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Predictors of Self-mutilation in Patients with Borderline Personality Disorder: A 10-Year Follow-up Study

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Abstract

Background—Self-mutilation is a common and serious problem in patients with borderline personality disorder (BPD). The purpose of this study was to determine the most clinically relevant baseline and time-varying predictors of self-mutilation over 10 years of prospective follow-up among patients with BPD.

Method—Four semi-structured interviews assessing axis I disorders, childhood adversity, adult experiences of abuse, and experiences of self-mutilation were administered at baseline to 290 patients meeting DIB-R and DSM-III-R criteria for BPD. Three of these interviews (all except for the childhood adversity interview) and two self-report measures pertaining to dysphoric affects and cognitions were administered at each of five contiguous two-year follow-up periods.

Results—Eleven variables were found to be significant bivariate predictors of self-mutilation over the five follow-up periods. Six of these predictors remained significant in multivariate analyses: female gender, severity of dysphoric cognitions (mostly overvalued ideas), severity of dissociative symptoms, major depression, history of childhood sexual abuse, and sexual assaults as an adult.

Conclusions—Taken together, the results of this study suggest that factors pertaining to traumatic experiences throughout the lifespan are significant risk factors for self-mutilation over time. These results also suggest that major depressive episodes and cognitive symptoms, particularly overvalued ideas and dissociation, significantly heighten the risk of self-injurious behaviors tracked for a decade.

Keywords

borderline personality disorder; self-mutilation; longitudinal course

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1. Introduction

Self-mutilation is a common and serious symptom of borderline personality disorder (BPD) (Dulitt et al., 1994; Sabo et al., 1995; Soloff et al., 1994; Zanarini et al., 1990). Cross-sectional studies have found that childhood adversity is significantly associated with self-mutilation in patients with BPD (Dubo et al., 1997; Zanarini et al., 2002). Cross-sectional studies have also found that suicidal ideation, previous suicide attempts, and dissociative symptoms are significantly related to their self-mutilatory efforts (Dulitt et al., 1994; Soloff et al., 1994). Still other cross-sectional studies have found that borderline patients commonly report that they mutilate themselves to gain relief from negative emotions (Brown et al., 2002; Hulbert & Thomas, 2010). However, to the best of our knowledge, no study has assessed the predictors of self-mutilation over time. The current study assesses this relationship over a decade of prospective follow-up in a large sample of carefully diagnosed patients with BPD. We studied most of the predictors mentioned by others but added additional predictors thought by our group to be clinically relevant (e.g., **severity of** dysphoric inner states, substance abuse, major depression).

2. Methods

2.1 Procedures

The methodology of this study, which was reviewed and approved by the McLean Hospital Institutional Review Board, has been described in detail elsewhere (Zanarini et al., 2003). Briefly, all subjects were initially inpatients at McLean Hospital in Belmont, Massachusetts. Each patient was first screened to determine that he or she: 1) was between the ages of 18-35; 2) had a known or estimated IQ of 71 or higher; 3) had no history or current symptoms of schizophrenia, schizoaffective disorder, bipolar I disorder, or an organic condition that could cause psychiatric symptoms; and 4) was fluent in English.

After the study procedures were explained, written informed consent was obtained. Each patient then met with a masters-level interviewer blind to the patient's clinical diagnoses for a thorough diagnostic assessment. Three semistructured diagnostic interviews were administered. These diagnostic interviews were: 1) the Structured Clinical Interview for DSM-III-R Axis I Disorders (SCID-I), (Spitzer et al., 1992) 2) the Revised Diagnostic Interview for Borderlines (DIB-R), (Zanarini et al., 1989) and 3) the Diagnostic Interview for DSM-III-R Personality Disorders (DIPD-R). (Zanarini et al., 1987) The inter-rater and test-retest reliability of all three of these measures have been found to be good-excellent (Zanarini & Frankenburg, 2001; Zanarini, Frankenburg, & Vujanovic, 2002).

