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## Anger, preoccupied attachment, and domain disorganization in borderline personality disorder

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### Abstract

Emotional dysregulation and attachment insecurity have been reported in borderline personality disorder (BPD). Domain disorganization, evidenced in poor regulation of emotions and behaviors in relation to the demands of different social domains, may be a distinguishing feature of BPD. Understanding the interplay between these factors may be critical for identifying interacting processes in BPD and potential subtypes of BPD. Therefore, we examined the joint and interactive effects of anger, preoccupied attachment, and domain disorganization on BPD traits in clinical sample of 128 psychiatric patients. The results suggest that these factors contribute to BPD both independently and in interaction, even when controlling for other personality disorder traits and Axis I symptoms. In regression analyses, the interaction between anger and domain disorganization predicted BPD traits. In recursive partitioning analyses, two possible paths to BPD were identified: high anger combined with high domain disorganization and low anger combined with preoccupied attachment. These results may suggest possible subtypes of BPD or possible mechanisms by which BPD traits are established and maintained.

## Anger, preoccupied attachment, and domain disorganization in borderline personality disorder

Emotional dysregulation (ED) is central to most conceptual and theoretical formulations of the underlying processes in borderline personality disorder (BPD) and may be a ‘prime driver or underlying constitutional predisposition’ (Putnam & Silk, 2005). This is supported by evidence from retrospective studies (Reich & Zanarini, 2001) and cross-sectional investigations (Brown, Comtois, & Linehan, 2002; Ebner-Priemer, Kuo, Kleindienst, Welch, Reisch, Reinhard, Lieb, Linehan, & Bohus, 2007; Russell, Moskowitz, Zuroff, Sookman, & Paris, 2007).. ED has been conceptualized in diverse ways, however, and alternative conceptualizations vary in the importance they attribute to the interpersonal context in which emotions are regulated. At one end of the spectrum is the view that interpersonal relationships and ED are closely and inevitably intertwined. The exemplar is attachment theory, which some proponents argue is “fundamentally about emotional experiences and their regulation” (Tidwell, Reis, & Shaver, 1996, p.729). In this view, insecure attachment styles (especially preoccupied, unresolved, and disorganized variants) are likely to be associated with ED (Levy, 2005; Levy, Meehan, Weber, Reynoso, & Clarkin, 2005). At the opposite pole is the view that negative emotionality or neuroticism shapes both subjective experience and expressive style and permeates both social and non-social contexts uniformly. In this view, a predisposition to intense, negative affect and limited capacity for executive control of such affect is fundamental to ED. A third view, which also credits the reciprocal relationship between interpersonal functioning and ED, asserts that ED occurs in relation to the contrasting demands of different kinds of social interaction. We refer to difficulties regulating behaviour and emotions in a way that is consistent with the expectations for different kinds of social interaction as domain disorganization.

Neuroticism, attachment problems, and domain disorganization have each been identified in BPD. Neuroticism has its origins in, or shares underlying processes with, variations of negative emotionality that are identifiable in infancy as dimensions of temperament (Caspi, Roberts, & Shiner, 2005; Clark, 2005). Neuroticism predicts many forms of personal and interpersonal dysfunction (Caspi *et al.*, 2005) and is the best discriminator among the “big five” personality factors between BPD and non-BPD patients (Morey & Zanarini, 2000). However, neuroticism may be too general a construct for an understanding of mechanisms in BPD because it encompasses facets of anger proneness and high anxiety, emotional processes with different evolutionary functions and developmental implications (Lemerise & Arsenio, 2000).

Anger proneness is more likely than high anxiety to be the facet of neuroticism specific for BPD. Intense anger is one of the Diagnostic and Statistical Manual (DSM) (APA, 2000) criteria which is most prevalent among both clinical (Zanarini, Frankenburg, Hennen, Reich, & Silk, 2005) and non-clinical samples (Trull, 1995) and among the first-degree relatives of patients with BPD (Zanarini, Frankenburg, Yong, Giuseppe, Reich, Hennen, Hudson, & Gunderson, 2004). Labile anger scores on the Affective Lability Scale (ALS, Harvey, Greenberg, & Serper, 1989) were higher for BPD patients than other PD patients, even when controlling for history of depressive disorders, current major depression, age, gender and self-reported overall affect intensity (Koenigsberg, Harvey, Mitropoulou, Schmeidler, New, Goodman, Silverman, Serby, Schopick, & Siever, 2002). Labile anger predicted BPD diagnosis with 72% accuracy and distinguished BPD patients from patients with other PDs in a discriminant function analysis (Koenigsberg *et al.*, 2002). These authors suggested that affective intensity alone does not sufficiently describe BPD, but that more specific lability in anger may.

