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PSYCHOPATHOLOGY, CHILDHOOD TRAUMA, AND PERSONALITY TRAITS IN PATIENTS WITH BORDERLINE PERSONALITY DISORDER AND THEIR SISTERS

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The aim of this study was to document and compare adverse childhood experiences, and personality profiles in women with borderline personality disorder (BPD) and their sisters, and to determine how these factors impact current psychopathology. Fifty-six patients with BPD and their sisters were compared on measures assessing psychopathology, personality traits, and childhood adversities. Most sisters showed little evidence of psychopathology. Both groups reported dysfunctional parent-child relationships and a high prevalence of childhood trauma. Subjects with BPD reported experiencing more emotional abuse and intrafamilial sexual abuse, but more similarities than differences between probands and sisters were found. In multilevel analyses, personality traits of affective instability and impulsivity predicted DIB-R scores and SCL-90-R scores, above and beyond trauma. There were few relationships between childhood adversities and other measures of psychopathology. Sensitivity to adverse experiences, as reflected in the development of psychopathology, appears to be influenced by personality trait profiles.

A large body of previous research has shown that women with borderline personality disorder (BPD) frequently report a highly pathogenic childhood family environment (Johnson, Smailes, Cohen, Brown, & Bernstein, 2000; Zanarini, 2000). Many of these women have siblings who share some of the same genetic and environmental risk factors. However, we know little about the siblings' social adaptation, their history of and response to childhood adversities and their propensity to develop emotional

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difficulties. Most empirical research on risk and protective factors in families in which one member suffers from BPD has relied on between-families designs and has usually been limited to the assessment of the patient, with only a few studies directly interviewing first-degree relatives (Gunderson & Lyoo, 1997; Laporte & Guttman, 2001; Links, Steiner, & Huxley, 1988). None of these studies specifically examined the siblings of patients with BPD.

The purpose of this study was to systematically investigate whether BPD patients and their siblings experience similar childhood adversities (abuse, neglect, and dysfunctional parent-child relationships), and whether they have different trait profiles and psychopathology. Moreover, no previous study has examined the interaction of adverse childhood experiences with personality profiles in women with BPD and their sisters, and determined how these risk factors impact current psychopathology.

Numerous studies have reported high rates of both abuse and neglect in the childhood of patients with BPD (Laporte & Guttman, 1996; Zanarini, 2000). Although the relationships between trauma and psychopathology tend to be more specific when the parameters of abuse (nature, severity, duration, and perpetrators) are considered, only a few previous reports (Laporte & Guttman, 2001; Ogata et al., 1990; Paris, Zweig-Frank, & Guzder, 1994; Zanarini et al., 1997) have examined abuse parameters in detail. Furthermore, no study to our knowledge has compared the differential abuse characteristics of women with BPD and their sisters and looked at how these differences could play a role in the developmental trajectories of these women.

Dysfunctional parent-child relationships have also been related to the development of psychiatric disorders in general (Johnson, Cohen, Kasen, Smailes, & Brooke, 2001) and to BPD in particular (Fruzzetti, Shenk, & Hoffman, 2005). Parent-child relationships can vary within the same family (Plomin, Manke, & Pike, 1996). Studies have consistently shown that parents treat each of their children differently and that there is an association between differential parenting and psychological development (Dunn & Plomin, 1990). Several studies have used the Parental Bonding Instrument to assess disordered parent-child relationships among patients with BPD. Some authors have reported disturbed maternal attitudes while others have also described the father's failures (see review in Paris et al., 1994); most of this evidence points to biparental failure (Frank & Hoffman, 1986; Guttman & Laporte 2002; Laporte & Guttman, 2007). No study to date has looked at differential treatment within the family of patients with BPD.

While childhood trauma tends to increase the risk for psychopathology, these experiences do not necessarily have the same meaning for all siblings within the same family (Dunn & Plomin, 1990), and do not consistently lead to adult psychopathology (Mullen & Fergusson 1999) or to the development of a personality disorder (Paris, 2008). Many individuals function well as adults in spite of childhood adversity (Collishaw et al., 2007; Fergusson, Horwood, & Lynskey, 1996; Jaffee, Caspi, Moffitt, Polo-

Tomas, & Taylor, 2007). Consequently, the comparison of childhood trauma and dysfunctional parent-child relationships experienced by siblings provides a particular opportunity to evaluate how adverse family experiences contribute specifically and differentially to the development of psychopathology.