Three other semistructured interviews were also administered at baseline. These interviews were: the Lifetime Self-destructiveness Scale (LSDS) (Zanarini et al., 2006), the Abuse History Interview (AHI) (Zanarini et al., 2005), and the Revised Childhood Experiences Questionnaire (CEQ-R) (Zanarini et al., 1997). The interrater and test-retest reliability of these interviews have also been found to be good-excellent (Zanarini et al., 2005, Zanarini et al., 1997).

At each of five follow-up waves, separated by 24 months, axis I and II psychopathology was reassessed via interview methods similar to the baseline procedures by staff members blind to baseline diagnoses. After informed consent was obtained, our diagnostic battery was readministered (with the SCID I focusing on the past two years and not as at baseline, lifetime axis I psychopathology). The follow-up interrater reliability (within one generation of follow-up raters) and follow-up longitudinal reliability (from one generation of raters to the next) of these three measures have been found to be good-excellent (Zanarini & Frankenburg, 2001; Zanarini, Frankenburg, & Vujanovic, 2002).

The follow-up versions of the LSDS and the AHI were also administered at each of the study's five follow-up periods. The follow-up interrater reliability and follow-up longitudinal reliability of these two measures have also been found to be good-excellent (Zanarini et al., 2006; Zanarini et al., 2005).

In addition, the Dysphoric Affect Scale, a 50-item self-report measure, was administered at each of the study's five follow-up periods (Zanarini et al., 1998). The DAS assesses 50 affects or cognitions that represent the inner states typical of borderline patients. The measure has been found to have good internal consistency as well as test-retest reliability. The DES, a 28-item self-report, measuring the severity of dissociative experiences was also administered at each of these five waves of follow-up (Zanarini et al., 2008). The DES has been found to have good test-retest and split-half reliability (Bernstein & Putnam, 1986). It has also been found to have construct and criterion validity. Both of these self-report measures ask subjects to rate the percentage of the time that each inner state is experienced, with a range of 0-100%.

2.2 Participants

Two hundred and ninety patients met both DIB-R and DSM-III-R criteria for BPD. In terms of baseline demographic data, 80.3% (N=233) of the subjects were female and 87.2% (N=253) were white. The average age of the borderline subjects was 26.9 years (SD=5.8), their mean socioeconomic status was 3.4 (SD=1.5) (where 1=highest and 5=lowest), and their mean GAF score was 38.9 (SD=7.5) (indicating major impairment in several areas, such as work or school, family relations, judgment, thinking, or mood).

In terms of continuing participation, 275 borderline patients were reinterviewed at two years, 269 at four years, 264 at six years, 255 at eight years, and 249 at ten years. At the ten-year assessment, 41 borderline patients were no longer in the study: 12 had committed suicide, seven died of other causes, nine discontinued their participation, and 13 were lost to follow-up. All told, 91.9% (N=249/271) of surviving borderline patients were reinterviewed at all five follow-up waves.

2.3 Statistical Analyses

Generalized estimating equations (GEE) were used in longitudinal analyses of the predictors of the prevalence of self-mutilation. These analyses modeled the log odds (or logit of the prevalence) of self-mutilation, yielding an odds ratio (OR), and 95% confidence interval (95%CI), for the association with a given predictor; analyses also appropriately accounted for the correlation among the repeated measures of self-mutilation. In carrying out the analyses summarized in this report, we first assessed the relationship between each baseline and time-varying predictor variable and the presence of self-mutilation, while controlling for assessment period. Next, to select the subset of predictors to be retained in the most parsimonious multivariate model, we compared a sequence of models in a step-down manner. In these models, assessment period was always included as a covariate to allow for temporal variation in the prevalence of self-mutilation. This selection procedure started with the significant bivariate factors and stepped down to the most parsimonious model on the basis of tests of significance of the predictors in the model.