The DSM (APA, 2000) BPD criteria ‘fear of abandonment’ and ‘intense unstable relationships’ strongly imply that attachment difficulties are likely to be prominent in BPD. Although recent reviews have concluded that secure attachment is rare in BPD, they have also highlighted that it has not so far been possible to identify patterns of attachment insecurity that are characteristic

of BPD. There are probably several contributors to the lack of consistency in the research literature, including variations in sampling methods and measurement. A clearer picture may also emerge when specific hypotheses regarding attachment and BPD are addressed. Thus from the perspective of emotion dysregulation the key process is likely to be hyperactivation of the attachment system which is likely to 'foster excessive or exaggerated emotional displays' (Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993). In this study we employed a measure designed to assess hyperactivation of the attachment system. Some have argued that disrupted attachment relationships are central for the development of emotional dysregulation in BPD (Fonagy, Gergely, Jurist, & Target, 2002). One review reports that the most consistent finding is that BPD is associated with insecure attachment, regardless of the method for assessing attachment (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004). This review concludes that unresolved and fearful attachment styles are most common among BPD patients, but notes that patients classified as unresolved or fearful received a secondary attachment classification of preoccupied attachment style. Elevated rates of preoccupied attachment have been reported in many studies using both interview (Barone, 2003; Fonagy, Leigh, Steele, Steele, Kennedy, Mattoon, Target, & Gerber, 1996; Levy, 2005; Patrick, Hobson, Castle, Howard, & Maughan, 1994; Stalker & Davies, 1995; Stovall-McClough & Cloitre, 2003) and self-report measures (Levy *et al.*, 2005) and processes generally thought to be associated with attachment preoccupation – elevated negative emotions in intimate relationships – are prominent in many of the findings. For this study, we have used a standardized measure to describe adult attachment styles, the Kobak Attachment Q-Sort, that does not assess unresolved or fearful attachment style, thus we have focused particularly on preoccupied attachment style.

In addition to high levels of anger and insecure attachment, patients with BPD have greater levels of generalized interpersonal difficulties related to emotional dysregulation. Previously, we proposed a model of personality disorder derived from a social-domain-based hypothesis (Bugental, 2000; Hill, Pilkonis, Morse, Feske, Reynolds, Hope, Charest, & Broyden, 2008). We argued that, starting in infancy, children acquire the skills of regulating emotions and behaviours in different arenas of social interactions – social domains - and that regulation is key to effective personality development. Each social domain has its own, usually implicit, rules for social interaction, referred to by Bugental (2000) as the "algorithms of social life." These rules for social interaction specify the behaviours, communications, and emotions that are appropriate as well as the level of support and intimacy available in different social domains. Emotions are regulated in relation to these rules or 'algorithms of social life' (Bugental 2000). For example social encounters in educational or work contexts are characterised by lower levels of confiding and bids for intimacy or care than interactions in romantic relationships, and hence have less intense expressions of emotional neediness. Bids for personal care and high emotional intensity in work are likely to undermine the prevailing rules of social interaction leading to interpersonal problems. More generally, the expression of high levels of interpersonal and emotional intensity, common in family and romantic relationships, amounts to dysregulation when expressed in less intense social domains.

One mechanism in the development of BPD may be a failure to regulate effectively emotional expression and behaviours according to the demands of the social domain. In particular, problems may arise where strong emotions that are commonly expressed in family and romantic relationships are displayed in other kinds of social interactions and relationships, such as work or less intimate social interactions. This is consistent with the identification of "friend exclusivity" among children with borderline features (Crick, Murray-Close, & Woods, 2005) and descriptions of intense relational patterns appearing early in the treatment of patients with BPD (Bradley & Westen, 2005). We have previously demonstrated that domain disorganization was elevated in a BPD patients when compared to patients with avoidant personality disorder and non-PD psychiatric disorders (Hill et al., 2008).

Understanding the interplay between negative temperament (particularly anger), preoccupied attachment, and domain disorganization, with a particular focus on emotional dysregulation, may be critical for identifying interacting processes in BPD and possible BPD subtypes. Though the main effects of these factors on BPD trait have been demonstrated, only a few studies have examined their joint effects (Fossati, Donati, Donini, Novella, Bagnato, & Maffei, 2001; Meyer, Ajchenbrenner, & Bowles, 2005) and none have demonstrated interactive effects. Fossati and colleagues (2001) reported that BPD patients differed from other patients on temperamental dimensions after controlling for self-reported attachment. In another study BPD was associated with higher levels of negative emotions (anger, anxiety, depression) and with more insecure attachment to parents than was avoidant PD (Meyer *et al.*, 2005). This paper is concerned with the possible links between negative temperament (specifically anger), preoccupied attachment, and domain disorganization and BPD trait. As high levels of negative temperament and preoccupied attachment are common and non-specific in psychopathology, specific combinations of or interactions between these factors may be better suited for understanding mechanisms in the development of BPD or for identifying meaningful subtypes of BPD patients. It is plausible that different subgroups of persons with BPD have different profiles of negative temperament, attachment preoccupation, and domain disorganization and that these different profiles arise through different mechanisms in the development and maintenance of BPD. Our goal in the present report was an exploratory analysis to examine these processes – negative temperament (specifically, anger), attachment insecurity (specifically, preoccupied attachment), and domain disorganization – both independently and jointly and to identify the interactions between them. We expected that these processes would contribute independently and jointly to severity of BPD but did not have specific hypotheses about which processes would be most important or would interact.

