**Diatheses and Stressors in Borderline Pathology of Childhood: The Role of Neuropsychological Risk and Trauma**

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**ABSTRACT**

**Objective:** To determine the relative contributions of neuropsychological deficits and psychosocial stressors to the presence of borderline pathology in children. **Method:** The subjects were 86 school-age children (75 males, 11 females) referred for psychiatric day treatment. Thirty-five of the children met criteria for borderline pathology. Data on psychosocial risk factors were obtained for each child from a questionnaire completed by members of the child’s clinical team and were based on interviews with parents and children, as well as reports from schools and social agencies. Neuropsychological measures included computerized versions of the Wisconsin Card Sorting Test and the Continuous Performance Test. **Results:** Both deficits in executive function and psychological trauma made significant and independent contributions to the variance in borderline pathology. Inclusion of both sets of risk factors produced a model that explained 48% of the variance in borderline diagnosis. **Conclusions:** Both environmental risks and neurobiological vulnerability should be taken into account to understand the etiology of borderline pathology in children. *J. Am. Acad. Child Adolesc. Psychiatry*, 2001, 40(1):100–105. **Key Words:** borderline pathology, children at risk, neuropsychological testing.

“Borderline pathology of childhood” describes a complex and severe form of behavioral pathology characterized by a combination of impulsive, affective, and cognitive symptoms (Bemporad and Cicchetti, 1982; Guzder et al., 1999; Kernberg, 1991). The label “borderline” has been used to describe this clinical picture because of its resemblance to borderline personality disorder (BPD) in adults. Moreover, the work of our research team indicates that the risk factors for borderline children and borderline adults are also similar (Guzder et al., 1996, 1999).

The literature on the adult disorder (Paris, 1994) suggests that the etiology of BPD depends on interactions between diatheses and stressors. Diatheses have been identified through neurobiological and neuropsychological markers and include deficits in frontal lobe functioning such as impulsivity, cognitive inflexibility, and perseveration (Judd and Rugg, 1993; O’Leary and Cowdry, 1994; van Reekum et al., 1993). Similar deficits have been observed in children with borderline pathology (Paris et al., 1999). Stressors are related to childhood trauma, including physical and sexual abuse, as well as witnessing violence (Goldman et al., 1992; Guzder et al., 1996; 1999). Parental psychopathology such as depression, substance abuse, and criminality have also been found to be risk factors associated with borderline pathology in children (Goldman et al., 1993; Guzder et al., 1999). We hypothesize that these environmental risks combine with neurobiological vulnerabilities to shape the clinical syndrome of borderline pathology.

In previously published work, our research group examined, in separate analyses, the relationship of a series
of psychosocial risk factors (Guzder et al., 1999) and a set of neuropsychological variables (Paris et al., 1999) to the diagnosis of borderline pathology in children. The purpose of this report is to examine both sets of variables together to determine the relative contributions of psychosocial stressors and cognitive deficits to this clinical picture. Both of these sets of risk factors were assessed directly in a clinical sample of children and their parents.

METHOD

Participants

The sample consisted of 86 children (75 males and 11 females) who had participated in a research project that assessed risk factors for borderline pathology in children. In this study, 89 children had been assessed with the neuropsychological test battery; however, due to an upgrade in the computer software used to assess attention problems, Continuous Performance Test (CPT) index scores were not available for 3 of the participants. As a result, data are reported for the 86 children for whom this summary score was available. The participants had been referred for admission to a child psychiatry day treatment program at an urban teaching hospital and were evaluated over a period of 24 months. The children ranged in age from 7 to 12 years, with a mean age of 9.8 years. They were referred for such problems as severe conduct disorders, aggressive behavior, suicidality, attention deficit disorder, selective mutism, school refusal, and posttraumatic stress disorder. Additional information on psychiatric diagnoses in this sample can be found in Guzder et al. (1999).