Categorical data are reported as % (N); averaged continuous data are reported as means with standard errors of the means (SE). Statistical significance required 2-tailed $p < 0.05$.

3. Results

Our outcome was the presence/absence of at least one episode of self-mutilation at each of the study's five follow-up periods. Self-mutilation was defined as any intentional self-

inflicted injury without intent to die (e.g., punching, cutting, or burning oneself). The following prevalence figures were found: 50.9% (N=140) at two-year follow-up, 35.3% (N=95) at four-year follow-up, 28.4% (N=75) at six-year follow-up, 22.4% (N=57) at eight-year follow-up, and 17.5% (N=44) at 10-year follow-up.

In terms of baseline predictors, we selected these 14 variables based on our review of the cross-sectional literature and our collective clinical experience. All told, 62.4% (N=181) of participants reported a childhood history of sexual abuse. Severity of other forms of childhood abuse was found to have a mean of 7.3 (SE=0.31) (range=0-18), while severity of neglect was found to have a mean of 14.7 (SE=0.63) (range=0-42).

In terms of time-varying predictors, Figure 1 presents the means (SE) for the DAS and the DES at two-year follow-up through 10-year follow-up. Figure 2 presents the prevalence of major depression and substance abuse at the same five time points, while Figure 3 presents the prevalence of being the victim of sexual or physical assault as an adult at these five time periods. (Each of these time-varying variables predicted self-mutilation occurring in the same time period as the predictor occurred. For example, major depression during the two years from two to four year follow-up was studied as a predictor of self-mutilation during the same two-year period.)

Table 1 presents the bivariate predictors of self-mutilation across the five follow-up periods. (Each row represents a separate analysis for each predictor that also controlled for the effect of time.) As can be seen, 11 of these variables were found to be significant in these analyses. These 11 variables were: female gender, mean DAS affect score, mean DAS cognition score (mostly overvalued ideas, such as I am evil or I am damaged beyond repair), mean DES score, major depression, childhood history of sexual abuse, severity of childhood history of other abuse, severity of childhood history of neglect, adult sexual assault, adult physical assault, and lifetime number of episodes of self-mutilation at baseline.

Given the complexity of the analyses, we believe that several examples would be helpful for interpreting the results in Table 1. The odds of self-mutilation over time are 2.67 times higher for subjects who reported a childhood history of sexual abuse at baseline (relative to those who did not). In a like manner, having been raped as an adult increased the odds of self-mutilation over time by a factor of approximately 2. As an example of a continuous predictor variable, for each five-point increase in severity of other forms of childhood abuse, the odds of self-mutilation over time increases by 21%. For each 10-point increase in the mean DAS affect score (e.g., moving from 40% of the time to 50% of the time), the odds of self-mutilation over time increases by 30%.

Table 2 presents the multivariate predictors of self-mutilation across the five time periods. Six variables were found to significantly predict self-mutilation in this joint analysis: female gender, severity of dysphoric cognitions (mostly overvalued ideas), severity of dissociative symptoms, major depression, history of childhood sexual abuse, and sexual assaults as an adult.

As a partial check on circularity, we repeated these bivariate and multivariate analyses using only baseline (childhood predictors) and two-year predictors (e.g., mean DES score, physical assault at that time point). We found basically the same results and this is supportive of the assumed direction of the relationship between predictors and outcome.

4. Discussion

Four main findings have emerged from this study. The first is that bivariate predictive factors associated cross-sectionally with self-mutilation also predict self-mutilation over 10

years of prospective follow-up. More specifically, we found that the severity of childhood experiences of abuse and neglect as well as the severity of dissociative experiences and the presence of episodes of major depression were associated with self-mutilation over time.

The second main finding, which also pertains to bivariate predictors, is that a history of being the victim of adult violence is associated with self-mutilation over time. More specifically, having reported a history of rape as an adult and/or a history of having a physically assaultive partner or spouse is associated with on-going self-mutilatory episodes.

