A prospective investigation of the development of borderline personality symptoms

ELIZABETH A. CARLSON, BYRON EGELAND, AND L. ALAN SROUFE
University of Minnesota

Abstract

The antecedents and developmental course of borderline personality disorder symptoms were examined prospectively from infancy to adulthood using longitudinal data from a risk sample ($N = 162$). Borderline personality disorder symptom counts were derived from the Structured Clinical Interview for *DSM* Disorders diagnostic interview at age 28 years. Correlational analyses confirmed expected relations between borderline symptoms and contemporary adult disturbance (e.g., self-injurious behavior, dissociative symptoms, drug use, relational violence) as well as maltreatment history. Antecedent correlational and regression analyses revealed significant links between borderline symptoms in adulthood and endogenous (i.e., temperament) and environmental (e.g., attachment disorganization, parental hostility) history in early childhood and disturbance across domains of child functioning (e.g., attention, emotion, behavior, relationship, self-representation) in middle childhood/early adolescence. Process analyses revealed a significant mediating effect of self-representation on the relation between attachment disorganization on borderline symptoms. The findings are discussed within a developmental psychopathology framework in which disturbance in self-processes is constructed through successive transactions between the individual and environment.

Borderline personality disorder (BPD) is a severe psychiatric disorder characterized by pervasive patterns of disturbance or instability across multiple domains of functioning, including behavior (e.g., impulsivity, repetitive self-destructive behavior including self-injury and suicide), affect (e.g., chronic fear of abandonment, affective instability, intense or inappropriate anger), cognition (e.g., distorted thoughts and perceptions), attention (dissociative experience), and relationship interaction (e.g., intense, volatile adult relationships) (e.g., American Psychiatric Association, 2001; Gunderson, Zanarini, & Ki-

siel, 1995; Paris, 2005a, 2005b; Zanarini, 2005; Zanarini, Ruser, Frankenburg, & Hennen, 2000). Common to both community and hospitalized samples, these distortions in underlying functioning may be manifested in increased drug or alcohol abuse, victimization in adult relationships, poor parenting, and frequent changes in work, gender identity, and values (e.g., Hobson, Patrick, Crandell, Garcia-Perez, & Lee, 2005; Zanarini, 2005). Although BPD has a population prevalence of only 1–2%, the disorder is associated with life course psychosocial dysfunction (as well as chronic medical conditions), accounting for high levels of psychiatric care (20% of psychiatric hospitalizations) and social service use (American Psychiatric Association, 2001; Frankenberg & Zanarini, 2004; Torgersen, 2005; Torgersen, Kringler, & Cramer, 2001).

Historically, the place of BPD in psychiatric nosology has been a point of contention, with conceptualizations ranging from pathological conditions with neurotic and psychotic features to specific forms of personality disorder

(Gunderson, 1984, 2001), schizophrenia spectrum disorder (Wender, 1977) and affective spectrum disorder (Stone, 1980, 1981) to recent conceptualizations of the personality disorder as related to impulse control and trauma spectrum disorders (van der Kolk, 1987, 1988; Zanarini, 1993). Although the validity of BPD is now generally accepted, attention has turned to etiology.

The array and complexity of symptoms associated with BPD have inspired numerous etiological hypotheses including deprivation of early socialization, constant exposure to chaotic and traumatic environments, deviant family interactional patterns, and relatively subtle forms of neuropsychological and biochemical impairment (which may be sequelae of innate vulnerabilities and childhood experience). Specifically, the disorder and symptom spectrum have been associated with histories of prolonged childhood separations, caregiver emotional withdrawal, conflictual, distant or overprotective maternal relationships, failure of father presence, maltreatment (i.e., especially sexual abuse), ongoing family chaos and insensitivity, genetic vulnerabilities and other endogenous factors such as temperament and stress reactivity, as well as interactions among these factors. (e.g., Brodsky, Cloitre, & Dulit, 1995; Herman, Perry, & van der Kolk, 1989; Hobson et al., 2005; Linehan, 1993; Ogata et al., 1990; Paris, 2000; Posner et al., 2003; Siever & Koenigsberg, 2000; Zanarini, 2000, 2005).

This abundant literature represents an important guide for further research. However, in the absence of prospective, longitudinal data, none of these hypotheses can be confirmed, nor without comprehensive data can their likely interactions be examined. Concurrent manifestations, proximal correlates (which already may reflect the incipient disturbance), and retrospective reports are not fully adequate. Correspondence between an adult symptom and a defined dimension of infant temperament is suggestive, but it cannot confirm that such features were present from the early months of life or play a causal role. Moreover, retrospective reports of parents, even if made in childhood, do not provide adequate data on infant temperament. Such reports may reflect current child behavior, which itself may be the outcome of earlier development. Likewise, reports by affected adults

that current or historic relationships were filled with anger, or reports of current anger toward historic relationship partners (Dozier, Stovall, & Albus, 1999; Zanarini, 2000), may reflect the current pathology rather than reveal its cause. Even the robust, widely replicated interview studies (with independent data and clinical control groups) showing associations between borderline symptoms and sexual abuse, parental emotional unavailability, or other trauma, cannot be accepted as proving a causal link, as plausible as these ideas are. Such negative reports may be influenced by the disorder itself, as when "selectively activated memories of borderline subjects artificially inflate reports of negative parenting" (Bezirganian, Cohen, & Brook, 1993, p. 1837). They also leave unexplained why most individuals with histories of abuse or loss do not develop BPD symptoms.

"To determine the true relationship between childhood and adult personality pathology, prospective longitudinal follow-up studies are needed" (Paris, 2000, p. 77). Moreover, researchers have called for studies of children in high risk, community samples (Gunderson & Zanarini, 1989; Rogosch & Cicchetti, 2005), because they "are the most reliable source of information on how early experiences shape adult life" (Paris, 2000). As Paris further argues, "children need to be studied from infancy onwards, so as to provide a baseline of temperament measures; regular assessments of parenting behavior need to be made over the course of childhood; measurement of the influence of factors outside of the family (e.g., social class; schools, peer groups) needs to be included in the design" (p. 84). Researchers have argued for not only identifying contributing factors and interactions, but looking for continuity at the level of underlying personality organization (Cicchetti & Olsen, 1990; Lenzenweger & Cicchetti, 2005; Rogosch & Cicchetti, 2005) and examining the phenomena from both dimensional and categorical approaches (Zanarini & Weinberg, 1996).

The current investigation addresses this gap in existing knowledge through a systematic prospective study of developmental precursors and trajectories of borderline personality symptoms including the effects of specific life events and relationships on the course of functioning

(Cicchetti & Olsen, 1990; Lenzenweger & Cicchetti, 2005; Pagano et al., 2004; Paris, 2003; Zanarini & Frankenburg, 1997).

Organizational Perspective

The current work derives from a developmental psychopathology perspective. As the study of the origins and course of individual patterns of behavioral adaptation, the perspective provides a useful framework for integrating diverse theoretical accounts of borderline phenomena with a focus on dynamic processes among internal and external influences and biological and psychological transformations that occur over time (e.g., Cicchetti, 2006; Cicchetti & Valentino, 2007; Rutter, 1996; Sameroff, 2000; Sroufe & Rutter, 1984).

From an organizational developmental framework, emphasis is placed on the organization of experience and patterns of adaptation, rather than continuity of manifest discrete behaviors (Sroufe & Waters, 1977). Adaptation is defined with respect to the quality of integration among domains of functioning related to salient developmental issues (Cicchetti, 1989; Waters & Sroufe, 1983). Positive adaptation is enabled by integrations of biological, socioemotional, cognitive, and representational capacities that promote the flexible negotiation of concurrent and future developmental issues (Cicchetti, 1993; Egeland, Carlson, & Sroufe, 1993; Sroufe, 1989; Waters & Sroufe, 1983). Maladaptation (i.e., psychopathology) reflects developmental deviation(s) from normal patterns of adaptation, rigid patterns of functioning that compromise development (Cicchetti, 1993; Sroufe, 1989). In keeping with this perspective, development is defined as a series of qualitative reorganizations whereby earlier patterns of adaptation provide a framework for, and are transformed by, later adaptations. In this way, development is cumulative, and early experience is uniquely influential. Successive adaptations or maladaptations represent the combined influence of contemporaneous experience and development up to that point (Bowlby, 1973).

