime diagnosis of dysthymia. Although several severity measures of the depressive or anxiety disorders showed significant associations in univariable analyses, none of them remained significant in multivariable analyses. Remarkably, most of the known determinants of attempted suicide did not differ between those who conducted a single suicide attempt

versus those who conducted recurrent attempts. In addition, the socio-demographic characteristics also failed to show significant associations.

Our findings that maltreatment in childhood, substance abuse and alcohol disorders are not associated with recurrent suicide attempts are consistent with the findings of Soloff and Chiappetta (2012). We add to the current knowledge that the comorbid BPD symptoms anger independently increased and fights independently decreased the risk of recurrent suicide attempts. In our study the symptom anger was defined as 'I have trouble to control my anger or tempers', with 25% of respondents answering positive. Fights was defined as 'I am more often involved in real fights than most other people', with only 3% positive answers. The contrasting associations with anger and fights might lie in the fact that the question on anger appears to focus more on the internalizing problems, whereas the question on fights more on the externalizing problems. Keeping the low positive response on fights in mind, this suggests that especially internalizing anger problems represent a risk factor for recurrent attempts.

In two recent prospective studies, contrasting findings with regard to impulsivity as predictor for suicide attempts were found (Boisseau et al., 2012; Soloff and Chiappetta, 2012). As suggested in previous research, impulsivity, hostility and aggressiveness are strongly associated (Keilp et al., 2006; Brodsky et al., 2006).

However, after accounting for BPD, Keilp et al. found that aggressiveness appeared to be the distinguishing feature of suicide attempts in patients with MDD.

Further, in contrast with previous studies (Soloff et al., 2000; Berk et al., 2007; Hawton et al., 2003), we did not find a significant association between hopelessness and recurrent suicide attempts (after correcting for depression), despite the fact that it is generally assumed that elevated levels of hopelessness are a strong predictor of suicide attempts (Beck et al., 1985; Brown et al., 2000). However, this contrasting finding might be explained by recruitment setting of those studies. Soloff et al. (2000) recruited patients in an inpatient setting and Hawton et al., (2003) and Berk et al. (2007) at emergency centres, representing a higher severity of illness which possibly corresponds with higher levels of hopelessness. Another explanation might be that in our study a lifetime diagnosis of dysthymia appeared to be a stronger and overlapping risk factor for recurrent suicide attempts.

To our knowledge, this is the first study in which the influence of borderline personality traits on recurrent suicide attempts in anxious and depressed patients was examined in such detail. Other strengths of the study were that we examined the associations between recurrent suicide attempts and various characteristics in four clusters with both univariable and multivariable analyses. Finally, we had a large sample of respondents from different clinical settings, which represent depression and anxiety at different levels of severity and development. Several limitations of this study should also be mentioned. First, inconsistencies existed between the reported numbers of lifetime suicide attempts at 2-year follow-up compared to baseline. We used the highest reported number of lifetime suicide attempts, which may have led to an over-estimation. Analyses were repeated with the strictest criterion, which is the lowest reported number of suicide attempts. This resulted in similar findings when using the overall BPD traits. This implies that found associations were not due to specific suicide criteria justifying our decision to use the highest reported number of suicide attempts. However, findings referring to the separate BPD symptoms must be interpreted cautiously, because when using the strict criterion no significant association between fight and anger and recurrent suicide attempts was found. Second, the screening of personality disorders was added to the NESDA assessments at the 4-year follow-up for the first time. That was a reason why it was impossible to examine the influence of comorbid BPD traits on incident suicide attempts. Additionally, the low incident rate of suicide attempts within the NESDA study precluded a prospective study. Therefore, lifetime suicide attempts instead of incident suicide attempts were analyzed. Consequently, it was impossible to make statements about the chronological or causal order of events.

To conclude, the relative impact of borderline personality traits on the risk of suicide attempts in patients with anxiety or depression seems to increase in patients with more lifetime attempts. As this is the group at highest risk of committing suicide, including a thorough assessment of personality disorders and access to appropriate treatment seems increasingly important for patients with a history of suicide attempts.

