Parent Personality Traits and Psychopathology Associated with Antisocial Behaviors in Childhood Attention-Deficit Hyperactivity Disorder

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Although a role for family and parent factors in the development of behavioral problems in childhood is often acknowledged, the roles of specific parental characteristics in relation to specific child actions need further elucidation. We studied parental “Big Five” personality traits and psychiatric diagnoses in relation to their children’s antisocial diagnoses and naturally observed antisocial behaviors, in boys with and without the diagnosis of Attention-Deficit Hyperactivity Disorder (ADHD). First, regardless of comorbid antisocial diagnosis, boys with ADHD, more often than comparison boys, had mothers with a major depressive episode and/or marked anxiety symptoms in the past year, and fathers with a childhood history of ADHD. Second, compared to the nondiagnosed group, boys with comorbid ADHD + Oppositional Defiant or Conduct Disorder (ODD/CD) had fathers with lower Agreeableness, higher Neuroticism, and more likelihood of having Generalized Anxiety Disorder. Third, regarding linkages between parental characteristics and child externalizing behaviors, higher rates of child overt antisocial behaviors observed in a naturalistic summer program were associated primarily with maternal characteristics, including higher Neuroticism, lower Conscientiousness, presence of Major Depression, and absence of Generalized Anxiety Disorder. The association of maternal Neuroticism with child aggression was larger in the ADHD than in the comparison group. In contrast, higher rates of observed child covert antisocial behaviors were associated solely with paternal characteristics, including history of substance abuse and higher Openness. Results provide external validation in parent data for a distinction between overt and covert antisocial behaviors and support inclusion of parent personality traits in family studies. The interaction of maternal Neuroticism and child ADHD in predicting child aggression is interpreted in regard to a conceptualization of child by parent “fit.”

Keywords: Hyperactivity, aggression, conduct disorder, attention deficit disorder, family factors, personality.

Abbreviations: ADHD: Attention-Deficit Hyperactivity Disorder; CBCL: Child Behavior Checklist; CD: Conduct Disorder; DBD: Disruptive Behaviors Checklist; DIS-3-R: Diagnostic Interview Schedule for DSM-III-R; MMPI: Minnesota Multiphasic Personality Inventory; NEO-FFI: Neuroticism, Extraversion, Openness Five Factor Inventory; ODD: Oppositional Defiant Disorder; WURS: Wender Utah Rating Scale.

Introduction

Parent characteristics are one obvious feature of the broader “ecology” of child development (Bronfenbrenner, 1986) to which researchers have often turned in order to understand child psychopathology. Yet research on parent factors related to childhood attention-deficit hyperactivity disorder (ADHD)—which has emphasized parenting attitudes and behaviors as well as parental psychopathology—has not yielded consistent patterns of results (Frick, 1994). This difficulty may be related to two issues. First, dimensional and categorical conceptions of child psychopathology are typically treated separately (Jensen et al., 1993), a potential source of inconsistency because categorical diagnoses might capture varying combinations of disparate child behavior dimensions (Frick et al., 1993). Second, parent personality traits and diagnosed disorders are rarely examined together (Watson, Clark, & Harkness, 1994)
but these might contribute differentially to child behavioral outcomes. To address these issues, we studied the contribution of parent psychopathology and personality traits to subtypes of antisocial activity in children with ADHD.

Because ADHD is one of the most commonly diagnosed, persistent, and impairing of child disorders, with substantial risk for escalating problems (Klein & Mannuzza, 1991), a priority is to understand the risk factors and comorbid conditions that exacerbate its course. Comorbidity with antisocial behaviors is salient: ADHD overlaps 40–50% or more with conduct disorder (CD) or oppositional defiant disorder (ODD; Abikoff & Klein, 1992). Childhood antisocial behaviors increase risk for later poor outcomes (Loeber, 1991), but child ADHD increases risk of negative outcomes above that associated with ODD or CD alone (Farrington, Loeber, & Van Kammen, 1990; Moffitt, 1990). In short, children with ADHD are at high risk of developing antisocial behaviors and attendant poor later outcomes (Lilienfeld & Waldman, 1990), although the etiology of this risk is not well understood. Whereas effects of heritability and nonshared environment are salient for hyperactivity, shared environment effects are also implicated in child antisocial behaviors and for child comorbidity generally (Edelbrock, Rende, Plomin, & Thompson, 1995; Nigg & Goldsmith, in press), suggesting that study of parent characteristics might be one fruitful avenue for understanding antisocial development in ADHD.