Our third main finding, which too pertains to bivariate predictors, is that severity of dysphoric affects and dysphoric cognitions other than dissociation reported by borderline patients are both bivariate predictors significantly associated with the longitudinal course of self-mutilatory behaviors. More specifically, dysphoric affects (which often co-occurred) and dysphoric cognitions (mainly overvalued ideas of being bad or damaged) were longitudinally predictive of the presence of self-mutilatory acts across the waves of follow-up, suggesting that the chronic inner states of borderline patients are important to address in efforts to help borderline patients stop mutilating themselves. The affective aspect of this finding is consistent with the prior finding that borderline patients commonly report deliberately hurting themselves physically to relieve negative feelings (Brown et al., 2002; Hulbert & Thomas, 2010).

Our fourth finding is that most of the factors that were significant in bivariate analyses remained significant when considered jointly in multivariate analyses: female gender, DAS cognition score, DES score, presence of major depression, history of childhood sexual abuse, and adult sexual assault. It is not surprising that being female is a predictor of episodes of self-mutilation as it has previously been found that self-harm is more common over time among women than men with BPD (Zanarini et al., 2003). It is a new finding that the severity of overvalued ideas of being bad heightens the risk of self-mutilation over time. This finding suggests that firmly held negative beliefs about the self, which might be intensified by either interpersonal disappointments or concurrent major depressive episodes, are an important predictor of the likelihood that a borderline patient will engage in self-mutilation over time.

Dissociation has long been associated with the borderline diagnosis. At times, it is seen as a core symptom of BPD (Zanarini, Gunderson, & Frankenburg, 1990) with a strong heritable component (Jang et al., 1998). At other times, it is seen as a way of coping with the stress inherent in childhood sexual abuse or adult sexual assault (Herman & van der Kolk, 1987). Regardless of its etiology, it seems that being disengaged from one's feelings heightens the risk that a person with BPD will engage in self-mutilation at some point over a decade of prospective follow-up.

Our final multivariate predictors of self-mutilation over time are childhood sexual abuse and adult sexual assault. These findings, while important, need to be placed in context. More specifically, these factors are associated with a heightened risk of self-mutilation over time. These results do not mean that all borderline patients who mutilated themselves over time had a history of childhood sexual abuse, adult sexual assault, or both. Nor do they mean that all borderline patients who reported childhood and/or adult sexual abuse or assault deliberately hurt themselves physically over the course of the study.

However, five significant bivariate predictors were not significant in our multivariate model: DAS affect score, severity of other forms of childhood abuse, severity of childhood neglect, adult experiences of being physically assaulted by a partner or spouse, and lifetime number of episodes of self-mutilation. At first glance, it seems surprising that dysphoric affects would not be a significant multivariate risk factor for episodes of self-mutilation. But our

results seem to suggest that painful overvalued ideas and the numbing effects of dissociation are substantially stronger risk factors than dysphoric affects, perhaps because they are more stable inner states than affects, which tend to be more reactive in nature. In addition, the presence of one or more episodes of major depression in a follow-up period may have subsumed some of the predictive power of our continuous measure of affective dysphoria.

It also seems surprising that the severity of non-sexual forms of childhood abuse and the severity of childhood neglect are not significant multivariate predictors of self-mutilation over time. This is particularly so because we had previously found a cross-sectional relationship between these variables in this study (Zanarini et al., 2002). However, it may be that the effects of other forms of childhood abuse and childhood neglect attenuate over time or at least their effects may attenuate more over time than the effects of childhood sexual abuse.

The lack of a significant multivariate relationship between adult experiences of physical abuse and self-mutilation over time does not seem particularly surprising. This is so partly because no cross-sectional study has found a significant link between childhood physical abuse and a history of self-mutilation (Zanarini et al., 2002). This is also so because these abandonment-sensitive patients may interpret the actions of physically abusive partners or spouses as a sign of intense involvement that mitigates the need for the indirect communication inherent in self-mutilation (Hooley & Hoffman, 1999).