References

American Psychiatric Association, 2001. Diagnostic and Statistical Manual of Mental Disorders DSM-IV-TR, fourth edition American Psychiatric Association, Washington D.C., Text Revision.

Angst, J., Angst, F., Stassen, H.H., 1999. Suicide risk in patients with major depressive disorder. Journal of Clinical Psychiatry 60 (Suppl. 2), 57–62.

Beck, A.T., Epstein, N., Brown, G., Steer, R.A., 1988. An inventory for measuring clinical anxiety: psychometric properties. Journal of Consulting and Clinical Psychology 56 (6), 893–897.

Beck, A.T., Kovacs, M., Weissman, A., 1979. "Assessment of suicidal intention: the scale for suicide ideation". Journal of Consulting and Clinical Psychology 47 (2), 343–352.

Beck, A.T., Steer, R.A., Kovacs, M., Garrison, B., 1985. Hopelessness and eventual suicide: a 10-year prospective study of patients hospitalized with suicidal ideation. American Journal of Psychiatry 142 (5), 559–563.

Beck, A.T., Steer, R.A., Ranieri, W.F., 1988. "Scale for suicide ideation: psychometric properties of a self-report version". Journal of Clinical Psychology 44 (4), 499–505.

Berk, M.S., Jeglic, E., Brown, G.K., Henriques, G.R., Beck, A.T., 2007. Characteristics of recent suicide attempters with and without borderline personality disorder. Archives of Suicide Research 11 (1), 91–104.

Boisseau, C.L., Yen, S., Markowitz, J.C., Grilo, C.M., Sanislow, C.A., Shea, M.T., Zanarini, M.C., Skodol, A.E., Gunderson, J.G., Morey, L.C., McGlashan, T.H., 2012. Individuals with single versus multiple suicide attempts over 10 years of prospective follow-up. Comprehensive Psychiatry 10.1016/j.comppsych.2012.07.062. [Epub ahead of print].

Brodsky, B.S., Groves, S.A., Oquendo, M.A., Mann, J.J., Stanley, B., 2006. Interpersonal precipitants and suicide attempts in borderline personality disorder. Suicide and Life-Threatening Behavior 36 (3), 313–322.

Brown, G.K., Beck, A.T., Steer, R.A., Grisham, J.R., 2000. Risk factors for suicide in psychiatric outpatients: a 20-year prospective study. Journal of Consulting and Clinical Psychology 68 (3), 371–377.

Brugha, T., Bebbington, P., Tennant, C., Hurry, J., 1985. The list of threatening experiences: a subset of 12 life event categories with considerable long-term contextual threat. Psychological Medicine 15 (1), 189–194.

Eikelenboom, M., Smit, J.H. Beekman, A.T.F., Kerkhof, A.J.F.M., Penninx, B.W.J.H., Recall of suicide attempts: consistency and determinants in a large mental health study, submitted for publication.

Forman, E.M., Berk, M.S., Henriques, G.R., Brown, G.K., Beck, A.T., 2004. History of multiple suicide attempts as a behavioral marker of severe psychopathology. American Journal of Psychiatry 161 (3), 437–443.

de Graaf, R., Bijl, R.V., Smit, F., Vollebergh, W.A., Spijker, J., 2002. "Risk factors for 12-month comorbidity of mood, anxiety, and substance use disorders: findings from the Netherlands Mental Health Survey and Incidence Study". American Journal of Psychiatry 159 (4), 620–629.

Hawton, K., Houston, K., Haw, C., Townsend, E., Harriss, L., 2003. Comorbidity of axis I and axis II disorders in patients who attempted suicide. American Journal of Psychiatry 160 (8), 1494–1500.

Hyler, S.E., Skodol, A.E., Kellman, H.D., Oldham, J.M., Rosnick, L., 1990. Validity of the personality diagnostic questionnaire-revised: comparison with two structured interviews. American Journal of Psychiatry 147 (8), 1043–1048.

Hyler, S.E., Skodol, A.E., Oldham, J.M., Kellman, H.D., Doidge, N., 1992. Validity of the personality diagnostic questionnaire-revised: a replication in an outpatient sample. Comprehensive Psychiatry 33 (2), 73–77.