Studies of the first-degree relatives of patients with BPD have shown that they have a high frequency of disorders marked by impulsive and affective symptoms (White, Gunderson, Zanarini, & Hudson, 2003). Although they share 50% of their genes (McCartney, Harris, & Bernieri, 1990; Torgersen et al. 2000), siblings who grow up within the same family generally differ in personality and in their risk for psychopathology. Most researchers (Gunderson & Links, 2008; Paris, 2008) have concluded that interactions between genetic vulnerability and environmental factors are involved in the pathogenesis of BPD. Specific alleles do not account for a large percentage of the heritable component of personality (Livesley, 2008) but behavioral genetic studies have shown that affective instability and impulsivity, those personality traits most associated with BPD, are heritable (Livesley, Jang, & Vernon, 1998). Comparing probands and their siblings on personality traits profiles could help determine how biological vulnerability differs within families. In particular, if traits such as impulsivity and affective instability underlie the development of BPD (Siever & Davis, 1991), affected probands may have a different profile from unaffected siblings and these personality profiles could influence their response to childhood trauma, as research has suggested (Rutter, 2006). Thus, some trait profiles could be considered vulnerability markers, which develop into disorders in the presence of environmental stressors (Rutter, 1987), while other personality profiles are more adaptive and associated with resilience.

The present study will be among the first to document and compare the presence of psychopathology in siblings of patients with BPD, their personality profiles as well as the nature and extent of adverse childhood experiences. This sibling-pairs design will also permit the comparison of those risk factors among women with BPD with their sisters and determine their impact on current psychopathology. Since most clinical patients with BPD are female (Zimmerman, Rothschild, & Chelminski, 2005), and since developmental pathways can be influenced by gender, the present study was limited to women.

METHOD

PARTICIPANTS

Subjects were female patients and their sisters referred from psychiatric clinics across a large urban area. All sisters had to be full siblings who had lived with at least one of the same biological parents during their upbringing. Seventy-eight percent of the patients had only one sister; when

there was more than one, we choose the closest in age, and all sisters were within 5 years of each other. Of the 135 referred patients, 14 patients did not meet the criteria (did not have a full sibling, or had only brothers or a sister who was too young or too old); 15 did not enter the study because their sister lived too far away; and 18 choose not to participate. Then, among the 88 sisters invited to participate in the study, 13 sisters declined and 13 changed their mind or did not turn up for their appointment. Of the 62 pairs of sisters who eventually participated, 56 fully completed the study.

All subjects were between 18 and 45 years old, with a mean age of 28.7 for the BPD patients and 30.2 for the sisters ($F = 0.75$, $p < 0.39$). The patient was the youngest of the pair in 64% of the cases and there were 3 sets of dizygotic twins. Sisters were also comparable on most demographic variables (marital status, income, having children), but had significantly more education (BPD = 12. 8 vs. sisters = 14.3 years, $F = 7.2$, $p < 0.008$). Fifty-seven percent of the sample was French speaking and 43% was English speaking; all measures were administered in validated translations in the subject's native language.

PROCEDURES

Subjects met the research team twice to participate in semi-structured interviews and to complete self-report questionnaires. A signed informed consent was obtained from each subject after the procedures were fully explained. Institutional review boards at all hospitals from which patients were recruited, as well as the Research Ethics Board at McGill University, approved the study. All subjects received an honorarium for their participation.