Measures

Diagnosis. The Child version of the Retrospective Diagnostic Interview for Borderlines (CDIB-R) (Greenman et al., 1986) is an adaptation for children of a widely researched semistructured interview (Gunderson and Kolb, 1978; Zanarini et al., 1989) that has been shown to be a specific and sensitive diagnostic tool for borderline pathology in adults. The CDIB-R includes 24 items that yield five subscales—Social Adaptation, Impulsivity, Affect, Psychosis, and Interpersonal Relations—each scored on a scale from 0 to 2. A score of 7 or more is used as the cutoff point for borderline pathology. We established good interrater reliability for this measure (0.72) in our previous work (Guzder et al., 1996). Scores on the CDIB-R were used to divide the sample into borderline (n = 35; 28 males, 7 females) and nonborderline (n = 51; 47 males, 4 females) groups. The distribution of males and females in the two groups was not significantly different (χ² = 2.75, p > .05).

Child Psychopathology. The Child Behavior Checklist (CBCL) (Achenbach and McConaughy, 1997) was used to obtain information on behavior problems in the children. This parental report has excellent test-retest reliability (r = 0.80) and discriminates between clinical and nonclinical samples. For the purposes of the present analysis, the Thought Problems scale was used as a measure of cognitive symptoms such as daydreaming and confusion. Raw scores are converted to t scores, with a mean of 50 and a standard deviation of 10.

Psychosocial Risk Factors. The data for this measure were derived from multiple sources, including interviews with the child and his or her parents, observations made by schools and social agencies, as well as a comprehensive chart review. A dichotomously scored, semistructured questionnaire was completed for each child by a process of consensus among the members of the clinical team working with that child. All team members were blind to the borderline diagnosis, which was made for research purposes only and never appeared in the child’s chart. The questions were designed to assess psychological trauma, including (1) signaling to youth protection services for any reason; (2) sexual abuse of any kind; (3) physical abuse by parents; (4) verbal abuse by parents; (5) severe neglect (defined as the significant failure of parents to provide adequate supervision, protection, and physical care); (6) foster placement; and (7) witnessing violence. Other questions assessed parental dysfunction such as substance abuse, criminality, history of separation, and divorce.

Neuropsychological Measures. The CPT (Conners, 1994) is a computer-assisted assessment of vigilance and sustained attention. The subject is asked to press the computer spacebar immediately after the on-screen presentation of specific letters. The test yields a number of indicators of attention difficulties, including omission errors, reaction time, and changes in performance over time. Indicators of impulsivity include commission errors and risk-taking. Measures of this type have been found to distinguish between nonclinical and clinical populations (Halperin et al., 1992). The database for the Conners CPT consists of 670 individuals clinically referred for attention problems and 520 individuals from the general population. The program yields an overall index of attention problems, which was the measure used in this study’s analysis.

The Wisconsin Card Sorting Test (WCST) (Heaton, 1981) assesses the ability to form abstract concepts and to shift and maintain set. The test requires subjects to sort, by color, form, and number, cards that depict colored geometric shapes, and it yields indices of cognitive flexibility, perseveration, conceptual ability, and learning efficiency. This measure has been found to differentiate between patients with frontal lobe lesions and those with other lesions. Norms are available for children (Chelune and Baer, 1986), and the measure shows good reliability in children and adolescents (Heaton et al., 1993). In our previous research, numerous indices of the WCST differentiated between borderline and nonborderline groups (Paris et al., 1999). For the purpose of this study, it was necessary to reduce the number of variables to be used in data analysis. Logistic regression was used to determine the best predictor of borderline pathology. Direct entry of the six significant WCST indices resulted in selection of the “Learning to Learn” score, which measures learning efficiency, as the best predictor of borderline pathology. Because the normative data for this variable are skewed (i.e., not normally distributed), the index was not scored as a continuous variable but, rather, as a categorical variable, as either within the normal range or not.

Procedures

The children and at least one parent were involved in the assessment process, which required two appointments. Parents were interviewed by a psychiatrist and were then asked to complete the CBCL. The neuropsychological tests were administered to the children by a psychologist who was blind to the borderline diagnosis. Another psychologist scored the CDIB-R after reviewing the medical chart; this rater had previously established reliability in scoring borderline pathology (Guzder et al., 1996). As noted above, a consensus rating of psychosocial risk factors was made by the clinical staff of the Day Hospital program, who were also blind to the borderline diagnosis.