## Method

### Sample

Patients from 21 to 60 years old were solicited from the general adult outpatient clinic at Western Psychiatric Institute and Clinic (WPIC), Pittsburgh, PA. Patients with psychotic disorders, organic mental disorders, and mental retardation were excluded, as were patients with major medical illnesses that influence the central nervous system and might be associated with organic personality change (e.g., Parkinson's disease, cerebrovascular disease, seizure disorders).

We recruited three groups: patients with BPD, patients with other PDs, and patients suffering from Axis I disorders (primarily depression and anxiety) but no PD. Announcements describing the study were posted in the clinic. Patients interested in participating contacted the research staff directly and were pre-screened by phone.

The study sample consisted of 128 patients who had complete data on the measures of interest. The average age of the group was 37.9 years ( $SD = 10.7$ , range = 21 to 60), and 96 of the patients were women (75%). The majority were white (96; 75%); of the minority patients, the largest percentage was African American (30 of 32, 94%). In terms of marital status, 67 patients (52%) were single and never married, 31 (24%) had suffered some marital disruption (i.e., they were separated or divorced), 28 (22%) were currently married or committed to a long-term domestic partner, and 2 (2%) were widowed. A large percentage of the sample had educational attainments beyond high school (83% with some vocational or college training), but the level of financial deprivation was high – 45% of the participants reported annual household incomes of less than \$10,000, and 67% less than \$20,000.

Current and lifetime diagnoses on Axis I were assessed with the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First, Gibbon, Spitzer, & Williams, 1997a). As Table

1 illustrates, the most prevalent current Axis I diagnoses were combinations of affective and anxiety disorders ( $n = 48$ ; 38%), followed by complex presentations (“other disorders”) that included eating, somatoform, dissociative, and sexual disorders together with more common affective, anxiety, and substance use disorders ( $n = 30$ ; 23%). In addition, Axis II diagnosis frequencies are displayed, demonstrating a high frequency of Cluster B and C PD diagnoses.

## Assessment

### BPD traits and diagnosis

Diagnostic assessments at intake required a minimum of three sessions with every patient. Each session lasted 2 hours or more. Session 1 included the administration of the SCID-I (SCID-I; First et al., 1997a) and other measures of current symptomatology. In Session 2, a detailed social and developmental history was taken, using a semi-structured interview, the Interpersonal Relations Assessment (IRA), developed for this purpose (Heape, Pilkonis, Lambert, & Proietti, 1989). During Session 3, the SCID for DSM-IV Axis II Personality Disorders (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1997b) was administered. In order to be consistent with Axis II data previously collected by this group, additional items assessing the research PDs included in DSM-III-R were also administered.

Following best-estimate diagnostic procedures, after the intake evaluation, the primary interviewer presented the case at a 3-hour diagnostic conference with colleagues from the research team. A minimum of three judges participated. All available data (historical and concurrent) were reviewed and discussed at the conference, and each clinician voted independently about the presence or absence of a PD. Judges were given access to all data that had been collected: current and lifetime Axis I information, symptomatic status, social and developmental history, and personality features acknowledged on the Axis II interview. For the present purpose, the key measures that emerged from the best-estimate consensus were the (a) overall decision about the presence versus absence of a PD and (b) specific DSM-IV Axis I and II diagnoses assigned. During the diagnostic conference, a checklist of the Axis II criteria for each of the DSM IV and the research DSM III-R PDs was completed by consensus, with each item rated absent (0), present (1), or strongly present (2). Dimensional scores reflecting the severity of each PD were computed by summing the scores (range 0 to 2) of the individual criteria. In this sample, the average dimensional score for BPD was 5.55 ( $SD = 4.85$ , range 1 to 15); the average dimensional score for all other PDs combined was 21.23 ( $SD = 10.50$ , range 4 to 49).

Our interest in broader conceptualizations of BPD led us to use a threshold of three or more BPD criteria, rather than the DSM diagnostic cutoff of 5 or more criteria. The threshold of 3 criteria was previously identified as the best predictor of membership of a Borderline Latent Class (BLC) (Clifton & Pilkonis, 2007). A BPD category created using the three symptoms criterion also showed improved discrimination from other Axis II disorders, and equal or superior prediction of Axis I symptoms and social dysfunction, when compared with the DSM BPD threshold of five or more symptoms. Of the 128 patients, 54 (43%) met the criteria for DSM IV BPD, 72 (56%) were in the BPD latent class, and 23 (18%) were not diagnosed with any PD (see Table 1).