Thus, from a developmental perspective, disturbed behavior is constructed through the cumulative interaction of risk and protective factors operating over time. Early risks potenti-

ate the impact of later risks, yet may be moderated by ongoing immediate or contextual supports. The earliest transactions between child and environment shape subsequent reactions to challenges and opportunities and set conditions both for the emergence of disturbance and its course (Sroufe, 1983). A special place is reserved for the role of early child characteristics and experience as "initiating conditions," but of central importance are the ways in which early experience, later experience, and current circumstances interact to shape adult adaptation or disturbance.

Self-Development and Borderline Personality Disturbance

Adopting an organizational theory of development, borderline personality dysfunction reflects disturbance in core dimensions of self-competence that interact and transact to form the foundation of subsequent functioning (Sroufe, Egeland, & Carlson, 1999). From a developmental perspective, the self is defined in terms of o*rganization*, in particular, the inner organization of attitudes, feelings, expectations, and meanings with manifestations in attention, behavior and relationships (Sroufe, 1990). Core levels of self-competence across domains of functioning derive from the quality of early caregiving experience and, in turn, contribute to the negotiation of developmental issues at multiple, interactive levels (Sroufe et al., 1999).

From responsive early caregiving experience, children develop flexible patterns of emotion and attention regulation, positive expectations and attitudes regarding the self and others, and fundamental individual and relational skills that maintain internal organization and empathic connections with others (e.g., Carlson & Sroufe, 1995; Sroufe, 1996). With development, dynamic changes in emerging cognitive and neurological capabilities, caregiver scaffolding (e.g., parental modeling, reinforcing, structuring, redirecting, and altering interpretations), and interactions with the social world contribute to the child's evolving repertoire of self-regulatory strategies (Buchsbaum & Emde, 1990; Maccoby, 1992, 2000; Nelson, 2007; Sroufe, Egeland, Carlson, & Collins, 2005; Thompson, 2006; Vygotsky, 1978).

For some children, overwhelming emotional experience (i.e., trauma) in childhood compromises normal processes of organization and integration. In the context of malevolent caregiving relationships, extreme emotionally arousing experience evokes simultaneous conflicting needs. Such experiences overwhelm immature regulatory processes, resulting in multiple, incompatible emotional, attentional, and behavioral patterns, and expectations of self and other (Liotti, 1992). Repeated experiences of contradictory cues contribute to a collapse in regulatory strategies for coping with distress, reflected in infancy in attachment disorganization (Hesse & Main, 2000; Main & Solomon, 1990). The breakdown in early dyadic regulatory patterns that form the base for emerging self-regulation may be one mechanism by which traumatic experience in the caregiving environment is translated into adaptational vulnerabilities (Liotti, 1992, 1999).

Typically, as the self develops, increasing capacities for representation and symbolization provide new avenues for managing and integrating experience (e.g., Carlson & Sroufe, 1995; Sroufe, 1990; Stern, 1985). However, when capacities to regulate and verbalize affect are compromised by intolerable experience and lack of relationship support, important avenues for affective differentiation and integration may be restricted, and development proceeds along alternate pathways (Cicchetti & Toth, 1995). Secondary or compensatory behavioral and psychological processes substitute to organize experience.

Sustained and pervasive traumatic experience in early childhood, particularly in the context of the caregiving relationship, compromises the quality of adaptation at multiple levels of functioning (attentional, emotional, behavioral, representational, and relational). These distortions and disruptions in basic self-processes contribute to the emergence of enduring compensatory regulatory and relational strategies to facilitate the negotiation of developmental challenges.

For example, extreme intrusive, hostile, or rejecting caregiving may foster distortions in self-regulation including negative expectations of self and others in relationships (Cicchetti & Valentino, 2006; Fischer & Ayoub, 1994; Fonagy, Target, & Gergely, 2000; Sroufe, 1990; van der Kolk & Fisler, 1994). From early maltreatment, the child may expect that important

others will be unavailable or ineffective as soothing agents during times of distress. Chronic maltreatment, trauma, or caregiving hostility may render the child passive, isolated, and vulnerable to seeking sources of nurturance, regulation, and connection through external sources of stimulation, dissociative processes, and body manipulation rather than through more meaningful interpersonal interactions (Herman, 1992; Putnam, 1994, 2006).

Trauma and maltreatment undermine the child's capacity to attend to, recognize, and interpret accurately the cues and affective states of others and by extension, the self (Fonagy et al., 2000; Laub & Auerhahn, 1993; Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak & Sinha, 2002; Pollak, Vardi, Putzer Bechnier, & Curtin, 2005). Dissociative processes instill a sense of passivity whereby events are perceived as happening to the individual or controlled outside of the self (i.e., without volition; Breger, 1974; Bowlby, 1969/1982). Children become hypervigilant to the attitudes and intentions of others, further compromising emergent self-awareness, a sense of authorship, and the ability to attend to internal cues, emotional needs, and thoughts (Briere, 1988; Calvery, Fischer, & Ayoub, 1994; Putnam, 1997; Rieder & Cicchetti, 1989; Westen, 1994).

Early traumatic experience compromises emergent capacities in affect regulation, impulse control, and arousal modulation. Children may become hyper- or hyporesponsive to emotional stimuli, particularly those that signal threat or danger, resulting in marked or unpredictable shifts in arousal levels disproportionate to environmental context (Cicchetti & Curtis, 2005; Cummings, Pellegrini, Notarius, & Cummings, 1989; Eisenberg et al., 1997; Pollak, Cicchetti, Klorman, & Brumaghim, 1997). Children exposed to maltreatment or trauma continue to rely on primitive coping skills (e.g., isolation, aggression, somatization) and defenses (e.g., dissociation) to negotiate developmental challenges long after typically developing children have abandoned such defenses in favor of more sophisticated emotional regulatory and relational strategies (Macfie, Cicchetti, & Toth, 2001). Ongoing reliance on rigid coping skills and defenses results in a progressive narrowing of possibility as the child becomes

increasingly isolated from restorative relationships and opportunities.

Early extreme experience is associated with deficits in the capacity to symbolize or mentalize affective experience (i.e., to reflect on and integrate affective experience into higher order cognition; Fonagy & Batement, 2008; Fonagy & Target, 1997). Trauma "overwhelms and defeats one's capacity to organize it" (Laub & Auerhahn, 1993, p. 288). Thus, deficits in affective processing may include the inability to describe internal states (i.e., alexithymia; Krystal, 1988) as well as restrictions in attributional focus.

Lacking adequate caregiving support for the integration and mentalization of affective experience the traumatized child is prone to act, rather than reflect, upon affect, turning to compensatory behavioral outlets rather than symbolic capacities to express affective experience (Fonagy & Bateman, 2008; van der Kolk & Fisler, 1994). Deviant, apparently manipulative or controlling, interpersonal behaviors may be employed with the purpose of eliciting others to attend to regulatory needs. An inability to control one's own behavior and emotion, and related experiences of fear, may be manifested in frustration, anger, and attempts to control the feelings and behavior of others (Siever & Koenigsberg, 2000).

Dissociative processes of compartmentalization and passivity of experience in conjunction with the developmental need to view the caregiving relationship as a source of safety support a distorted sense of self and negativity bias for children who have experienced maltreatment and other forms of trauma (Ayoub et al., 2006; Beeghly & Cicchetti, 1994; Calvery et al., 1994; Westen & Cohen, 1992). To preserve a semblance of safety and adult protection within a harsh caregiving relationship, the child may internalize a sense of self-criticism and hostility (Westen, 1994) and over time come to regard the self as defective, unlovable, loathsome, or frightening (Fischer & Ayoub, 1994; Westen & Cohen, 1992). Dissociative representational processes may be manifested in intrusive and unpredictable thoughts and images and a blurring of internal and external experience. These processes may not only be experienced as frightening but guide the expression of frightening behavior.

Compromised developmental processes related to the misreading of interpersonal cues, lack of access to inner emotional experience, and related dissociative representational experience lead to disturbances in social functioning. In this way, relational functioning may mirror individual experience. Social behavior may be characterized by intrusiveness, aggression, and insensitivity to interpersonal cues and rules.