RESULTS

A series of logistic regressions was used to determine the relative contributions of two sets of risk factors in
predicting borderline pathology in children: neuropsychological vulnerability and psychosocial risk factors. We tested each of these two sets separately, then combined the best predictors from each of these analyses into a final logistic regression equation. The results of these analyses can be found in Table 1. The dependent variable for all the analyses was assignment to the borderline or nonborderline groups on the basis of CDIB-R scores. Direct entry of the independent variables was used in all the regression equations. Gender was initially entered as an independent variable in the regression equations; because this variable did not contribute significantly to any of the equations, it was dropped from further analysis.

Psychosocial Risk Factors

On the basis of previous analyses (Guzder et al., 1999), we had determined that sexual abuse and parental criminality were significant risk factors in the prediction of borderline diagnosis. In this study, these variables were entered into a logistic regression on group assignment, along with the measure of witnessing violence, which was significantly more frequent in the borderline group (83%) than in the nonborderline group (49%) ($\chi^2 = 11.5, p < .001$). The model that includes the three psychosocial risk factors fits the data better than a model containing only the constant ($\chi^2 = 24.3, p < .0001$), and it explains 33% of the variance in group assignment. All three variables contributed significantly to the equation. An abnormal WCST score was associated with a 6:1 odds ratio for assignment to the borderline group. Because the CPT and CBCL scores are continuous variables, their associated odds ratios are not meaningful. This model correctly classified 80% of the nonborderline children and 66% of the borderline children, for an overall classification rate of 74%.

Neuropsychological Vulnerability

Three independent variables were entered into the logistic regression equation: the WCST “Learning to Learn” index, the CPT index score, and the CBCL Thought Problems score. This model is also an improvement over the model that includes only a constant, with −2 log likelihood reduced from 116.2 to 91.9 ($\chi^2 = 24.3, p < .0001$), and it explains 33% of the variance in group assignment.

Combined Model

The five significant variables (sexual abuse, witnessing violence, WCST score, CPT index, and CBCL Thought Problems score) were entered into the final logistic regression equation. Children who had experienced sexual abuse were almost 4 times more likely to be classified as borderline than those who had not; the odds that children who had witnessed violence would be classified as borderline were almost 5 to 1. However, it should be noted that although this model correctly classified 94% of the nonborderline children, only 29% of borderline children were correctly classified, for an overall classification rate of 67%.

Table 1

TABLE 1

<table>
<thead>
<tr>
<th>Analyses</th>
<th>Regression Coefficient (β)</th>
<th>Significance (p Level)</th>
<th>Partial Correlation</th>
<th>Odds Ratio</th>
<th>Confidence Interval</th>
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<td>Psychosocial risk factors</td>
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<td></td>
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<td>Sexual abuse</td>
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<td>0.14</td>
<td>3.98</td>
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<td>0.00</td>
<td>1.13</td>
<td>0.36–3.52</td>
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<tr>
<td>WCST “Learning to Learn” score</td>
<td>1.82</td>
<td>.002</td>
<td>0.26</td>
<td>6.17</td>
<td>1.99–19.11</td>
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<tr>
<td>CBCL Thought Problems score</td>
<td>0.08</td>
<td>.004</td>
<td>0.23</td>
<td>1.08</td>
<td>1.02–1.13</td>
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<tr>
<td>CPT index</td>
<td>0.08</td>
<td>.05</td>
<td>0.13</td>
<td>1.09</td>
<td>1.00–1.18</td>
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<td>Witnessing violence</td>
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<td>1.12</td>
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<td>CBCL Thought Problems score</td>
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<td>0.10</td>
<td>1.05</td>
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<td>.01</td>
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<td>7.08</td>
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</table>

Note: WCST = Wisconsin Card Sorting Test; CBCL = Child Behavior Checklist; CPT = Continuous Performance Test.
perpetrators of violence. It is of interest that parental crim-

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witnessed violence have been found to be at risk for emo-

higher risk for borderline pathology. Children who have 
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childhood sexual abuse as a risk factor for adult BPD, 
sets of variables make significant and independent con-

DISCUSSION

The results of this study confirm that both psycholog-
ical trauma and deficits in executive functioning are risk 
factors for borderline pathology in children. These two 
sets of variables make significant and independent con-
tributions to the variance in borderline diagnosis.