Keilp, J.G., Gorlyn, M., Oquendo, M.A., Brodsky, B., Ellis, S.P., Stanley, B., John, M.J., 2006. Aggressiveness, not impulsiveness or hostility, distinguishes suicide attempters with major depression. Psychological Medicine 36 (12), 1779–1788.

Kessler, R.C., Berglund, P., Borges, G., Nock, M., Wang, P.S., 2005. Trends in suicide ideation, plans, gestures, and attempts in the United States, 1990–1992 to 2001–2003. Journal of the American Medical Association 293 (20), 2487–2495.

Nock, M.K., Borges, G., Bromet, E.J., Cha, C.B., Kessler, R.C., Lee, S., 2008. Suicide and suicidal behavior. Epidemiologic Reviews 30, 133–154.

Paris J. Managing suicidal crises in patients with severe personality disorders. In: Luyn B van, Akhtar S, Livesley WJ, editors. Severe Personality Disorders. Everyday Issues in Clinical Practice. Cambridge: Cambridge University Press, 2007.

Penninx, B.W., Beekman, A.T., Smit, J.H., Zitman, F.G., Nolen, W.A., Spinhoven, P., Cuijpers, P., De Jong, P.J., van Marwijk, H.W., Assendelft, W.J., van der, M.K., Verhaak, P., Wensing, M., de, Graaf R., Hoogendijk, W.J., Ormel, J., van, Dijk R., 2008. The Netherlands Study of Depression and Anxiety (NESDA): rationale, objectives and methods. International Journal of Methods in Psychiatric Research 17 (3), 121–140.

Roberti, J.W., Storch, E.A., Bravata, E., 2003. "Further psychometric support for the sensation seeking scale—form V". Journal of Personality Assessmen 81 (3), 291–292.

Rush, A.J., Gullion, C.M., Basco, M.R., Jarrett, R.B., Trivedi, M.H., 1996. "The Inventory of depressive symptomatology (IDS): psychometric properties". Psychological Medicine 26 (3), 477–486.

Sansone, R.A., McLean, J.S., Wiederman, M.W., 2008. "The prediction of healthcare utilization by three self-report measures for borderline personality". International Journal of Psychiatry in Clinical Practice 12 (4), 312–315.

Sareen, J., Cox, B.J., Afifi, T.O., de, Graaf R., Asmundson, G.J., Ten, Have M, Stein, M.B., 2005. Anxiety disorders and risk for suicidal ideation and suicide attempts: a population-based longitudinal study of adults. Archives of General Psychiatry 62 (11), 1249–1257.

Soloff, P.H., Lynch, K.G., Kelly, T.M., Malone, K.M., Mann, J.J., 2000. Characteristics of suicide attempts of patients with major depressive episode and borderline personality disorder: a comparative study. American Journal of Psychiatry 157 (4), 601–608.

Soloff, P.H., Chiappetta, L., 2012. Prospective predictors of suicidal behavior in borderline personality disorder at 6-year follow-up. American Journal of Psychiatry 169 (5), 484–490.

Ten Have, M., de Graaf, R., van Dorsselaer, S., Verdurmen, J., van 't Land, H., Vollebergh, W., Beekman, A., 2009. Incidence and course of suicidal ideation and suicide attempts in the general population. Canadian Journal of Psychiatry 54 (12), 824–833.

Van der Does, W., 2002. Cognitive reactivity to sad mood: structure and validity of a new measure. Behaviour Research and Therapy 40 (1), 105–120.

Wittchen, H.U., 1994. Reliability and validity studies of the WHO—composite international diagnostic interview (CIDI): a critical review. Journal of Psychiatric Research 28 (1), 57–84.

World Health Organization, 1998. Composite International Diagnostic Interview (CIDI), version 2.1. Geneva, WHO.

Zahl, D.L., Hawton, K., 2004. Repetition of deliberate self-harm and subsequent suicide risk: long-term follow-up study of 11,583 patients. British Journal of Psychiatry 185, 70–75.