In summary, from a developmental perspective, the self is defined by organization and integration of experience (Breger, 1974; Loevinger, 1976). Failure to integrate salient experience represents a profound distortion or fragmentation in the self system. When experience is unnoticed, disallowed, unacknowledged or forgotten, connections among experiences are thwarted, and the resulting gaps in personal history compromise the integrity of the self and subsequent adaptation. In infancy and early childhood, across domains of functioning, experiences are modulated by the caregiver in daily routines. Through repeated experience with a responsive caregiver, the child's capacity for self-regulation is internalized (Emde, 1983; Sroufe, 1996). In contrast, in the context of extreme emotional arousal, the child's emergent capacity for regulation may be overwhelmed and the developing organization of self processes may be disrupted or distorted at multiple levels (van der Kolk, 1987, 1988). The study of developmental mechanisms and processes underlying the origin and evolution of BPD is integrally related to the study of the organization of behavior, representation, and environmental influences on the developing self. Based on this framework, special emphasis in this study is placed on the examination of early experience and its developmental implications.

Aims of the Current Study

The aim of the current study is to utilize longitudinal data from a community sample to examine the relation between self-development and borderline personality symptoms. Specifically, we examine (a) contemporary correlates of the adult BPD symptoms, (b) predictive contributions of early endogenous (i.e., temperament) and environmental (i.e., attachment disorganization, maternal hostility, life stress) factors to adult borderline symptoms, (c) the contribution of disturbances in core aspects of self-development in early adolescence to personality disturbance,

and (d) the function of self-development in mediating the link between early experience and symptoms of adult disorder. Primary analyses rely on dimensional data. Although dimensional and categorical approaches are mutually informing at the observational level for both research and clinical decision making (Paris, 2003; Pickles & Angold, 2003), dimensional approaches are consistent with the broader spectrum of personality disorder criteria (Haslam, 2003; Paris, 2000; Widiger & Trull, 2007), and continuously distributed dimensions address the power issues inherent in the study of low frequency phenomena (Paris, 2000).

Method

Participants

Participants ($N = 162$; 82 males, 80 females) were drawn from a longitudinal study of parents and children, the study of development and adaptation in a poverty sample of young mothers (range $= 14–34$ years; $M = 20.66$, $SD = 3.57$) and their first-born children (for complete sample data, see Egeland, 1991). The original sample of primiparous mothers was recruited between 1975 and 1977 from the public health clinics where they were receiving prenatal care. The families were identified as at risk for parenting problems because of poverty (100%), single motherhood (62%), and low maternal educational attainment (34% had not completed high school). This sample was 67% Caucasian, 11% African American, 5% Native American, Latino or Asian, and 17% multiracial. Based on US Census occupational categories, 43% of heads of households were employed as either clerical, service workers, operatives, or craftsmen, 5% were employed in technical, managerial, or sales positions, 40% were unemployed, and 12% were students when the infants were born. Attrition analyses did not reveal differences between the current participants and those not included in these analyses with respect to demographic variables.

Procedure

Because longitudinal multivariate data afford the opportunity for multiple analyses regarding a particular phenomenon, it becomes critical to define a clear rationale or strategy for variable selection. The goal of the current study was to examine specific hypotheses concerning the development of borderline personality symptoms: the relations between early endogenous and environmental factors, self-processes in middle childhood/early adolescence and borderline phenomena. With this aim in mind, variables were chosen for inclusion in the study based on two criteria: whether they (a) were representative of constructs of interest (e.g., infant temperament, quality of caregiver infant regulation, child functioning, psychopathology) and (b) had proven to be powerful indicators in previous studies. All variables examined in the statistical analyses were explicitly chosen for this study based on these criteria, and all results of these analyses are reported here.

Assessments

Adulthood variables.

Structured Clinical Interview for DSM Disorders (SCID, 28 years). Sections of the SCID/NP Research version were used to assess borderline personality. The interview provides a full range of information that allows for classification of the disorder as well as a symptom count that can be used as a dimensional scale for each disorder (First, Spitzer, Gibbon, & Williams, 1997a, 1997b). In addition, information is provided regarding the chronology of the disorder (e.g., age of onset, presence of and percentage of time symptoms have been present). For purposes of the dimensional approach in the current study, the BPD symptom count was used (Haslam, 2003; Pickles & Angold, 2003). Scores ranged from 0 to 7 ($M = 0.46$, $SD = 1.16$).

Because the SCID relies on clinical judgment, its reliability depends on the training and skill of the interviewer. In the current study, the interview was administered by advanced graduate students trained and supervised on by senior investigators experienced in SCID interview use. Training procedures are outlined by First and Gibbon in their SCID Training Guide (First, Gibbon, Spitzer, & Williams, 1996). Segal, Hersen, and Hasselt (1994) re-

ported highly reliable diagnoses for most Axis I and II disorders. In a study using the *Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition, Text Revision* (American Psychiatric Association, 2000), Ventura, Liberman, Green, Shaner, and Mintz (1998) found excellent reliability on SCID symptoms (overall $k = .85$).

Dissociative Experiences Scale (DES, 26 years). The DES (Carlson & Putnam, 1993) is a self-report measure of the frequency of dissociative experiences in an individual's daily life. Participants quantify their experiences by placing a mark on a response scale (0–100%) for each of 28 items. The items on the scale cover experiences of memory disturbances, identity, awareness, and cognition. Examples of items include "having no memory for significant past events" or "feeling that a familiar place is unfamiliar." The DES has discriminated clinical and nonclinical samples, and demonstrated good construct and criterion validity (Carlson & Putnam, 1993). Internal reliability ($r = .80$) and test–retest reliability ($r = .83$) were adequate. Current scores ranged from 0 to 30.54 ($M = 6.57$, $SD = 6.17$).

Self-Injurious Behavior Questionnaire (SIB, 26 years). SIB was assessed at age 26 using a semistructured interview about body-based self-injurious behaviors (Yates & Carlson, 2003). The interview includes initial questions related to culturally contextualized body modifications (e.g., piercing, tattooing), related risk-taking behaviors (e.g., accident proneness), and peer engagement in SIB. In subsequent questions, participants are asked if they have ever hurt themselves intentionally without meaning to kill themselves by cutting, burning, or hitting themselves. If the reported incident(s) fall within the current definition of SIB, participants are asked a series of questions to assess lifetime history of SIB and its parameters. Frequency, severity, and duration of SIB are rated across six scale points: none, mild ambiguous, multiple ambiguous or 1 clear incident, 3 or more clear incidents, more than 10 clear incidents prior to age 18, more than 10 clear incidents extending into adulthood ($M = 1.55$, $SD = 1.23$). Two coders rated all reports of SIB. Coder agreement was excellent across 35 SIB cases ($k = .85$). The continuous SIB rating was used in the current study as suggested by MacCallum, Zhang, Preacher, and Rucker (2002). The rating has been related to sexual abuse history, $r(163) = .34$, $p < .001$, dissociation, $r(158) = .20$, $p < .05$, and somatization, $r(159) = .30$, $p < .001$, symptoms (Yates, Carlson, & Egeland, 2008).

Adult Health Survey (26 years). This paper-and-pencil survey is a version of Blum, Resnick, and Bergesien's (1989) Adolescent Health Survey modified for use at age 26. The original survey is the result of a 10-year process of item writing and scale development and has been administered to approximately 75,000 individuals in research and epidemiology studies. Survey items used in the current study included (a) drug use (nine-item composite including use of sedatives, cocaine, inhalants; range $= 0–18$; $M = 1.43$, $SD = 1.72$), (b) drug-related family/friendship dysfunction (three-item composite; range $= 0–3$; $M = 0.11$, $SD = 0.40$), (c) domestic violence (range $= 0–4$ from no participation to conviction; $M = 0.08$, $SD = 0.41$), (d) suicidal thoughts (rating of 0, $n = 154$; rating of 1, $n = 6$), and 5), and (e) criminal activity (16-item composite; range $= 0–13$; $M = 0.51$, $SD = 1.53$).

Early endogenous variables. Multiple measures of endogenous infant characteristics (i.e., medical history, infant anomalies at birth, Brazelton assessments, Carey ratings, Emotionality, Activity, Sociability and Impulsivity Index [EASI] scores) were included in the study. Given the nature of borderline phenomena, it was considered important to examine hypotheses regarding biological/neurological contributions to the degree possible within the constraints of the longitudinal data set.