### Domain disorganization

Social dysfunction was measured using the Revised Adult Personality Functioning Assessment (RAPFA) (Hill & Stein, 2000a, 2000b) by a second interviewer who was unaware of the results from the diagnostic assessments. Like its predecessor the Adult Personality Functioning Assessment (APFA) (Hill, Harrington, Fudge, Rutter, & Pickles, 1989), this interview enquires about functioning over the previous five years in six domains of work, love relationships,

friendships, non-specific social interactions, negotiations and coping. Negotiations and coping were not included in this study. This is an investigator-based measure, in which the interviewer uses flexible questioning to obtain adequate information and makes ratings on the basis of detailed rating rules, a dictionary of examples, and training. The interviews are audio recorded, and detailed reports are prepared from the tapes.

Domain disorganization is rated from the RAPFA by identifying markers of high emotional intensity or intimacy in work, friendships or non-specific social interactions, or breaches in the demarcation of these domains from each other and from romantic relationships. The presence of marked inconsistencies in the structuring of the domains also contributes to the rating, for example where there are both high levels of intimacy and known tolerated infidelity in romantic relationships. Participants are asked to give detailed examples of overall functioning and relating with others in the domain and are asked specifically about emotional intensity (e.g., How much do you confide in co-workers? What do you do when a friend has social plans without you?) and about the demarcation of domains (What did you do when you found out your spouse was unfaithful? Do problems in your romantic relationship ever get you into trouble at work? How do co-workers respond when you are upset?) Domain disorganization is rated on a 0 – 6 scale. Zero is rated where there are no markers for domain disorganization, '1 – 2' where there are some markers but no convincing examples, '3 – 4' where there are definitely some relevant features but there are also aspects of functioning in which domain clarity is preserved, and '5 – 6' where most or all functioning lacks domain clarity. Domain disorganization was rated in the UK from the written reports generated by the Pittsburgh group, blind to all of the other Pittsburgh clinical ratings. We have reported high inter-rater reliability for the domain disorganization scale, and elevated domain disorganization in BPD patients compared to patients with other personality disorders and psychiatric patients without personality disorder (Hill et al., 2008).

### **Negative temperament**

Negative temperament, similar to neuroticism, was assessed using the negative temperament scale in the Schedule for Nonadaptive and Adaptive Personality (SNAP) (Clark, 1993). This scale has 28 items assessing proneness to irritation, anger, and anxiety. In this sample the average negative temperament score was 20.95 (SD = 6.31, range = 1 to 30) and Cronbach's  $\alpha = 0.85$ . In order to examine whether the anger or anxiety facets of negative temperament were differentially associated with BPD and because we expected temperamental anger to be the more important facet of negative temperament for BPD, we also created two subscales. SNAP items within the negative temperament scale that unequivocally referred to anger were identified and this yielded a five-item scale with internal reliability (Cronbach's  $\alpha$ ) of 0.73. Based on consultation with Dr. Clark, we added two further items from the SNAP that are not in the published negative temperament scale, 'It's very hard to make me angry' (reversed) and 'I become angry more easily than most people', yielding a seven-item scale with Cronbach's  $\alpha = 0.82$ . We also identified nine SNAP items in the negative temperament scale that refer to anxiety. These nine items yielded a scale with Cronbach's  $\alpha = 0.81$ .

### **Preoccupied Attachment**

Adult attachment was assessed using a Q-sort methodology devised by Kobak (1989) for rating adult attachment interviews. This instrument has the advantage that it not only provides a direct measure of hyperactivation of the attachment system, but also generates a score for every individual. This is in contrast to categorical approaches that do not provide estimates of the degree of attachment hyperactivation in individuals in the non-preoccupied categories. The items in the Kobak's Q-sort are based on Main and Goldwyn's (1996) system for identifying attachment styles. The Q-sort methodology allows raters to integrate aspects of adult attachment relationships into a descriptive pattern. Correlation with each of three prototypes

– secure, preoccupied, and dismissing – generates three attachment scores. For this study, the Q-sort was applied to the Interpersonal Relations Assessment (IRA, Heape et al., 1989) interviews. The IRA asks about important relationships across the life span, with specific sections detailing childhood relationships with parents, siblings, and friends and current friendships and romantic relationships, yielding clinical material appropriate for using the Kobak Q-sort. Individuals with preoccupied attachment styles seek close, intimate relationships and are often particularly sensitive to interpersonal threats or slights. We focused on preoccupied attachment scores because we expected that the expressive styles associated with preoccupied attachment in adulthood would be characterized by elevated negative emotions in intimate relationships.

## Procedure

Eligible patients participated in 5 of 1-3 hour evaluation sessions conducted by 9 evaluators with masters degrees in mental health related fields, completed self-report scales, and a daily social interaction diary. Participants were paid up to \$300 for completion of the protocol sessions. Written informed consent was obtained from all participants after a full description of study procedures was given but before any study procedures were implemented. The study protocol was approved by the Institutional Review Board of the University of Pittsburgh.