MEASURES

In order to be given a diagnosis of BPD, the participants were required to meet DSM-IV-TR criteria (American Psychiatric Association, 2000) and to score 8/10 on the *Diagnostic Interview for Borderline Personality Disorder, Revised* (DIB-R; Zanarini, Gunderson, & Frankenburg, 1989). While the DIB-R was originally developed as a categorical measure, its scores have also been used in research as continuous variables (Zanarini, 2003). The only exclusion criteria for the sample were organic brain syndromes and mental retardation. Other Axis II disorders were diagnosed using the *Diagnostic Assessment for Personality Disorders* (DIPD-IV; Zanarini, Frankenburg, Sickel, & Yong, 1996). An experienced clinician (JP), who has previously established interrater reliability (Paris et al., 1994), administered these interviews, as well as the eating disorders and substance abuse sections of the *Clinical Interview for DSM-IV* (SCID-I; First, Spitzer, Gibbon, & Williams, 2002), the *Hamilton Depression Scale* (HAM-D; Hamilton, 1960), and the *Hamilton Anxiety Scale* (HAM-D; Hamilton, 1959).

Self-report instruments included the well-known *Symptom Checklist-90, revised* (SCL-90-R; Derogatis, 1975), the *Diagnostic Assessment of Personality Pathology, Brief Questionnaire* (DAPP-BQ; Livesley et al., 1998), a widely used instrument for assessing personality traits, as well as two other trait measures, the *Barratt Impulsivity Scale* (BIS; Barrat, 1985) and the *Affective Lability Scale* (ALS; Harvey, Greenberg, & Serper, 1989).

Histories of childhood abuse and neglect were assessed with the *Childhood Trauma Interview* (CTI; Fink, Bernstein, Handelsman, Foote, & Lovejoy, 1995), a widely used and well-validated instrument that provides a detailed clinician-administered interview of childhood interpersonal trauma up to age 18. This report focuses on 4 domains: physical neglect, emotional abuse, physical abuse, and sexual abuse. The CTI scores age range, duration (in years), and nature and number of perpetrators for each type of abuse. The severity and frequency of childhood interpersonal trauma are rated separately on scales ranging from 1 to 6, on the basis of a detailed manual. A composite score of the severity of the abuse can be calculated for each of these trauma domains by summing the product of the severity, frequency, and duration scores across all perpetrators within each type of abuse (Fink et al., 1995). In order to ensure the reporting of significant abuse and neglect, we only have reported on severity scores of 2 or more, on frequencies describing multiple occurrences (with the exception of rape), and on abuse and neglect occurring within the family, except for sexual abuse for which we report on all reported abuse. Two experienced interviewers administered the CTI and interrater reliability was established on 12 subjects for the 6 types of trauma (physical neglect, emotional, physical, and sexual abuse occurring within the family as well as sexual abuse by extended family members or by extrafamilial perpetrators). The alpha scores for reliability of ratings ranged from .86 to 1.0.

The quality of parental relationships was assessed with the *Parental Bonding Instrument* (Parker, 1983), a widely used self-report instrument that scores neglect and overprotection from each parent prior to age 18.

STATISTICAL ANALYSES

For univariate analyses, continuous data in patients and sisters were compared using paired *t*-tests, while categorical measures of prevalence of abuse and neglect were compared with chi-squared analyses.

Multilevel modeling was used to determine which factors identified in univariate analyses were the most important predictors of symptomatology. These analyses were conducted using SAS PROC MIXED, Version 9.1 (SAS, 2004) and maximum likelihood estimation. The degrees of freedom for F tests were determined by dividing the residual degrees of freedom into between-subjects and within-subjects portions, following a recommendation by Singer (1998); family membership was specified as the subject for each analysis. All models included a random intercept and the default error covariance matrix.

Separate analyses examined the DIB-R, SCL-90-R, HAM-A, and HAM-D as dependent variables, using predictor variables identified in univariate analyses. Predictors were evaluated simultaneously, correcting for the presence of all other predictor terms in the model (i.e., Type III sums of squares). A principal component analysis (PCA) was used to reduce the number of DAPP-BQ scales to a more manageable yet conceptually meaningful set of variables. Consistent with previous work (Brezo, Paris, Tremblay, Vitaro, & Turecki, 2008; Livesley et al., 1998) PCA with oblimin rotation was employed on 17 of the 18 DAPP-BQ scales (the self-harm scale was eliminated from the PCA due to its overlap with BPD symptomatology). Examination of the scree plot and eigenvalues suggested that a four-factor solution was most appropriate. These four factors were included as predictor variables in multilevel analyses, and included: DAPP1 (loadings >0.40 of affective instability, submissiveness, cognitive distortion, identity problems, insecure attachment, anxiousness, suspiciousness, social avoidance, narcissism, and passive aggressivity); DAPP2 (loadings >0.40 of conduct problems, stimulus seeking, callousness, and rejection); DAPP3 (loadings >0.40 of restricted expression and intimacy problems); and DAPP4 (loadings >0.40 of compulsivity).