Medical history (prenatal). Variables representing the mother's history of medical problems (e.g., diabetes, asthma) and complications prior to and during pregnancy and birth were derived from hospital records. These included (a) number of serious medical problems (e.g., asthma, diabetes) prior to pregnancy (range $= 0–3$; $M = 0.39$, $SD = 0.61$), (b) number of medical complications during pregnancy (range $= 0–4$; $M = 0.53$, $SD = 0.77$), (c) drug/alcohol

use prior to and/or during pregnancy (coded 0, 1, 2; $M = 0.17$, $SD = 0.41$), (d) presence (coded 1, $n = 19$) or absence (coded 0; $n = 143$) of premature birth, and (e) number of medical complications at the time of delivery (range = 0–6; $M = 0.75$, $SD = 0.95$).

Infant anomalies (birth). A variable representing frequency and severity of infant anomalies at birth was derived from hospital records. Infant conditions were rated on a 4-point scale taking into account number and severity of conditions reported ($M = 0.39$, $SD = 0.61$).

Neonatal Behavioral Assessment Scale (NBAS, 7–10 days). The NBAS (Brazelton, 1973) was administered for each infant at home on the 7th and 10th days of life. The NBAS consists of 27 behavioral items (e.g., habituation to visual, auditory and tactile stimulation, muscle tone, alertness) rated on 9-point scales and 17 reflex items (e.g., Babinski, moro, rooting, and sucking reflexes) rated as low, medium, or high. Five examiners administered the NBAS. Two had been trained by Brazelton's associates, and three established reliability with the original trainees using the criteria of no more than one disagreement on the reflex items and/or no more than one scale score disagreement of more than one scale point. The two primary testers examined 67% of the infants. Interrater agreements averaged .93 for the entire sample.

A nonoptimal score, defined as the number of items on which the infant was judged to be functioning in the nonoptimal range, indicated the infant's overall level of functioning. The average of the nonoptimal scores from the two assessments was used in the analyses (range = 0–15; $M = 3.69$, $SD = 2.79$). Also included were five factor scores related to orientation ($M = 0.08$, $SD = 0.88$), irritability ($M = 0.05$, $SD = 0.86$), maturity ($M = 0.01$, $SD = 0.77$), physical ability ($M = -0.22$, $SD = 0.78$), and consolability ($M = 0.03$, $SD = 0.71$).

Carey Infant Temperament Questionnaire (3, 6 months). The Carey Infant Temperament Questionnaire (Carey, 1970) was completed by mothers at 3 and 6 months. The questionnaire assessed nine dimensions of temperament, including mood, approachability, adapt-

ability, intensity, activity, persistence, threshold, rhythmicity, and distractibility. For each dimension, three responses were possible (e.g., low, medium, or high). (See Vaughn, Deinard, and Egeland, 1980, for comparison of Carey results of the current and standardization samples.) Final analyses in this study included the 6-month activity dimension (range = 0–1.0; $M = 0.46$, $SD = 0.28$).

Infant behavior during feeding (3 months). At 3 months postpartum, infant–mother pairs were observed in their homes during feeding. Observers rated a range of maternal behaviors, infant behaviors, and interactions between the mother and infant (e.g., frequency of looking at the infant, cuddling by the infant, responsiveness of the caregiver to infant initiatives). A total of 33 maternal and child behaviors were rated by independent observers. The mean range of scores was 7 for the fifteen 9-point scales, 6 for the ten 7-point scales, 4 for two 6-point scales, 4 for four 5-point scales, and 2 for one 3-point scale.

Trained observers established a median reliability of .85 using the Lawlis and Lu index (1972). Reliability checks throughout the course of the study maintained the overall level of agreement at 85%. The Lawlis and Lu measure of interrater reliability is defined as the proportion of cases on whom the raters agree within the limits set, corrected for number of agreements expected by chance.

The data derived from the feeding observations were factor analyzed using a principal components analysis with varimax rotation. A four factor solution was identified. The first two factors were identified primarily by variables assessing the mother's caretaking skills and quality of her affective interactions with the infant, accounting for 41% and 37% of the common variance, respectively. The third and fourth factors examined in this study were identified primarily by infant variables and include infant social behavior (range = -1.70– 2.53; $M = -0.01$, $SD = 0.82$) and infant disposition (range = -2.09–1.64; $M = 0.05$, $SD = 0.73$). See Vaughn, Taraldson, Crichton, and Egeland (1980) for descriptions of the items and the factor structure of the variables.

EASI Temperament Survey (30 months). The EASI measure is a 20-item questionnaire designed to assess temperamental child characteristics (Buss & Plomin, 1975). The items reflect four factors: emotionality, activity, sociability and impulsivity. Each item is rated on a 5-point scale (1 = *not at all true*, 5 = *very true*). A total score for a particular factor is the sum of five items for that factor. Descriptive statistics for this sample were as follows: emotionality (range = 6–23; $M = 14.16$, $SD = 3.47$), activity (range = 10–25; $M = 18.33$, $SD = 3.31$), sociability (range = 9–23; $M = 17.99$, $SD = 2.54$), and impulsivity (range = 8–25; $M = 15.54$, $SD = 3.23$).

Early environmental variables.

Maternal relationship status (infant birth). The status of the mother's marital or primary social relationships at the time of her infant's birth was recorded. The status was coded 1 (*single, divorced, or long-term separation*; $n = 100$) or 0 (*married or involved in a long-term relationship*; $n = 62$).

Infant maltreatment history (birth–18 months). Infant maltreatment was identified on the basis of information regarding child rearing practices and maternal attitudes toward the child derived from: (a) home observations of mother and infant when the infants were 7 and 10 days old and at 3, 6, 9, and 12 months; (b) home interviews with mothers including the Child Care Rating Scale (Egeland & Deinard, 1975) and questions regarding caretaking skills, feelings toward the infant, and disciplinary practices; (c) observations of the dyads and interviews with mothers conducted during mother–child visits to the public health clinic; and (d) laboratory observations of the dyads when the infants were 9, 12, and 18 months old.

Behaviors considered to be physically abusive ranged from frequent and intense spanking to unprovoked angry outbursts resulting in serious injuries, such as severe cigarette burns. In all instances, the abuse was seen as potentially physically damaging to the child.

Mothers identified as hostile/verbally abusive routinely found fault with their children and criticized them in an extremely harsh fashion. Whereas many physically abusive mothers were not chronically hostile or rejecting (but rather prone to violent, unprovoked outbursts), verbally abusive mothers engaged in constant berating and harassment of their children. At 24 months, children of hostile/verbally abusive mothers with or without physical abuse exhibited more frustration and anger compared with the control group, and toddlers with experiences of hostile but not physical abuse demonstrated more frustration oriented toward mother (Egeland & Sroufe, 1981).

Mothers considered to be psychologically unavailable were unresponsive to their children and, in many cases, passively rejecting of them. These mothers appeared detached and uninvolved with their children, interacting with them only when necessary. In general, they were withdrawn, displayed flat affect, and seemed depressed. At 24 months, frequency of frustration, whining, and negative affect was greatest for children who had experienced psychologically unavailable care without physical abuse (Egeland & Sroufe, 1981).

Mothers rated as neglectful were irresponsible or incompetent in managing day-to-day child care activities. They failed to provide for the necessary health or physical care of the children and did little to protect them from possible dangers in the home. Although these mothers sometimes expressed interest in their children's well-being, they lacked the skill, knowledge, or understanding to provide consistent, adequate care.

The validity of group placement was supported by information from multiple sources. All mothers in the physical abuse group had been under the care of child protection or had been referred to child protection by a person outside of the longitudinal project. Independent raters' observations of mothers and infants in limit-setting tasks at 12 and 18 months and a problem-solving task at 24 months supported the identification of hostile/verbally abusive mothers and psychologically unavailable mothers. Mothers rated as neglectful were or had been under the care of the public health nurse or child protection.

For purposes of the current study, dyads were coded 1 for presence or 0 for absence of each of 4 conditions: physical abuse, verbal abuse, psychological unavailability, and neglect (Egeland & Sroufe, 1981; Egeland, Sroufe, & Erickson,

1983) and were assigned a composite rating of abuse (range = 0–4; $M = 0.32$, $SD = 0.83$).