**Variables and analyses**—Diagnostic systems treat psychopathology as a categorical entity. It is evident, however, that in many instances there are no natural thresholds demarcating disorder from absence of disorder (Pickles & Angold, 2003). Although DSM-IV specifies different disorders as categories, the advantages of considering personality disorders dimensionally are becoming increasingly apparent (Skodol, Gunderson, Shea, McGlashan, Morey, Sanislow, Bender, Grilo, Zanarini, Yen, Pagano, & Stout, 2005; Zanarini et al., 2005). Therefore, our analyses included both PD dimensions and categories.

Associations between BPD trait and domain disorganization, preoccupied attachment and negative temperament scores were examined first using simple bivariate Pearson correlation coefficients. Overall negative temperament and the separated anger and anxiety emotionality scores were included. In order to test for the specificity of associations with BPD psychopathology while controlling for current depression and anxiety as well as other PD traits, we calculated a BPD trait residual score by regressing BPD trait on to the sum of the Hamilton scale anxiety and depression scores, and the sum of all non-BPD scores. The hypotheses regarding independent and interactive effects of negative temperament or anger, preoccupied attachment, and domain disorganization were examined in hierarchical linear regression analyses with the BPD traits residual as the dependent variable and testing for interactions between negative temperament, preoccupied attachment and domain disorganization. These analyses were re-run after calculating dimensional scores without the BPD lack of anger control criterion (i.e., “inappropriate, intense anger or difficulty controlling anger (e.g., frequent displays of temper, constant anger, recurrent physical fights)”) in order to control for potential confounds resulting from the inclusion of both the BPD anger criterion and temperamental anger scores.

The interactions were further examined in relation to BPD diagnosis using the previously described threshold of three or more BPD criteria. We used binary predictor variables in order to obtain an estimate of the impact of interactions on the proportions of individuals with BPD. The thresholds for these variables were determined by recursive partitioning signal detection analyses (Kiernan, Kraemer, Winkleby, King, & Taylor, 2001; James, White, & Kraemer, 2005). Recursive partitioning is well suited to exploratory analyses of statistical interactions between continuous variables where there are no a priori criteria for determining thresholds. Partitioning continues as long as marginal counts are at least 10 and where a stringent test of

significance of  $p < 0.001$  is obtained for  $\chi^2$  tests, in order to reduce the risk of Type I errors (Kiernan, Kraemer, Winkleby, King, & Taylor, 2001).

## Results

### Correlation analyses

Table 2 depicts the results of the bivariate correlation analyses. BPD dimensional trait scores were associated with each of the three negative temperament scales, preoccupied attachment, and domain disorganization. They were also associated with other PD traits as well as Hamilton depression and anxiety scores.

### Regression analyses

In hierarchical linear regression analyses with the BPD residual as the dependent variable and negative temperament, preoccupied attachment, and domain disorganization as predictor variables, each of the three predictors made significant independent contributions to the BPD trait residual scores, accounting jointly for 22% of the variance ( $F_{(3,124)} = 11.71, p < 0.0001$ )<sup>1</sup>. In addition, the interactions between negative temperament, preoccupied attachment, and domain disorganization accounted for a further 8% of the variance ( $F_{\text{change}(3,121)} = 4.35, p < 0.01$ ), though only the interaction between negative temperament and domain disorganization was significant ( $\beta = .27, t = 3.26, p < 0.001$ ). Because temperamental anger ( $\beta = 0.34, p < 0.001$ ) but not anxiety ( $\beta = -0.04, p = 0.59$ ) significantly contributed to BPD traits, temperamental anxiety was not considered in subsequent analyses.

The results of the hierarchical linear regression analyses with the BPD residual as the dependent variable and anger, preoccupied attachment, and domain disorganization as predictor variables are shown in Table 3. Each of the three predictors made significant independent contributions to the BPD residual scores, accounting jointly for 28% of the variance ( $F_{(3,124)} = 17.68, p < 0.0001$ ). In addition, the interactions between anger, preoccupied attachment, and domain disorganization explained a further 7% of the variance ( $F_{\text{change}(3,121)} = 4.61, p < 0.01$ ), and this was accounted for by the interaction between anger and domain disorganization ( $\beta = .28, t = 3.67, p < 0.001$ ). When the regression models were re-run with the BPD trait residual omitting the BPD anger criterion, temperamental anger remained a strong predictor of the BPD residual.<sup>2</sup> Thus, temperamental anger contributes to the BPD construct in general and not only to the BPD anger trait.