The role of sexual abuse in differentiating the two 
groups in our sample has some theoretical implications. 
Retrospective studies in adults (Herman et al., 1989; 
Ogata et al., 1990; Paris et al., 1994a,b) have identified 
childhood sexual abuse as a risk factor for adult BPD, 
although a recent meta-analysis of all such studies (Fossati 
suggests that it is actually only a weak predictor 
of this form of pathology. It is most likely that sexual 
abuse is an easily measurable marker for a range of 
eglectful and traumatic experiences that tend to co-occur 
in the same patients (Zanarini et al., 1997). It is nonethe-
less of interest that sexual abuse also plays a role in the 
risks for borderline pathology in childhood, with children 
who had experienced sexual abuse being 4 times more 
likely to exhibit borderline pathology than those who had 
not been victims of sexual abuse. Unlike studies of adults, 
our design did not depend on the often unreliable mem-
ories of highly disturbed patients, and our data on trauma 
were current and obtained from multiple data sources.

Being a witness to violence also placed children at 
higher risk for borderline pathology. Children who have 
witnessed violence have been found to be at risk for emo-
tional distress and behavior problems (Osofsky, 1995); 
such children are more likely to be victims of abuse and 
perpetrators of violence. It is of interest that parental crim-

hyperabilities interfere with the resilience mechanisms that 
allow many, if not most, children to cope with exposure 
to a traumatic environment (Rutter and Rutter, 1993; 
Eaves, 1986).

In applying this model to borderline children, we 
assume that multiple vulnerabilities, which affect the 
impulsive, affective, and cognitive spheres, make these 
children more sensitive to stress. In other words, these vul-
nerabilities interfere with the resilience mechanisms that 
allow many, if not most, children to cope with exposure 
to a traumatic environment (Rutter and Rutter, 1993; 
Werner and Smith, 1992).
However, the results could be interpreted in at least two other ways. It is also possible that neuropsychological abnormalities are the result of environmental stressors (cf. Graham et al., 1999). Only longitudinal research that tracks both stressors and cognitive development can address this important issue. Finally, deficits that emerge in neuropsychological testing may or may not have etiological significance in accounting for the origins of borderline pathology in children but may simply co-occur with the syndrome.

Limitations

Although our multivariate methodology has the clear-cut advantage of examining relative contributions to risk, our study is still limited by its cross-sectional, as opposed to prospective, design. It remains possible that the associations found here mask latent variables that are closer to the true mechanisms that drive this form of pathology.

An additional limitation of this study is the skewed gender distribution of our sample. The majority of our subjects were boys, reflecting the preponderance of male referrals to psychiatric treatment programs for school-age children. The small number of females in both the borderline and nonborderline groups did not permit separate analyses by gender, and we lacked sufficient power to detect possible gender differences. Although BPD is more common in women, about 20% to 25% of cases are men; studies of this population indicate that childhood risk factors are virtually identical for males and females with this disorder (Paris et al., 1994b). In a community study of psychopathology in young adults, males and females differed in rates of antisocial personality disorder but not other cluster B personality disorders, which include BPD (Kasen et al., 1999).

Clinical Implications

Our results also have a number of potential clinical implications. Borderline pathology in childhood has been described by other researchers (Cohen et al., 1987; Lincoln et al., 1998) as a “multiple complex developmental disorder.” This terminology is apt, in the sense that the symptoms appear in so many different areas of functioning. Because these children represent a high-risk population, evaluation of neuropsychological functioning and of environmental stressors should be undertaken to plan comprehensive treatment strategies. Furthermore, one would expect that the treatment of these children would need to be multidimensional: traumatic environmental circumstances might be dealt with by removing children from chronic exposure to them, and neuropsychological deficits might be overcome by cognitive therapies designed to promote self-observation, control of impulses, and better affective regulation. Family interventions to enhance parenting skills could focus on ways to reduce the cognitive deficits evident in these children.

REFERENCES