Considered as dimensions, childhood antisocial behaviors are not unitary. First, a distinction between “overt” aggression and “covert” antisocial behavior is supported (Hinshaw, Lahey, & Hart, 1993). Thus, being aggressive does not always covary with such covert actions as lying and stealing (Achenbach, Conners, Quay, Verhulst, & Howell, 1989). A second important distinction lies between (1) both overt aggression and covert actions and (2) noncompliance (Loeber & Schmaling, 1985). Noncompliant behaviors appear to lie at the midpoint of this overt/covert bipolar continuum (see also Hinshaw, Simmel, & Heller, 1995). A key question is whether these partially independent antisocial behavior dimensions have differential relations with the external criterion of family or parent risk factors. In fact, aggression, noncompliance, and covert behaviors differ in ways that suggest possible differential family correlates, as we detail after describing specific parent characteristics below.

Parent Psychopathology and Personality

The literature suggests well-known adult psychiatric disorders and several potentially relevant but unstudied personality traits that might be related to different antisocial behaviors in child ADHD.

Parent psychiatric history. First, the psychiatric family literature reveals consistently that parent antisocial personality disorder, alcoholism, and substance use aggregate with CD or comorbid ODD/CD in ADHD samples (Biederman, Faraone, Keenan, Knee, & Tsuang, 1990; Faraone et al., 1995; Lahey et al., 1988), and that a parent history of childhood ADHD is associated with child ADHD regardless of comorbid CD or ODD (Faraone, Biederman, Keenan, & Tsuang, 1991; Lahey, Russo, Walker, & Piacentini, 1988). We hypothesized replication of this pattern of findings in our study for categorical child diagnoses. In contrast, findings are mixed regarding the possible contributions of parent depression (cf. Biederman, Faraone, Keenan, & Tsuang, 1991; Lahey et al., 1988) and anxiety disorders (cf. Barkley, DuPaul, & McMurtry, 1990; Biederman, Faraone, Keenan, Steingard, & Tsuang, 1991) to childhood ADHD and associated antisocial behaviors, and so we examined both lifetime and recent symptoms of these parental disorders. We checked rates of parent mania as a precaution (Wozniak et al., 1995). In regard to dimensions of antisocial behavior, we expected that child overt antisocial behavior would be related to higher rates of maternal depression. We evaluated competing hypotheses that parental generalized anxiety disorder would serve a protective versus a risk role in relation to overt antisocial behaviors. On the one hand, because anxiety disorders are associated with ADHD and could disrupt parenting, anxiety in parents might exacerbate antisocial actions by a child with ADHD. On the other hand, anxiety is associated in temperament and physiological models with a tendency to refrain from engaging in risky or antisocial behavior—antisocial adults are a notoriously low-anxiety population (for a review see Zuckerman, 1991). Thus, parent anxiety might enhance child ADHD-like symptoms yet be transmitted to a child as a protective factor against antisocial acting out.

Even the most definitive studies (e.g. Faraone et al., 1995) have relied on a maternal report of both child and parent symptoms for children under age 12 and have not distinguished covert and overt antisocial behaviors, in part because of reliance on rating scales. One alternative, adopted herein, is to observe child behaviors in a naturalistic setting, allowing better discrimination of behavior subtypes.

Parent personality traits. Although parent personality is thought to relate to the development of child psychopathology (Hetherington & Martin, 1986), study of specific parent traits in relation to child ADHD and associated problems has been relatively neglected. Dimensionally measured personality traits might be sensitive to a wider range of variation in functioning than disorders alone, because unlike disorders (which are found only in a minority of parents of children with ADHD), traits are not confined to the “extremes” of parent functioning. Whereas previous studies addressing this topic in ADHD have looked at parent personality with the Minnesota Multiphasic Personality Inventory (MMPI) or the Sensation Seeking Scale (Frick, Kuper, Silverthorn, & Cotter, 1995; Lahey et al., 1989), we chose to view personality through the lens of the popular “Big Five” conception (John, 1990), which offers a comprehensive, nonpathological formulation of normal-range traits. Each Big Five trait is of interest.