### Recursive partitioning analyses

Figure 1 depicts the results of the recursive partitioning analyses with temperamental anger, preoccupied attachment and domain disorganization as predictor variables<sup>3</sup>. These yielded two significant interactions, one between temperamental anger and domain disorganization (Figure 1, right-hand side) and one between temperamental anger and preoccupied attachment (Figure 1, left-hand side). Of the 85 (66%) patients above the threshold for high temperamental anger identified in recursive partitioning, 71% were members of the BPD latent class compared to 28% of those with low anger scores ( $\chi^2_{(1)} = 21.14, p < 0.001$ ). Moreover, patients who had both high anger and high domain disorganization scores had a higher rate of membership in the BPD latent class (86%) than those with high anger but low domain disorganization (47%;  $\chi^2_{(1)} = 13.89, p < 0.001$ ). Although the rate of BPD among patients with low temperamental

<sup>1</sup>In similar regression models, secure attachment did not predict BPD trait residual scores and did not interact with domain disorganization or anger to predict BPD trait residual scores.

<sup>2</sup>Anger  $\beta = 0.29, t = 2.87, p < 0.001$ , preoccupied attachment  $\beta = 0.29, t = 3.78, p < 0.001$ , domain disorganization  $\beta = 0.78, t = 3.62, p < 0.001$ , anger by domain disorganization interaction  $\beta = 0.25, t = 3.24, p < 0.01$

<sup>3</sup>In similar recursive partitioning analyses, secure attachment did not interact with temperamental anger or domain disorganization.



anger was low (28%), those with high attachment preoccupation identified in recursive partitioning had a higher rate of membership in the BPD latent class (73%) than patients with low attachment preoccupation (13%) ( $\chi^2_{(1)} = 14.76, p < .001$ ). Thus two **possible** types of BPD were identified, one, the larger group in this sample, characterized by the combination of high anger and domain disorganization, and another, smaller group, characterized by low temperamental anger and preoccupied attachment.

## Discussion

This is the first study to show that negative emotionality (particularly anger), preoccupied attachment and limitations in the social organization of behaviours and emotions make contributions to BPD independently and in interaction. Our findings suggest that BPD is cross-sectionally associated with a) a general proneness to anger, b) high levels of negative emotions experienced and expressed specifically in relation to attachment figures as evidenced in preoccupied attachment, and c) difficulties in regulating emotional intensity in proportion to the ground rules of different kinds of relationships and social interactions reflected in domain disorganization.

Developmentally the distinction between anger and anxiety is crucial in that the emotions are evoked by different stimuli and require different regulatory strategies (Buss & Goldsmith, 1998; Robinson & Acevedo, 2001). Making this distinction also appears to be valuable in understanding processes in BPD. While patients with BPD have elevated symptoms of anxiety (e.g., Gunderson and Singer, 1975; Snyder and Pitts, 1988) and high rates of co-occurring anxiety disorders (McGlashan et al., 2000; Skodol et al., 1995; Zanarini et al., 1998, 1989; Zimmerman and Mattia, 1999), our results suggest that it is the anger rather than the anxiety component of neuroticism that characterizes BPD. We have controlled for Axis I symptomatology and other PD scores in the current analyses, supporting the conclusion that anger plays a key role and anxiety a lesser role in BPD. However, we recognize that because our sample is drawn from an outpatient mental health clinic, not all PDs are equally represented. Other PDs, specifically antisocial PD, may also be characterized by a profile highlighting problems with anger over problems with anxiety and that this question should be examined empirically for other PDs.

Both the regression models predicting residual BPD trait scores and recursive partitioning analyses predicting three or more BPD traits, revealed a statistical interaction between high temperamental anger and high domain disorganization. Recursive partitioning identified a further interaction in which high preoccupied attachment made a significant contribution only in individuals with low temperamental anger. Before considering these subgroups we should emphasise that they were generated by exploratory analyses, and further cross-sectional and prospective studies will be required to determine whether they are valid subtypes. In addition, we would also highlight that the data were gathered concurrently but also refer to different times, allowing us to speculate cautiously about developmental mechanisms that may give rise to the possible subtypes of BPD we have describe. Specifically, the attachment Q-sort, while based on an interview conducted in adulthood, focuses on childhood relationships with parents. Self-reported SNAP items were used to create temperamental anger scores; these items refer to general adult personality. Ratings of domain disorganization focus on social function within the past 5 years. Truly testing mechanisms for the development of BPD would require prospective and repeated assessments of these processes beginning in childhood.

The interaction between anger and domain disorganization may suggest a link between anger proneness and interpersonal functioning in the maintenance of BPD in adulthood. We hypothesize that domain disorganization is likely to make demands on emotion regulation and that this leads to severe dysregulation in anger prone individuals. These demands arise where

the ground rules of the domain are violated and there is little shared understanding of rules to resolve interpersonal challenges, particularly those posed by domain violations themselves. For example individuals with high domain disorganization commonly have intense friendships characterised by high levels of confiding and shared household, childcare, or financial arrangements more typical of family or romantic relationships. In addition, a hallmark of domain disorganization is the expression of emotions, either positive or negative, at a greater level of intensity than is generally anticipated in the domain. The ensuing social interactions are likely to contribute to emotional dysregulation, for example where friends retreat from strongly expressed positive emotions or inappropriately personal demands, leading to feelings of rejection in the recipient. This is likely to be particularly intense in anger prone individuals, leading to continued relationship instability and the maintenance of BPD symptoms such as frantic efforts to avoid abandonment and a pattern of intense interpersonal relationships.