To examine whether findings for continuous DIB-R scores were convergent with findings for diagnostic status as a dichotomous variable, a multilevel analysis was conducted using PROC GLIMMIX, Version 9.1 (SAS, 2004), which fits generalized linear mixed models. This analysis examined the diagnosis of BPD as an outcome; the link function was specified as logit and the distribution was specified as binary. As in previous multilevel analyses, residual degrees of freedom were divided into between-subjects and within-subjects portions, family membership was specified as the subject, and the model included a random intercept and the default error covariance matrix.

RESULTS

PSYCHIATRIC DIAGNOSIS AND CURRENT FUNCTIONING

Only three pairs of sisters were concordant for BPD, and no other personality disorders were identified in nonconcordant sisters. Most sisters reported no significant symptoms. As seen in Table 1, almost all measures of psychopathology (HAM-A, HAM-D, SCL-90-R, DIB-R, DIPD-IV, eating disorders, and substance abuse) were significantly higher in the patient group.

PERSONALITY TRAITS

Patients with BPD scored significantly higher than their sisters on all but two scales (compulsivity and rejection) of the DAPP-BQ, as well as on the factors DAPP1, DAPP2, and DAPP3 and on all scales of impulsivity (BIS) and affective lability (ALS, see Table 2).

TABLE 1. Psychopathology in Patients with BPD and Their Sisters: Means and Standard Deviations

	Patients with BPD (n = 56)		Sisters (n = 56)								
	Mean	***SD***	**Mean**	***SD***	**Paired *t*-test**		***N***	**%**	***N***	**%**	**χ^2 (df = 1)**
Depression (HAM-D)	10.00	8.2	1.69	2.7	7.48***	SCID					
Anxiety (HAM-A)	6.06	4.6	1.59	2.4	6.12***	Alcohol abuse	18	33.3	3	5.6	13.3***
SCL-90-R total score	160.26	70.2	59.43	49.7	8.93***	Substance abuse	18	34.0	6	11.1	8.03**
Borderline Personality						Anorexia nervosa	3	5.6	0	0.0	3.09*
Disorder (DIB-R)	8.88	0.9	1.02	2.2	24.39***	Bulimia	7	13.0	2	3.7	3.03

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 2. Univariate Analyses: Personality Traits

Personality traits	Patients with BPD		Sisters		Analyses
	Mean	*SD*	Mean	*SD*	Paired *t*-test
Impulsivity (BIS)					
Attention Dimension	2.64	0.41	2.19	0.44	5.68***
Motor Dimension	2.70	0.56	2.18	0.49	5.62***
Nonplanification	2.52	0.48	2.16	0.43	4.14***
Total	78.45	11.10	65.28	10.10	7.12***
Affective Lability (ALS)					
Depression	1.95	0.43	3.05	0.60	10.70***
Hypomania	2.29	0.56	3.17	1.22	5.81**
Biphasic	2.29	0.62	3.23	0.63	8.48***
Anger	2.29	0.73	3.31	0.69	8.10***
Anxiety	2.27	0.59	3.20	0.72	7.74***
Anxiety-Depression	2.16	0.63	3.21	0.80	9.69***
Total	2.13	0.49	3.17	0.65	10.2***
Personality pathology (DAPP)					
Submissive	3.11	0.82	2.40	0.68	5.03***
Cognitive distortion	3.32	0.90	1.88	0.68	9.60***
Identity problems	3.77	0.80	2.11	0.87	10.56***
Affective instability	4.07	0.75	2.76	0.90	7.86***
Stimulus seeking	3.29	0.95	2.34	0.63	6.33***
Compulsivity	3.30	0.95	3.07	0.81	1.55
Restricted expression	2.92	0.86	2.34	0.78	3.77***
Callousness	2.21	0.71	1.82	0.53	3.42**
Passive aggressive	3.30	0.81	2.30	0.71	6.81***
Intimacy problems	2.53	0.77	1.93	0.61	5.13***
Rejection	2.87	0.89	2.61	0.76	1.77
Anxiousness	4.06	0.76	2.71	0.93	7.77***
Conduct problems	2.39	0.88	1.61	0.53	5.54***
Suspiciousness	3.10	1.05	1.92	0.68	7.46***
Social avoidance	3.39	0.77	2.41	0.85	6.02***
Narcissism	3.37	0.93	2.75	0.78	4.27**
Insecure attachment	3.40	0.98	2.34	0.92	6.55***
Self-Harming behaviors	3.68	0.99	1.51	0.73	12.96***
Factors					
DAPP 1	3.49	0.61	2.36	0.62	9.80***
DAPP 2	2.69	0.70	2.09	0.48	5.41***
DAPP 3	2.73	0.70	2.14	0.60	5.12***
DAPP 4	3.30	0.95	3.07	0.81	1.56