Attachment quality (12, 18 months). Attachment assessments were conducted at 12 and 18 months using Ainsworth's Strange Situation procedure (Ainsworth, Blehar, Waters, & Wall, 1978). The standardized laboratory procedure includes eight brief episodes designed to activate infant attachment behavior through an increasingly stressful series of infant–mother separations and reunions. Individual differences in attachment relationships are coded with respect to the infant's gaining comfort in the mother's presence when stressed and using the mother as a secure base from which to explore. Infant–mother dyads are assigned to one of three major classifications: secure, anxious avoidant, or anxious resistant based on the patterning of four interactive behavioral ratings: proximity seeking, contact maintaining, proximity avoidance, and contact resistance. Attachment quality in the laboratory assessment has been related to caregiving sensitivity in the home during the first year (Ainsworth et al., 1978; Grossmann, Grossmann, Spangler, Suess, & Unzer, 1985; NICHD Early Child Care Network, 1997; Pederson, Gleason, Moran, & Bento, 1998; Posada, Jacobs, Carbonell, Lazate, Bustamante, & Arenas, 1999).

In the current study, videotaped Strange Situation assessments were classified by independent coders trained by and reliable with a team of expert coders, including Mary Ainsworth and Alan Sroufe. Agreement on major classifications derived from behavior ratings was 89% and 92% for the 12- and 18-month samples, respectively.

Strange Situation assessments were coded for attachment disorganization/disorientation using the classification scheme developed by Main and Solomon (1990). Indices of disorganization/disorientation include (a) sequential display of contradictory behavior patterns; (b) simultaneous display of contradictory behavior patterns; (c) undirected, misdirected, incomplete, and interrupted movements and expressions; (d) stereotypies, asymmetrical movements, mistimed movements, and anomalous postures; (e) freezing, stilling, and slowed movements and expressions; (f) direct indices of apprehension regarding the parent; and (g) direct indices

of disorganization or disorientation. Disorganization/disorientation in infant–caregiver attachment was rated on a 9-point scale (range = 1–8; $M = 3.68$, $SD = 2.24$). Coders were trained by Mary Main, and interrater agreement was 86% based on 35 cases ($k = .72$). In previous research, disorganization ratings were correlated significantly with DES dissociation ratings in late adolescence, $r(128) = .36$, $p < .001$ (Carlson, 1998).

Maternal hostility (42 months). The quality of the mother–child relationship at 42 months was observed in a series of teaching tasks: (a) building block towers of specific proportions, (b) naming things with wheels, (c) matching colors and shapes on a form board, and (d) tracing a preset pattern through an Etch-a-Sketch maze. The tasks were just beyond the ability of most children, requiring the parent/caregiver to help the child complete the task and capturing the coping skills of the child and his or her capacity to use the caregiver as a supportive resource (see Erickson, Sroufe, & Egeland, 1985). Seven-point ratings of mother and child behavior were derived from videotaped observations. Two ratings were used in this study: maternal hostility and generational boundary dissolution. Maternal hostility reflected the mother's expression of anger, discounting, or rejection of the child. A high rating indicated clear or overt rejection of the child (e.g., blaming the child for mistakes) or lack of emotional support for the child. A low rating did not necessarily indicate support; the caregiving may have been supportive or unsupportive, but the caregiver did not direct blame or actively reject the child. The generational boundary dissolution rating reflected the violation of appropriate parent–child roles through behaviors such as treating the child as a contemporary, and stimulating or engaging the child in provocative teasing. A high rating reflected a pervasive pattern in which the parent was not a dependable resource for her child, but often behaved in ways that appeared to meet parental needs at the expense of her child. A low rating reflected the provision of parent support and structure and the maintenance of appropriate parent–child roles.

The two variables discriminated children with and without a history of abuse in early childhood

(Egeland et al., 1983) and children with and without behavior problems in preschool (Erickson et al., 1985). Assessments were coded by two independent coders. Average interrater reliability (Spearman Brown correlation) was .80 for 87 participants. Descriptive statistics for these variables were as follows: hostility, range = 2–14, $M = 3.10$, $SD = 2.08$; generational boundary dissolution, range = 1–7, $M = 2.61$, $SD = 1.49$.

Family disruption (12–64 months). The family disruption scale captured the level of stability or disruption in the composition of family membership based on the number of the mother's romantic partners; the number of the mother's partners living in the home; the number of moves in and out of the home by the mother's partners; and the number of moves made by the mother and the child that were instigated by changes in the mother's romantic relationships (Pierce, 2000). Information for this scale was obtained from interviewer notes and mothers' interviews over the course of the study. The 5-point scale ranged from 1 = *stable one- or two-parent home* (e.g., one man was in the home, the mother was not involved in any romantic relationships during the measurement period) to 5 = *extremely disrupted home* (e.g., mother was involved with multiple partners, numerous moves in and out of the home during the measurement period). Interrater reliability was calculated based on 33 cases rated independently by two coders ($k = .61$). For these analyses, family disruption ratings were averaged across early childhood (range = 1–5; $M = 2.64$, $SD = 1.31$). Intraclass correlation for the family disruption composite was .77.

Stressful life events (3–42 months). Maternal life stress was assessed using a modified version of the 40-item Life Events Inventory (Cochrane & Robertson, 1973) with items added and deleted to increase its relevance for the sample (Egeland & Deinard, 1975). The resultant 39-item Life Events Scale was designed to assess the amount of social and economic stress experienced by the family. Life stress data were collected during semistructured maternal interviews in early childhood (3, 12, 18, 24, 30, and 42 months). Participants were asked whether each event (e.g., job loss, death

of family member) had occurred since the preceding assessment. Positive responses were probed further to enable independent, trained coders to rate the severity of each stressor on a 3-point scale reflecting the extent to which the event was disruptive to the family's functioning (Pianta & Egeland, 1990). Across all items, the mean interrater agreement was .86. At each time point, a total weighted life stress score was computed by summing the number of items checked on the scale, with the weights assigned according to the severity of each stressor. The composite life stress scores were calculated by averaging across standardized z scores at each time point ($M = 0.01$, $SD = 0.72$).

Middle childhood/early adolescence variables.

Teacher's Report Form (TRF, Grade 6, 12 years). The TRF, which is the teacher version of the Child Behavior Checklist (Achenbach & Edelbrock, 1986), was completed by the child's teacher toward the end of sixth grade along with other measures of classroom adjustment. The TRF consists of 113 items describing behavioral problems associated with middle childhood (e.g., "disobedient at school," "gets in many fights," "likes to be alone"). Each item is scored by the teacher to reflect occurrence, frequency, and severity of the problem (2 = *often and very true*, 1 = *sometimes or somewhat true*, 0 = *not true*).

The normative and psychometric data for the TRF were derived from large, representative national samples of nonreferred children. Validity and reliability of the measure have been demonstrated repeatedly. Two-week test–retest reliabilities for the TRF broad band and subscales ranged from .70 to .89 for girls (ages 6–11) and .82 to .92 for boys (ages 6–11). The authors report good convergent validity for the subscales (.62–.90 with corresponding scales of the Conner's Teacher Rating Scale) and good criterion-related validity in the form of significant differences between demographically similar referred and nonreferred children on all the TRF scales for all sex/age groups.

From purposes of this study, scales representing instability and disturbance in emotional, attentional, behavioral, and relational

domains were derived from the Grade 6 assessment (age 12 years). Seven items were selected for each domain based on core self processes underlying features of borderline personality functioning (Geiger & Crick, 2001) and moderate to high item-total score correlations. Behavioral items included "impulsive, acts without thinking," "fails to finish things," "destroys own things," "accident prone, gets hurt a lot," "behaves irresponsibly," explosive and unpredictable behavior," and "easily frustrated" (α = .79). Emotional items included: "cries a lot," "nervous highstrung or tense," "stubborn, sullen, or irritable," "sudden changes in mood," "sulks a lot," "temper tantrums or hot temper," and "unhappy, sad, or depressed" (α = .77). Attentional items included: "can't concentrate, can't pay attention," "confused or seems to be in a fog," "daydreams or gets lost in thoughts," "absorbed with picking at skin/body," "sleeps in class," "stares blankly," and "inattentive, distracted" (α = .81). Relational items included: "bullying, meanness to others," "destroys property of others," "disturbs others," "doesn't get along with others," "gets in fights," "physically attacks people," and "threatens people" (α = .87). These items overlap with those identified by Geiger and Crick (2001) and examined by Salvatore, Cobb, and Sroufe (2008).