Emotional regulation is also challenged where high DD individuals enter into transactions that are not licensed by the domain. Lending substantial amounts of money, for example, requires either the formal transaction of a bank or loan company, or particular kinds of close relationship such as among family members. Lending money to a work colleague without such a framework leads to difficulties if the money is not paid back, because there is no mutually understood procedure for resolving the problem. Anger prone individuals who find themselves in such situations are likely to have high levels of conflict and relationship breakdown with work colleagues. Thus the combination of anger and domain disorganization may be contributing to the maintenance of BPD symptoms such as inappropriate, intense anger.

An interaction between processes with general effects, as in the case of temperamental anger and domain disorganization, may be expected to give rise to pervasive dysfunction occurring in relatively few individuals, as in the case of BPD. However the mechanisms whereby attachment preoccupation alone may give rise to pervasive dysfunction in relatively few individuals require further consideration. That is because attachment processes are assumed to affect only intimate relationships, and attachment preoccupation is common. One explanation may be that the processes captured by the measure of attachment preoccupation are not specific to the hypothesised attachment system. Rather they affect a wider set of processes found in a range of social domains, hence leading to pervasive social dysfunction. Alternatively preoccupied attachment interacts with other processes not assessed in this study, for example impulsivity, to generate the pervasive dysfunction of BPD. A further possibility is that the disruption of intimate relationship functioning associated with attachment preoccupation radiates out into other social domains. For example anger activated in romantic relationships cannot be regulated during work interactions. This would imply two contrasting types of mechanism in BPD. In one the causal mechanisms directly affect several social domains, and in the other they directly affect only one domain of functioning, romantic relationships, this in turn disrupts functioning in other domains, hence giving rise to pervasive dysfunction.

The strengths of this study included that it examined the simultaneous and interactive effects of anger, preoccupied attachment and social domain dysfunction in a well-characterized clinical sample with a range of personality disorders. The majority of the measures were administered and rated without information about the others. Temperamental anger was assessed by self report, and domain disorganization from interviews that were administered and rated independently of all other measures. Preoccupied attachment was not assessed independently of PD traits; both were assessed using a consensus model. This was a clinical sample and so the results may not generalize to personality disorders in the general population.

In this study we have attempted to address not only the question of what are some of the key processes in BPD, but also how might they combine to produce the clinical picture of BPD. We have interpreted the findings in the context of a need to explain how severe pervasive

dysfunction occurring in relatively few individuals arises from psychological vulnerabilities that are common, and not so damaging, in the general population. The implications of the findings are at least fourfold. First, anger proneness, attachment and domain disorganization merit further investigation as mechanisms in BPD, and in particular require prospective study to determine their role in the emergence and maintenance of BPD psychopathology. Second, the developmental origins and evolution of domain disorganization need to be understood. Third, variations in temperament, attachment and social domain organization are seen in early childhood and may be key to understanding the developmental origins of BPD. Fourth each of these processes may be an important target for treatment and mediator of therapeutic effects.

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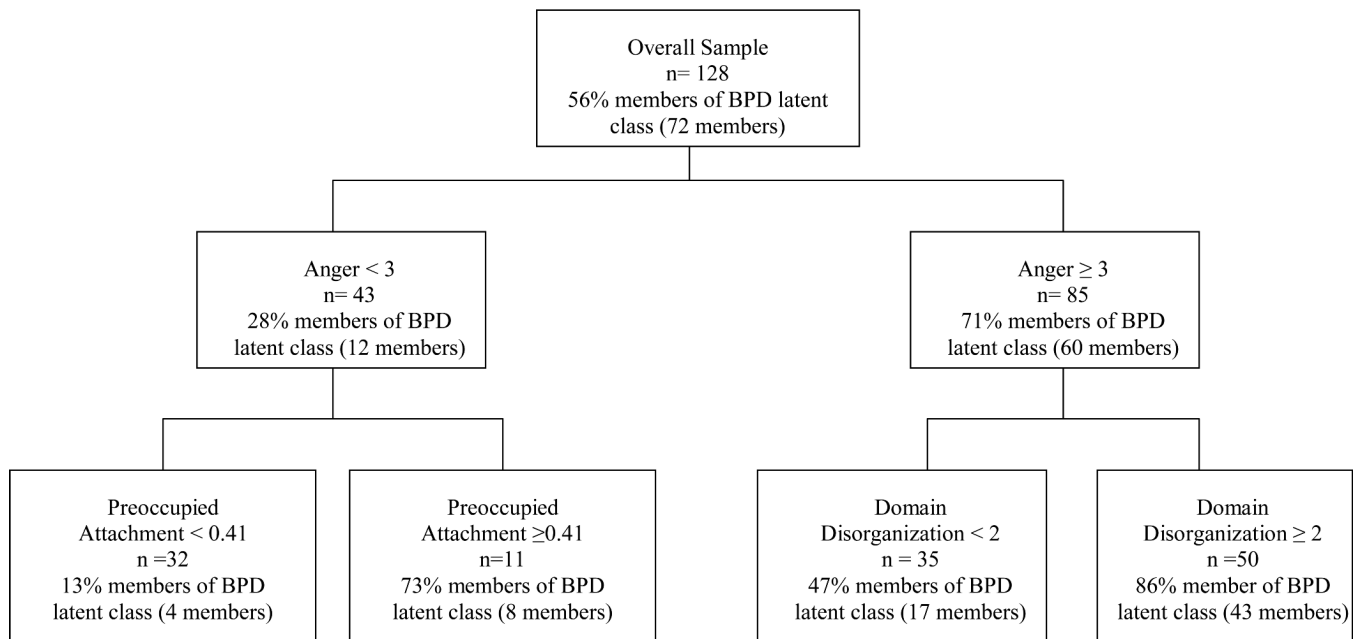
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**Figure 1.**  
Recursive Partitioning Decision Tree