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

CHILDHOOD ADVERSITIES

On the CTI, reported childhood trauma between pairs of sisters differed in some respects (see Table 3). Severity of neglect, as reflected in the composite score, and prevalence of neglect, was the same for both groups. However, more patients than sisters reported experiencing emotional abuse (BPD: 76.8% vs. sisters: 53.4%), and the severity of this type of abuse was greater in the BPD group. Patients reported the same prevalence of physical abuse as did sisters, but described greater severity. Patients also reported significantly more intrafamilial sexual abuse than sisters (BPD: 26.8% vs. sisters: 8.9%) but described similar severity. There was no significant difference in the prevalence and severity of sexual abuse by extended family or by strangers. On the measure of parent-child

TABLE 3. Univariate Analyses: Childhood Adversities

Childhood Adversities	Patients with BPD		Sisters		Analyses					
	Mean	*SD*	Mean	*SD*	Paired *t*-test	*N*	%	*N*	%	χ^2 (*df* = 1)
Parental Bonding (PBI)										
Mother care	17.12	6.7	14.48	6.9		2.53*				
Father care	19.72	7.4	18.46	7.0		1.14				
Mother protection	20.48	6.9	22.13	6.5		−1.79				
Father protection	23.30	6.2	22.90	5.4		0.50				
Childhood Trauma Interview (CTI)—Composite Scores										
Physical neglect (32 pairs)	125.87	184	73.28	105	1.47					
Emotional abuse (48 pairs)	291.27	199	178.95	215	2.5*					
Physical abuse (39 pairs)	174.79	203	90.38	113	2.28**					
Sexual abuse										
Intrafamilial (17 pairs)	95.82	122	31.88	73		1.82				
Extended (17 pairs)	36.92	62	4.35	11		2.04				
Extrafamilial (32 pairs)	7.5	11	6.09	10		0.51				
Childhood Trauma Interview (CTI)—Prevalence Scores										
Physical neglect						23	41.1	21	37.5	0.15
Emotional abuse						43	76.8	30	53.6	6.64**
Physical abuse						32	57.1	28	50.0	0.57
Intrafamilial sexual abuse						15	26.8	5	8.9	6.1*
Extended family						11	19.6	7	12.5	1.05
Extrafamilial						24	42.9	20	35.7	0.59

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

relationships (PBI), univariate analysis showed that patients with BPD scored somewhat higher on maternal care than sisters but reported similar paternal care and similar overprotection by both parents.

Results for the multilevel analyses are presented in Table 4. By and large, trait measures emerged as the strongest predictors of dependent variables. Thus, DIB-R scores were associated with higher scores on the ALS, BIS, DAPP1, and DAPP3. Results for a dichotomous diagnosis of BPD partially converged with the DIB-R findings; diagnostic status was predicted by the ALS ($b = 1.79$, $F = 4.55$, $p < .05$) and DAPP3 ($b = 1.19$, $F = 5.37$, $p < .05$), but not by the BIS or DAPP1. SCL-90-R scores were associated with higher scores on the BIS, DAPP1, and DAPP3. Scores on the HAM-A were associated with both higher physical abuse composite scores and higher DAPP1 scores, while HAM-D scores were associated with elevated DAPP1 scores.