Family drawing (8 years). Representational organization of self in family relationships in middle childhood was assessed through family drawings (cf. Main, Kaplan, & Cassidy, 1985) and coded using theoretically derived 5- and 7-point ratings (Carlson & Levy, 1999; Fury, Carlson, & Sroufe, 1997). Ratings of self-organization were used in the current study. These ratings were designed to capture lapses or lack of organization of the self in relationships as reflected in structural or thematic indicators. Structural indicators included the absence of (e.g., figure omitted, "buried," obscured) or extreme distortions (e.g., fragmented or "floating" body parts, false starts) in the self-drawing. Thematic components included frightening depictions of the self (e.g., scary figures) or inexplicable self-related markings (e.g., uninterpretable markings or chaotic scenes). Ratings captured a range of weak or no indicators (rating = 1) to frequent and/or severe indicators (rating = 5; $M = 1.93$, $SD = 1.04$). The rating was related significantly to antecedent histories of abuse, $r(175) = .25$, $p < .001$, and consequent dissociative symptoms in adolescence, $r(156) = .30$, $p < .001$; Carlson & Levy, 1999). Intraclass interrater reliability was .81 ($n = 63$).

Narrative projective assessment (12 years). Representational organization of self in relationships was assessed in early adolescence using a battery of narrative projective tasks with child and relationship themes. The assessment included (a) a sentence completion task, (b) storytelling task, (c) fable interpretation, and (d) friendship interview. The sentence-completion task consisted of 28 ambiguous sentence stems designed to assess attitudes and perceptions regarding central developmental issues (e.g., parent–child and peer relationships, emotional states, self-perceptions). The projective storytelling task included four pictures depicting ambiguous social situations designed to elicit individual and relationship themes: two drawn from the Tasks of Emotional Development (1 and 3; Cohen & Weil, 1971) and two from the Thematic Apperception Test (3BM and 16; Murray, 1938/1943). The fable interview, an adaptation of Johnston's (1988) moral dilemma procedure, was designed to assess the child's understanding and resolution of social expectations and problem-solving strategies. The friendship interview, a semistructured, open-ended interview developed by longitudinal project staff, was designed to elicit general expectations of self in close relationships.

Socioemotional expectations and attitudes across the four narrative measures were assessed using theoretically derived rating scales. Ratings of self-organization used in the current study were designed to capture lapses or distortions in organization of the self in relationships as reflected in the battery of narrative projective tasks. Indicators included references to unexplained or intrusive violence related to the self, unresolved feelings of guilt or fear, and/or bizarre images related to the self. Ratings captured a range of weak or no indicators (rating = 1) to frequent and/or severe indicators (rating = 5; $M = 2.31$, $SD = 1.05$). The rating has been related significantly to antecedent histories of abuse, $r(181) =$

.22, $p < .001$, and consequent dissociative symptoms in adolescence, r (158) $= .31$, $p < .001$ (Carlson & Levy, 1999). Intraclass interrater reliability was .79 ($n = 61$).

Parent–child relationship quality (13 years). Adolescents and their mothers were videotaped in a laboratory situation. (Because only 44 father figures were living with the children at age 13, triadic data are not reported here.) The dyads were asked to complete four structured interaction tasks (based on Block & Block, 1980): (a) plan an antismoking campaign, (b) assemble a series of puzzles while the parent was blindfolded (the child was asked to guide the assembly), (c) discuss the effects of two imaginary/hypothetical happenings, and (d) complete a Q-sort of an ideal person. The dyadic interactions were assessed in a series of 7-point rating scales (Sroufe, 1991).

For the current analyses, the scale measuring sexualized boundary dissolution between parent and child was used an indicator of relationship dysfunction. The scale captured the extent to which generational boundaries in the parent–child relationship were violated in an intrusive, intimate, or sexualized manner (e.g., sexualized teasing and playfulness, affectionate caressing, intrusive touching or holding hands). These behaviors were viewed as problems in the developmental context of early adolescent emancipation. At the high end of the scale (rating $= 7$), indicators of boundary dissolution were frequent and pervasive, occurring consistently throughout the session. At the midpoint in the scale, appropriate parent–child roles were maintained during much of the session; however, indicators were prevalent and appropriate boundaries were not fully reinstated when needed. At the low end of the scale (rating $= 1$), clear and appropriate parent–child boundaries were maintained. Intraclass interrater reliability for this scale was .57 ($n = 129$), and percent agreement within 1 point was .79. Ratings for this sample ranged from 1 to 7 ($M = 1.90$, $SD = 1.33$).

Family disruption (Grades 1–6). A description of the Family Disruption Scale (Pierce, 2000) can be found in the Early Environmental Variable Section. For these analyses, family disruption ratings were averaged across middle childhood Grades 1–6 (range $= 1–5$; $M = 2.70$, $SD = 1.39$).

Stressful life events (Grades 1–6). A description of the Life Events Inventory (Cochrane & Robertson, 1973; Egeland & Deinard, 1975) can be found in the Early Environmental Variable Section. Life stress data were collected during semistructured maternal interviews in middle childhood/early adolescence (Grades 1, 2, 3, and 6). Composite life stress scores were calculated by averaging across standardized z scores at each time point ($M = 0.05$, $SD = 0.76$).

Composite variables: Childhood to adolescence.

Maltreatment (54 months–18 years). Participants were classified into maltreatment groups at several points in time (Egeland, 1997; Shaffer, Huston, & Egeland, 2008). As described fully in the Early Environmental Variable Section, the current analyses included maltreatment ratings in infancy and across childhood from 54 months through age 18 years. During childhood and adolescence, physical abuse, physical neglect, and child sexual abuse were coded dichotomously (present/absent) for each participant on the basis of information from several sources, including direct observations, caregiver interviews, reviews of child protection and medical records when possible, and teacher interviews. Physical abuse included parental acts that resulted in physical damage to the child (e.g., bruises, cuts, burns). Physical neglect was defined as incompetent and irresponsible management of the child's day-to-day care, inadequate nutritional or health care, and dangerous home environments because of insufficient supervision by a caregiver. Child sexual abuse consisted of genital contact between the child and a person who was at least 5 years older than the child was (all perpetrators were in their teenage years or older).

During later childhood (5–18 years), available information from observations, interviews, and, when possible, records was reviewed, and participants were identified as having experienced one or more maltreatment types. Each case was rated separately for physical abuse, neglect, and sexual abuse. To establish reliability,

10% of these cases were coded by an independent rater and kappa coefficients were calculated (sexual abuse $k = .85$; physical abuse $k = .81$; physical neglect $k = .89$). Participants were included in these later ratings if maltreatment was reported at any point during the assessments between 5 and 18 years of age.

Family disruption (12 months–18 years). A complete description of the Family Disruption Scale (Pierce, 2000) can be found in the Early Environmental Variable Section. For this variable, family disruption ratings were averaged across infancy, early childhood, middle childhood and adolescence (rating = 5; $M = 2.73$, $SD = 1.31$).

Composite indices of self-functioning

For purposes of correlation, regression, and mediation analyses, drawing and narrative measures of self-organization/disorganization were standardized and combined to derive a composite representational index of self disturbance.

For purposes of mediation analyses, measures of self-disturbance in attention, emotional regulation, behavior, relationship, and representation were standardized and combined to derive an overall index of disturbance in self functioning.

Results

The current study examined adult BPD symptoms in relation to (a) contemporary correlates, (b) endogenous and environmental factors in infancy and early childhood, and (c) disturbances in core aspects of self-development in early adolescence to personality disturbance. The research explored the functions of self-development as mediators in the link between early experience and symptoms of adult disorder.

Bivariate analyses

Correlational analyses (SPSS, 2009) confirmed expected relations between BPD symptoms and contemporary adult disturbance, including self-injurious behavior, dissociative symptoms, drug abuse and drug-related relationship disturbance, domestic violence and other criminal activity, and suicidal ideation.

Shown in Table 1 are results of correlational analyses between borderline symptoms and early endogenous and environmental risk factors. Significant endogenous variables included infant motor maturity (7, 10 days), muscle tone/tension (3 months), parent report of infant activity (6 months), and child emotionality (EASI, 30 months). Although correlated with adult borderline personality symptoms, maternal history of significant medical problems was excluded from further analyses because of significant relations with early life stress ($r = .26$, $p < .001$). Remaining endogenous variables (30 indicators derived from six measures) were not significantly related to borderline symptoms.

Significant environmental indicators (see Table 1) included early abuse (12–18 months), attachment disorganization (12–18 months), maternal hostility and generational boundary dissolution (42 months), family disruption (12–64 months), and maternal life stress (3–42 months). In middle childhood/adolescence, disturbance in self-processes across multiple domains of functioning (behavior, emotion, attention, relationship, self-representation) and parent–child relationship disturbance were related significantly to adult borderline symptoms. Adult borderline personality symptoms were also related to cumulative measures of maltreatment and family disruption across childhood and adolescence.