**Table 1**

Axis I and II diagnoses for the 128 patients

Axis I Diagnosis	Current Diagnosis		Lifetime Diagnosis	
	Frequency	%	Frequency	%
No psychiatric disorders	3	2.3	0	0
Affective disorders only	16	12.5	11	8.6
Anxiety disorders only	9	7.0	2	1.6
Substance use disorders only	1	0.8	0	0
Affective and anxiety disorders	48	37.5	38	29.7
Affective and substance use disorders	9	7.0	10	7.8
Anxiety and substance use disorders	0	0	2	1.6
Affective, anxiety, and substance use disorders	12	9.4	31	24.2
Other Axis I disorders	30	23.4	34	26.6

Axis II Diagnosis	Frequency	%		
No Axis II diagnosis	23	18.1	--	--
Paranoid PD	6	4.7	--	--
Schizoid PD	2	1.6	--	--
Schizotypal PD	1	0.8	--	--
Histrionic PD	6	4.7	--	--
Narcissistic PD	21	16.4	--	--
Antisocial PD	11	8.6	--	--
Borderline PD	54	42.2	--	--
Avoidant PD	46	35.9	--	--
Dependent PD	12	9.4	--	--
Obsessive-compulsive PD	18	14.1	--	--
Passive-aggressive PD	23	18.0	--	--
Self-defeating PD	1	0.8	--	--
Sadistic PD	0	0	--	--
Depressive PD	20	15.6	--	--

Note: The "Other Axis I disorders" category include Axis I diagnoses of eating disorders, somatoform disorders, and other Axis I diagnoses not already captured. Unlike Axis I diagnoses, which are presented here in mutually exclusive categories which sum to 100%, individual PD diagnoses are presented here and the % sums to over 100% because some patients received more than one PD diagnosis. DSM IV and III-R PDs, including the research personality disorders, were assessed.

Table 2

## Correlations

	BPD	OPD	Ham Dep	Ham Anx	Neg Temp	Temp Ang	Temp Anx	Preocc
OPD	.21*	-	-	-	-	-	-	-
Ham Dep	.45***	.24*	-	-	-	-	-	-
Ham Anx	.46***	.22*	.74***	-	-	-	-	-
Neg Temp	.42***	.19*	.38***	.44***	-	-	-	-
Temp Ang	.41***	.00	.18*	.20*	.72***	-	-	-
Temp Anx	.30***	.19*	.42***	.45***	.89***	.47***	-	-
Preocc	.45***	.24*	.25*	.28**	.18*	.10	.17	-
DD	.45***	.08	.29***	.27***	.07	.06	.02	.25**

BPD = Borderline Personality Disorder dimensional score; OPD = Total Axis II dimensional score omitting BPD; Ham Dep = Hamilton Depression score; Ham Anx = Hamilton Anxiety Score; Neg Temp = SNAP Negative Temperament; Temp Ang = SNAP Anger Items; Temp Anx = SNAP Anxiety Items; Preocc = Q Sort Preoccupied Attachment Score; DD = Domain disorganization.



Summary of Hierarchical Regression Analysis for the prediction of the BPD trait residual from temperamental anger, attachment preoccupation, and domain disorganization

**Table 3**

Step	$r_A^2$	$F_A$	df	p	Variables	$\beta$	t	p
1	.30	17.68	3,124	<.001	Temperamental Anger	.33	4.30	<.001
					Preoccupied	.25	3.15	.002
					Attachment			
					Domain	.27	3.50	.001
					Disorganization			
2	.07	4.61	3,121	.004	Temperamental Anger (TA)	.31	4.15	<.001
					Preoccupied	.24	3.12	.002
					Attachment (PA)			
					Domain	.28	3.77	<.001
					Disorganization (DD)			
					TA by PA	-.11	-1.41	.16
					DD by PA	-.07	-.97	.34
					TA by DD	.28	3.67	.001