First, developmental studies of parent personality link maternal Neuroticism to child delinquency (Borduin, Henggeler, & Pruitt, 1985) and more generally to child externalizing behaviors (Bates, Bayles, Bennet, Ridge, & Brown, 1991). Neither study examined child ADHD, however. The parenting literature also suggests that parent stress-vulnerability and negative emotions (similar
to Neuroticism) impair parenting effectiveness (Belsky, Crnic, & Gable, 1995; Belsky & Pensky, 1988; O’Leary, 1995). We hypothesized that parent Neuroticism would be associated with comorbid ODD or CD and would correlate with observed overt antisocial child behaviors. Second, Belsky (1984; Belsky et al., 1995) has suggested that parental Extraversion may relate to child behavior problems. We hypothesized that with activity level and sociability as major facets of the Big Five version of Extraversion, this trait would relate to ADHD but not to antisocial behaviors. Third, Patterson and colleagues (e.g. Patterson & Capaldi, 1991; Patterson & Dishion, 1988) have shown that parental hostile interchanges with children predict child antisocial development. We theorized that such hostility on the parent side might be related to low parent Agreeableness (a trait with hostility as its opposite pole), so that low paternal Agreeableness would be found in boys with comorbid ODD or CD.

Fourth, longitudinal studies of personality development have linked traits similar to Conscientiousness with later positive adult outcomes in a range of behavioral and occupational domains, such as family stability. These outcomes, in turn, could influence child development in the next generation (e.g. Block, 1971; Caspi & Elder, 1988; Clausen, 1993). This literature suggested to us that low parent Conscientiousness would be related to both child ADHD and comorbid antisocial behaviors. Finally, the Big Five trait of Openness has been linked empirically with Sensation Seeking in at least one study (Angleitner & Ostendorf, 1994). Sensation Seeking, in turn, has been nominated as a temperamental variable contributing to antisocial behavior (Frick et al., 1995; Zuckerman, 1991). We therefore included Openness for exploratory analyses. Despite the possible relevance of all Big Five dimensions, none, to our knowledge, has been directly assessed among parents of children diagnosed with ADHD or evaluated with child antisocial behaviors.

At a broader level, we hypothesized that parent personality traits as just described would contribute to statistical models independently of parent diagnoses. We considered further how dimensions of child antisocial behavior might correlate differentially with parent characteristics. We hypothesized that covert behaviors as compared to aggression would correlate with lower levels of parent social confidence (Extraversion), a greater need for stimulation in the absence of social exchange (Openness), and parents’ own covert behavior (indexed as alcohol or cocaine substance abuse/dependence). Non-compliance, in contrast with aggression, implies conflict with adults rather than peers and so was expected to reflect parental inconsistency (low Conscientiousness). Child aggression was expected to relate specifically with maternal depression and with irritable/hostile parent characteristics in the form of higher Neuroticism and lower Agreeableness.

**Mechanisms**

We confined our study to biological parents because genetic mechanisms are important for nearly all of the traits and disorders discussed here. Data support moderate heritability (in the range of .4 to .5) for adult Extraversion, Conscientiousness, and Neuroticism (Jang, Livesley, & Vernon, 1996; Loehlin, 1992) and child ADHD (Stevenson, 1992). Data regarding Agreeableness and Openness are sparse, but the most recent findings suggest that they follow similar patterns of moderate heritability (Jang et al., 1996). Varying degrees of heritable influence are also reported for major depression (Moldin, Reich, & Rice, 1991), generalized anxiety disorder (Kendler, Neale, Kessler, Heath, & Eaves, 1992), and alcohol abuse and antisocial personality (Gottesman & Goldsmith, 1994). Also, key temperament constructs that might relate to ADHD, such as activity level and inhibition, are moderately heritable (Goldsmith, 1983; Saudino, McGuire, Reiss, Hetherington, & Plomin, 1995). Although these findings do not mean that standing on relevant traits is genetically determined (for one thing, all heritabilities are far less than 1.0), they do suggest that a mix of biological and adoptive families could create important confounds. In fact, as noted above, although behaviour genetic data reveal moderate heritable and nonshared environment effects for most temperament and personality domains, child antisocial behavior and comorbid child problems appear to be influenced also by shared environment factors, supporting the focus of the present study on parent characteristics.