DISCUSSION

The present study is the first to directly assess sisters of women with BPD. While previous investigations have found impulsive and affective disorders in first degree relatives of BPD patients (Links et al., 1988; White et al., 2003), the first major finding of this study was that only 3 pairs of sisters out of 56 were concordant for BPD, and that most of the sisters were currently psychopathology-free. To explain these striking differences between siblings raised in the same family, one must take into account the influence of temperamental and/or environmental risk and protective factors.

The second major finding pertained to childhood adversities. While levels of reported childhood abuse and neglect differed in nature and severity between pairs of sisters on some measures (emotional abuse and intra-

TABLE 4. Contribution of Emotional Abuse, Intrafamilial Sexual Abuse, and Personality Variables to Current Clinical Symptoms

	DIB-R		SCL-90		HAM-A		HAM-D	
	b	*F*	*B*	*F*	*b*	*F*	*b*	*F*
SA prev	0.73	0.74	0.10	0.61	0.87	0.78	3.42	3.64
EA prev	0.91	1.23	–0.11	0.91	–0.79	0.68	1.78	1.05
EA comp	–0.00	0.09	0.00	3.10	0.00	0.75	–0.00	0.68
PA comp	0.00	0.09	0.00	0.05	0.01	6.31*	0.01	2.47
ALS	1.88	7.75**	–0.08	0.77	0.92	1.39	0.64	0.21
BIS	0.04	1.70*	0.01	4.93*	0.03	0.69	0.09	1.72
Mcare	0.00	0.00	0.00	0.50	–0.00	0.00	0.06	0.38
DAPP 1	1.38	4.69*	0.72	66.53***	2.21	8.91**	2.89	4.67*
DAPP 2	–0.38	0.40	0.12	2.11	–0.97	1.95	–1.21	0.94
DAPP 3	0.98	5.23*	0.19	8.69**	–0.01	0.00	1.20	1.77
DAPP 4	0.02	0.00	0.01	0.02	0.24	0.31	–1.22	2.37

Notes. SA prev = prevalence of intrafamilial sexual abuse; EA prev = prevalence of emotional abuse; EA comp = composite of emotional abuse; PA comp = composite of physical abuse; Mcare = PBI Mother care; $df = 1, 11$ for SA prev, $df = 1, 20$ for EA prev, and $df = 1, 40$ for all other predictors.
*$p < .05$; **$p < .01$; ***$p < .001$.

familial sexual abuse), it is notable that sisters reported experiences of maltreatment that were broadly similar. Prospective studies have also shown that patients who develop BPD symptoms are more likely to have experienced childhood adversities (Johnson, Cohen, Brown, Smailes, & Bernstein, et al., 1999). However, although precise rates of symptoms vary from study to study depending on the sample population, childhood trauma does not lead predictably to psychopathology (Collishaw et al., 2007; Fergusson et al., 1996) and our data are consistent with this finding.

Similarly, both sisters reported equally impaired relationships with both their parents, with sisters reporting significantly poorer maternal care that did women with BPD; this difference, however, was no longer significant in multivariate analysis. The results also suggested that maladaptive parenting was not directed specifically at the child who eventually developed a personality disorder. As both groups of sisters reported maltreatment and impaired parent-child relationships, and only one group developed psychopathology, our findings point to the importance of resilience.

The third major finding was that personality trait profiles differed markedly between patients and sisters. This was shown by DAPP-BQ scores, particularly by the DAPP1 factor, which broadly measures neuroticism, and by the DAPP3 factor which measures problems in intimacy. There were also important differences between the sisters in their measures of impulsivity (BIS) and affective instability (ALS). These latter two traits have been hypothesized to underlie BPD (Siever & Davis, 1991). Similar personality profiles were found to be associated with BPD in a recent large-scale behavioral genetic study (Kendler et al., 2008). In line with a large body of literature (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2006), our findings support the view that personality profiles play an important role in resilience and in the present study, the trait profiles of abused and neglected sisters may have played a protective role. These findings are also consistent with the model of Linehan (1993), and with a recent revision of this theory (Crowell, Beauchaine, & Linehan, 2009) in which temperamental sensitivity associated with emotional dysregulation and impulsivity interacts with environmental stressors to produce BPD.