Multivariate analyses

Negative binomial regression analyses (Karazsia & van Dulmen, 2008) were conducted in Stata Version 8.0 (StataCorp. 2003) to examine the prediction of borderline personality symptoms from endogenous and environmental risk factors in early and middle childhood. As shown in Table 2, when early endogenous variables were examined in combination predicting borderline symptoms, no single factor emerged as significant. Among environmental predictors, both maternal hostility ($z = 2.64$, $p < .01$) and early life stress ($z = 1.96$, $p < .05$) significantly contributed to the prediction of borderline symptoms.

Regression analyses were conducted to examine the prediction of borderline personality symptoms from attentional, emotional, behavioral, and relational disturbances in child

Table 1. *Correlations between borderline personality symptoms (28 years) and measures of contemporary functioning (26 years) and antecedent experience (birth to 18 years)*

Variables	Borderline Symptoms (n)
Adulthood	
Self-injurious behavior (26 years)	.47*** (162)
Dissociative symptoms (26 years)	.32*** (161)
Drug use (26 years)	.39*** (160)
Drug related relationship dysfunction (26 years)	.21** (160)
Domestic violence (26 years)	.26** (159)
Suicidal ideation (26 years)	.46* (158)
Early Childhood Endogenous Characteristics	
Maternal history of serious medical problems	.22** (154)
Infant motor maturity (NBAS, 7–10 days)	.14† (152)
Infant muscle tone/tension (feeding observation 3 months)	.19* (151)
Infant activity (Carey parent report, 6 months)	.17* (134)
Emotionality (EASI, 30 months)	.21** (151)
Early Childhood Environmental Factors	
Maltreatment (12–18 months)	.20* (162)
Attachment disorganization (12–18 months)	.20* (122)
Maternal hostility (42 months)	.42*** (153)
Maternal boundary dissolution (42 months)	.17* (144)
Family disruption (12–64 months)	.14† (159)
Life stress (3–42 months)	.29*** (162)
Middle Childhood/Early Adolescence	
Attentional disturbance (12 years)	.34*** (159)
Emotional instability (12 years)	.28*** (159)
Behavioral instability (12 years)	.30*** (159)
Relational disturbance (12 years)	.23** (159)
Self-representation disturbance (8–12 years)	.39*** (158)
Family disruption (Grades 1–6)	.12 (159)
Life stress (Grades 1–6)	.12 (159)
Parent–child relationship disturbance (13 years)	.23** (149)
Early Childhood Through Adolescence	
Maltreatment history (54 months to 18 years)	
Physical abuse	.28** (162)
Sexual abuse	.19* (162)
Neglect	.08 (162)
Family/father disruption (12 months to 18 years)	.18* (157)

Note: NBAS, Neonatal Behavioral Assessment Scale (7–10 Days; Brazelton, 1973); EASI, EASI Temperament Survey (30 months; Buss & Plomin, 1975).
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

functioning, representational measures of self-disturbance, and parent–child relational disturbance (Table 3). In combination, disturbances self-representation contributed uniquely to the prediction of borderline symptoms ($z = 3.03$, $p < .01$), and emotional dysregulation demonstrated a marginally significant influence ($z = 1.73$, $p < .08$).

Table 2. *Negative binomial regressions predicting adult borderline personality symptoms (28 years) from early endogenous and environmental experience*

Independent Variables	B	SE	e^b	SE	z (p Value)
I. Prediction From Endogenous Characteristics					
Infant motor maturity (7–10 days)	−0.04	0.41	0.96	.40	−0.10
Infant muscle tone/tension (3 months)	−0.54	0.39	0.58	.23	−1.38
Infant activity (6 months)	−0.96	0.92	0.38	.35	−1.04
Emotionality (30 months)	0.13	0.08	1.14	.09	1.62
χ^2 (4) = 7.37***					
II. Prediction From Early Environmental Experience					
Attachment disorganization (12–18 months)	0.05	0.10	1.06	.11	0.54
Maternal hostility (42 months)	0.23	0.09	1.26	.11	2.64**
Maternal boundary dissolution (42 months)	0.10	0.12	1.11	.13	0.85
Maternal life stress (3–42 months)	0.51	0.26	1.66	.43	1.96*
χ^2 (4) = 18.47***					

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. *Negative binomial regressions predicting adult borderline personality symptoms (28 years) from middle childhood/early adolescent experience*

Independent Variables	B	SE	e^b	SE	z (p Value)
Attentional disturbance (12 years)	0.40	0.62	1.49	0.92	0.65
Behavioral instability (12 years)	0.01	1.12	1.00	1.12	0.00
Emotional instability (12 years)	1.39	0.80	4.00	3.21	1.73†
Relational disturbance (12 years)	0.54	0.80	0.58	0.47	0.60
Self-representation (8–12 years)	0.79	0.26	2.19	0.57	3.03**
Parent child disturbance (13 years)	0.17	0.12	1.19	0.15	1.42
χ^2 (6) = 24.38***					

†$p < .10$. **$p < .01$.

Process analysis

Mediation analyses were conducted following Baron and Kenny (1986). Negative binomial regressions were conducted in Stata, Version 8 (StataCorp, 2003).

In two sets of analyses, measures of disturbance in self-processes in middle childhood/early adolescence (composite index of self-functioning, index of representational disturbance) were examined as mediators of the observed relation between attachment disorganization and borderline personality symptoms (Table 4). Attachment disorganization was selected as the earliest precursor based on both theory and prior empirical work. In contrast to records of life events, attachment disorganization is thought to represent the child's experience of maltreatment and early internal microdissociative processes manifested in behavior (Liotti, 1992), and it has been related to dissociative symptoms in late adolescence (Carlson, 1998), a marker in the borderline functioning process. In preliminary analyses, disorganization was shown to mediate the link between abuse and middle childhood/early adolescent child functioning ($z = 2.03$, $p < .05$).

In the first set of mediation analyses, (a) attachment disorganization predicted borderline symptoms ($z = 2.12$, $p < .05$), (b) attachment disorganization marginally predicted the composite index of self-disturbance ($z = 3.91$, $p <$

Table 4. *Early experience (12–18 months), adult borderline personality symptoms (28 years), and the mediating role of child experience 12 (years)*

Dependent and Independent Variables [a]	B	SE	e [b]	SE	z (p Value)
I. Mediating Role of Composite Self Index					
Borderline symptoms (28 years)					
Attachment disorganization (12–18 months)	0.20	0.09	1.22	0.11	2.12*
Composite self index (12 years)					
Attachment disorganization (12–18 years)	0.08	0.05	1.09	0.05	1.74†
Borderline symptoms (28 years)					
Composite self index (12 years)	1.45	1.51	4.30	2.21	2.84**
Attachment disorganization (12–18 months)	0.07	0.10	1.07	0.10	0.74
Z = 1.39, p < .08					
II. Mediating Role of Self-Representation					
Borderline symptoms (28 years)					
Attachment disorganization (12–18 months)	0.20	0.09	1.22	0.11	2.12*
Self-representation (12 years)					
Attachment disorganization (12–18 years)	0.08	0.03	1.09	0.03	3.10**
Borderline symptoms (28 years)					
Self-representation (12 years)	1.04	0.25	2.84	0.70	4.21***
Attachment disorganization (12–18 months)	0.01	0.09	1.01	0.09	0.01
Z = 2.23, p < .01					

[a]The independent variables are the subentries.
*p < .05. **p < .01. ***p < .001.

.06), (c) disturbance in self-functioning predicted borderline symptoms with attachment disorganization held constant ($z = 4.21$, $p < .001$), and (d) the predictive strength of attachment disorganization to borderline symptoms decreased with self-disturbance held constant ($z = .01$, *ns*). The Sobel Test (MacKinnon, Warsi, & Dwyer, 1995) revealed a nonsignificant mediating effect of self-functioning on the relation between attachment disorganization on borderline symptoms ($z = 1.39$, $p < .08$).

In the second set of mediation analyses, (a) attachment disorganization predicted borderline symptoms ($z = 2.12$, $p < .05$), (b) attachment disorganization predicted disturbance in self-representation ($z = 3.10$, $p < .01$), (c) representational disturbance predicted borderline symptoms with attachment disorganization held constant ($z = 4.21$, $p < .001$), and (d) the predictive strength of attachment disorganization to borderline symptoms decreased with disturbance in self-representation held constant ($z = .01$, *ns*). The Sobel Test (MacKinnon et al., 1995) revealed a significant mediating effect of self-representation on the relation between attach-

ment disorganization on borderline symptoms ($z = 2.23$, $p < .01$).