Finally, lifetime number of episodes of self-mutilation reported at baseline failed to be a significant multivariate predictor of self-mutilation over time for borderline patients. The reasons for this are not clear. It may be that predictors closer in time to episodes of self-mutilation during the decade of prospective follow-up (i.e., time-varying predictors such as major depressive episodes) are stronger predictors of ongoing self-mutilation. It may also be that the pattern of self-mutilation engaged in prior to index admission was already waning for some patients.

This study has two main limitations. One limitation of this study is that all of the patients were seriously ill inpatients at the start of the study. Another limitation is that about 90% of patients were in individual therapy and taking psychotropic medications at baseline and about 70% were participating in each of these outpatient modalities during each follow-up period (Hörz *et al.*, 2010). Thus, it is difficult to know if these results would generalize to a less disturbed group of patients or people meeting criteria for BPD who are not in treatment.

5. Conclusions/Implications

Taken together, the results of this study suggest that factors pertaining to traumatic experiences throughout the lifespan are associated with self-mutilation over time. These results also suggest that major depressive episodes and cognitive symptoms, particularly overvalued ideas and dissociation, are associated with self-injurious behaviors tracked for a decade.

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Figure 1.
Mean DAS and DES Scores Over Time

Figure 2.
Prevalence of Selected Axis I Disorders Over Time

Figure 3.
Prevalence of Adult Sexual and Physical Assault Over Time

Table 1

Bivariate Predictors of Self-mutilation among Borderline Patients Over 10 years of Prospective Follow-up

	Odds Ratio	SE	z-score	p	95% Confidence Interval
Age *	1.01	0.02	0.85	0.397	0.98, 1.05
Gender *	3.64	1.16	4.06	<0.001	1.95, 6.79
SES *	1.12	0.08	1.73	0.084	0.98, 1.29
Mean DAS Affect Score (10 point increments)	1.30	0.45	7.64	<0.001	1.22, 1.39
Mean DAS Cognition Score (10 point increments)	1.46	0.07	7.57	<0.001	1.32, 1.61
Mean DES score (10 point increments)	1.37	.072	6.04	<0.001	1.24, 1.52
Major Depression	1.88	0.24	4.95	<0.001	1.46, 2.41
Substance Use Disorder	0.78	0.16	-1.25	0.212	0.52, 1.16
Childhood History of Sexual Abuse *	2.67	0.58	4.50	<0.001	1.74, 4.09
Severity of Other Childhood Abuse (5 point increments) *	1.21	0.11	2.13	0.033	1.02, 1.45
Severity of Childhood Neglect (5 point increments) *	1.15	0.05	2.97	0.003	1.05, 1.26
Adult Sexual Assault	2.14	0.47	3.47	0.001	1.439, 3.28
Adult Physical Assault	1.78	0.29	3.54	<0.001	1.29, 2.45
Baseline Number of Episodes of Self-Mutilation (100 episode increments) *	1.10	0.04	2.78	0.005	1.03, 1.17

* Baseline predictors; all others are time-varying

Table 2

Multivariate Predictors of Self-mutilation among Borderline Patients Over 10 years of Prospective Follow-up

	Odds Ratio	SE	z-score	p	95% Confidence Interval
Gender *	2.63	0.81	3.13	0.002	1.44, 4.81
Mean DAS Cognition Score (10 point increments)	1.35	0.07	5.47	<0.001	1.21, 1.50
Mean DES Score (10 point increments)	1.19	0.06	3.27	0.001	1.07, 1.33
Major Depression	1.68	0.23	3.73	<0.001	1.28, 2.21
Childhood History of Sexual Abuse*	1.63	0.37	2.15	0.031	1.04, 2.53
Adult Sexual Assault	1.87	0.46	2.57	0.010	1.16, 3.02
Time	0.23	0.05	-7.45	<0.001	0.15, 0.33