The fourth major finding was that on multilevel analysis, personality traits best accounted for variance in BPD scores, above and beyond experiences of abuse and neglect. The findings were similar for BPD diagnosis, although the use of a dichotomous dependent variable led to fewer findings being significant. As one might expect, DAPP1, a broad measure of neuroticism, was a particularly strong predictor of BPD scores and of SCL-90-R scores. We did not find the same results for DAPP2, a measure of impulsivity and antisociality, probably because BIS scores were such a strong predictor of DIB-R scores. However, some outcomes were associated with DAPP3 scores, suggesting a lower capacity for intimacy. Scores on the HAM-A and HAM-D, which do not specifically measure borderline pa-

thology, were not clearly predicted by trait profiles. While there is some degree of overlap between some of these trait measures and our measures of psychopathology, the symptoms of BPD are not assessed by personality measures. These factors describe most of the trait level aspects of BPD, but do not account for the specific symptoms of the disorder. Moreover, we observed fairly specific relationships between traits and disorder scores in the multilevel analyses. Finally, it should be noted that the prediction of BPD features based on trait scores is in no way a tautology, since individuals can be high on trait dimensions such as affective instability and impulsivity without having BPD.

Consistent with models of gene-environment interaction drawn from community prospective studies of psychopathology (Caspi et al., 2002; Caspi et al., 2003), and with behavioral genetic studies (Torgersen et al., 2000; Torgersen et al., 2008), it seems reasonable to hypothesize that only a complex combination of diatheses and stressors will lead to the emergence of BPD. Thus, the predisposition to develop BPD is rooted in personality traits, producing different reactions to the same environmental risk factors. Thus, high levels of emotionality, and a tendency towards impulsivity, would be associated with a higher sensitivity to mistreatment during childhood.

One of the strengths of this study is that the sample was large enough, and the interview detailed enough, to allow for analysis of the parameters of childhood abuse and neglect. As research has consistently shown (Mullen & Fergusson, 1999), the relationship of childhood adversities to sequelae is best understood when parameters of abuse are taken into account. In this study, these parameters were taken into account by the use of a standard interview with strict analyses of only these experiences considered as abusive (severity of 2 or more) and with an overall measure of severity.

Another value of the sibling method was that it provides support for the validity of retrospective data on childhood adversities. The veracity of retrospective reports of parental relationships and childhood maltreatment made by psychiatric patients could be subject to recall bias (Gunderson & Links, 2008; Paris, 2008). However in this study, both sisters provided similar reports of experiences of abuse and neglect and reported similar dysfunctional parent-child relationships; as each sister confirmed the validity of the other's report, it increases the reliability of the descriptions of their childhood.

The generalizability of the findings reported here is limited by the nature of the sample. This was a severely ill group of patients, as shown by the fact that we found a higher level of intrafamilial sexual abuse in BPD patients than has usually been reported (Laporte & Guttman, 2001; Ogata et al., 1990; Paris et al., 1994; Zanarini et al., 1997). It is known that BPD patients with severe abuse have a more serious prognosis (Soloff, Lynch, & Kelly, 2002). It is therefore possible that in less severely ill patients from less dysfunctional families, the rate of abuse in sisters could have been

lower. It is also possible that sibling pairs characterized by high conflict or sisters suffering from psychopathology may have chosen not to participate in our study. Thus, since not all potential subjects could be recruited for the study, these results could have been affected by sampling bias.

In summary, this study points to the complexity of pathways to the development of BPD. Our results suggest that the outcome of childhood adversity is mediated by personality traits. However, causal inferences based on the present data are not warranted. Prospective studies of children at risk would be needed to confirm these relationships.

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