Discussion

The current study examined the etiology of adult BPD symptoms in a community sample using a prospective longitudinal design and organizational developmental approach. In preliminary analyses, borderline personality symptoms were examined in relation to adult individual and relational disturbance previously associated with disorder in retrospective studies. As expected, borderline symptoms were significantly related to a range of adult disturbances, including self-injurious behavior, dissociative symptoms, drug use and related relationship dysfunction, criminal activity, domestic violence, suicidal ideation, and histories of maltreatment and family disruption. The findings support the validity of the assessment of borderline phenomena within this community sample and the use of a dimensional analytic approach.

Principal analyses focused on adult borderline functioning in relation to (a) early endogenous

and environmental experiences hypothesized to be related etiologically to borderline symptoms, (b) middle childhood/early adolescent behavioral and representational measures of self-disturbance, and (c) processes mediating the links between early experience and later disorder.

Etiological bivariate and multivariate analyses confirmed relations between relational and contextual antecedents hypothesized or reported in retrospective studies, but did not consistently support the endogenous contributions to adult disorder. Borderline personality symptoms were significantly related to four measures of infant disposition and temperament, including observational assessments of infant motor maturity and tension, maternal report of infant activity, and child emotionality. The symptom count was not related significantly to the 30 remaining prenatal, perinatal, or early infancy and childhood endogenous indicators derived from six measures.

In contrast, borderline personality symptoms were significantly related to early relational experiences previously reported in retrospective studies. These included attachment disorganization (12–18 months) and maltreatment (12–18 months), maternal hostility and boundary dissolution (42 months), family disruption related to father presence (12–64), and family life stress (3–42 months). Examined in combination with and without endogenous variables predicting borderline symptoms, maternal hostility and life stress contributed independently to the prediction.

Results also supported the relations between borderline personality symptoms in adulthood and disturbance across domains of attention, emotional regulation, behavior, relationship functioning and at the representational level in early adolescence. Moreover, exploratory process analyses suggested that disturbances in self-functioning, especially self-representation, in early adolescence may mediate the link between early relational disturbance and later personality disorder. The combined results related to self-functioning suggest that a constellation of behavioral and representational indices in late childhood may mark the pathway to borderline symptoms (Crick, Muray-Close, & Woods, 2005; Geiger & Crick, 2001).

The findings in this study support the significance of early experience in development, es-

pecially in the evolution of disturbance. In the history of psychology a special significance of early experience has often been hypothesized. From systems theorists who describe "initiating conditions" (e.g., Thelen, 1989) to organismic theorists who argue that all development entails differentiation from prior structures, many see development as a cumulative process (for a review, see Sroufe, 2007). One prominent hypothesis is that the earlier development goes awry the more profound will be the resulting disturbance. In particular, psychodynamic theorists such as Freud (1917/1966; e.g., mourning and melancholia) and Kohut (1977) argued that severe personality disturbances were the result of very early fixations and regressions, on the one hand or, alternatively, profound early disturbances in the formation of the self. As prominent as these hypotheses have been, there has been little prospective, empirical evidence to support such propositions. The current data provide an important start in this regard. Indeed, considering the period of time spanned, the link between early malevolent experience (especially parental hostility at age 3) and borderline personality symptoms at age 28 is noteworthy, especially given the contrasting data with a host of endogenous factors.

The study also explored a particular viewpoint on the developmental process by which early experience is linked to severe personality problems. Following Bowlby (1973) and others, representations and related mentalizing processes are viewed as carriers of experience (Carlson, Sroufe, & Egeland, 2004; Sroufe et al., 2005) and central to personality disorder (Fonagy & Bateman, 2008). Explicitly as predicted, measures of representation in childhood and early adolescence mediated the association between attachment disorganization, assessed in infancy, and BPD symptoms in adulthood.

Strengths and limitations

This study extends previous findings regarding BPD phenomena from clinical settings to a low-income community sample. Moreover, the data were collected prospectively using multiple independent methods and informants. Whether in clinical or community settings, prior studies of BPD have relied on retrospective research

designs, typically using single informants to report on both independent and dependent measures, which introduces potential confounds related to retrospective bias (Henry, Moffitt, Caspi, Langley, & Silva, 1994) and shared method variance (Sternberg, Lamb, & Dawud-Noursi, 1998). Finally, the study's emphasis on developmental processes and pathways moves this research beyond the level of description to examine specific transactions that may lead to adult pathology outcomes (Lenzenweger & Cicchetti, 2005).

Despite the contributions of this study to the literature on borderline personality phenomena, many of the features that strengthen the findings introduce potential limitations and confounds to their interpretation. The study provides a unique developmental perspective on a small number of individuals exhibiting borderline symptoms who have been followed from birth through adulthood. At the same time, the sample size limited the complexity of the current analyses, particularly the capacity to examine gender differences, predictive specificity, and interactive processes. Similarly, the examination of borderline phenomena in a community sample necessitated the adoption of a dimensional symptom, rather than categorical diagnostic, approach to data analysis, which may have implications for the generalizability of community findings to clinical settings. Nonetheless, the current sample consistently confirmed correlational clinical findings in the literature.

Beyond the unique features of the current sample and study design, methodological limitations in this study are typical of and suggest direction for broader research on psychopathology. Issues of classification, definition, and comorbidity are prominent concerns in studies of disturbance as well as maltreatment. Future studies may permit the specification of distinct pathology subgroups or the analysis of other forms of trauma (e.g., loss or illness) and biological factors (e.g., stress reactivity, genetic vulnerability) that may influence pathways toward and away from personality disturbance. Such specificity in longitudinal research may contribute to (a) early identification of children who only later show clear disturbance, (b) identification of risk and protective factors for the general sample and for subgroups of participants, and (c)

identification of factors associated with change (Lenzenweger & Cicchetti, 2005).

Implications

The current study suggests that adult borderline personality symptoms reflect a lengthy, multidetermined developmental process, beginning in the earliest years of life (Lenzenweger & Cicchetti, 2005; Sroufe, 1997). Extreme negative early parenting experience may initiate the process of disturbance. However, it will be important to examine processes that may account for the interplay among early endogenous and environmental experiences and their relation to later functioning, especially to understand the impact of trauma and the caregiving context of traumatic experience on developing personality processes. Prospective longitudinal research is needed to identify differential pathways to disorder (Cicchetti & Rogosch, 1996). For example, endogenous indicators related to temperament in combination with early physical maltreatment may initiate a pathway marked by disruptions in impulse control, whereas disturbances in affective–cognitive links may play a role in the relation between sexual abuse and personality disturbance.

Findings from the current study may contribute to emerging diagnostic and treatment conceptualizations of personality disorder as a more enduring underlying disturbance in personality structure in combination with dysfunctional behavioral manifestations (Clark, 2007, 2009). In keeping with a developmental psychopathology perspective, what is needed is an understanding of normative processes related to personality development and change (Lenzenweger & Cicchetti, 2005). Psychopathology researchers may then learn how these processes become distorted with experience and how stable and more acute aspects of disordered functioning are interrelated. These process-level investigations of personality disturbance will inform our understanding of the development of disturbance as well as ports of entry and implementation strategies for prevention and intervention.

Conclusion

In summary, the developmental psychopathology perspective that guides the current research

highlights the significance of early experience in the development of borderline features and encourages an understanding of psychopathology as an outgrowth of successive developmental deviations (Cicchetti & Cohen, 2006a, 2006b, 2006c; Sroufe, 1997). The research has implications for prevention/intervention efforts that aim to ameliorate the deleterious consequences of trauma exposure in infancy and early childhood as self-processes become consolidated. Strategies that support a relational approach to emotional regulation and self-understanding in early development may reduce the risk of children entering pathways to personality disturbance (e.g., Egeland & Erickson, 2004; Dozier, Lindhiem, & Ackerman, 2005). At the level of secondary intervention, the findings point to the critical importance of theoretically informed and evidence-supported interventions for traumatized children, relational efforts that address the integration of multiple aspects of functioning in aiding child victims to convey experience and develop genuine connections with others (Lieberman & Van Horn, 2008). Finally, these interventions must exist in the context of broader social efforts to support children and families at risk.

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