The above implies that parent personality could be linked to child behavior problems through comparatively direct processes such as modeling of behavior or genetic transmission, or indirectly such as by influencing parenting style and parent–child interactions. If there is “direct transmission” from parent to child of antisocial characteristics (as in social modeling or genetic effects), between-group differences would be expected when parents of children with ADHD are compared to parents of children without ADHD on a relevant trait. An alternative mechanism, however, derives from considerations of stress-diathesis models (Walker, Downey, & Bergman, 1989) or parent–child fit conceptualizations (e.g. Crockenberg, 1987) of the development of psychopathology. Such “fit” models, which have been popular since the classic work of Thomas and Chess (1977), typically imply the interaction of child temperament with some aspect of the rearing environment. Similarly, genotype–environment interaction models may best explain the development of antisocial behaviors and display of aggression (Cadoret, Yates, Troughton, Woodworth, & Stewart, 1995). In the case of a “fit” mechanism, one would not necessarily predict ADHD versus non-ADHD group differences in parent traits, but rather an interaction of parent trait with child diagnostic or risk status. For example, a parental trait such as low Conscientiousness or high Neuroticism may be benign with most children, but may influence interchange with a temperamentally impulsive (ADHD) child, increasing the risk for development or maintenance of specific antisocial behaviors.

The strongest evidence for relevant parent traits in regard to “fit” processes comes from the developmental parenting literature and implicates Neuroticism, Conscientiousness, and Agreeableness. Neuroticism is a candidate because it implies difficulty coping under stress. Hyperactive children would be expected to create unusual stress on parents, so that a vulnerable parent (with high standing on Neuroticism) might more often experience a
“breakdown” in parenting effectiveness (O’Leary, 1995), compounding the hyperactive child’s risk of antisocial development. Thus, we theorized that high parent Neuroticism and child ADHD would comprise an unfavorable combination leading to more child antisocial behaviors. Conscientiousness connotes consistent and planned activities, and parents high on this trait would be expected to provide the consistency and monitoring often lacking in homes of antisocial children (Patterson & Dishion, 1988). Finally, low parent Agreeableness might be especially unfortunate if a child is hyperactive, leading to more severe coercive and hostile parent–child interactions (cf. Patterson & Capaldi, 1991). We thus predicted significant interactions between (1) child ADHD diagnosis and (2) each of parent Neuroticism, Conscientiousness, and Agreeableness in relation to child overt antisocial behaviors (aggression and non-compliance), with effects expected to be larger in the ADHD than in the non-ADHD group. Tests of other possible interactions were exploratory.

As a final note, we emphasize that although hypotheses were generally framed statistically such that parent traits predicted child behaviors, parent traits probably do not exert a unidirectional causal influence on children; instead, bidirectional social influences are likely (Bell & Chapman, 1986), especially in the development of antisocial behavior (Patterson & Capaldi, 1991).

Method

Overview

Data were gathered for boys with ADHD through summer research programs (e.g. Hinshaw et al., 1995), which were conducted at local public school sites in the summers of 1991, 1993, 1994, and 1995. Each program served a new, independent cohort of families and ran for 5–6 weeks, emphasizing classroom and playground activities. The four cohorts did not differ above chance levels on the variables studied. Prior studies (Hinshaw et al., 1995) have used the same sample but this is the first report about parent characteristics in the four-cohort sample. During the summer programs staff observations and ratings of children were completed, providing naturalistic measures of child behaviors independent from the parent data. After careful telephone screening and completion of mailed rating scales, but before final enrolment, each family came to campus for assessments, where child diagnosis was confirmed and parent data obtained.

Participants

Two groups of children and their biological parents participated in the study. These were (1) 80 boys with ADHD (by DSM-III-R criteria) and 62 boys without ADHD, aged 6–12, and (2) their parents. One boy did not have a biological mother available for the study, several did not have biological fathers available, and nine sets of brothers participated. Thus, 133 families were represented. We assessed 132 mothers, with the cutoff of 5 symptoms; and (4) at least 8 of the 14 ADHD symptoms from the DSM-III-R Disruptive Behaviors Checklist (DBD; American Psychiatric Association, 1987; Pelham, Gnagy, Greenslade, & Milich, 1992). Of the 80 boys with ADHD, 67 (84%) met criteria on all four measures. Of the 59 boys with ADHD with participating biological fathers, 50 (85%) met criteria on all four measures. All boys with ADHD had at least a 6-month duration of symptoms and onset at or before the age of 6 years.

Oppositional defiant disorder (ODD) was diagnosed using the validated DBD checklist (Pelham et al., 1992) as reported by mothers, with the cutoff of 5/9 DSM-III-R symptoms of ODD for inclusion. Conduct disorder (CD) was diagnosed if 3/9 DSM-III-R (1991, 1993, 1994) criteria were met on the maternal DBD or (in 1995) if 3 DSM-IV criteria were endorsed on the maternal Diagnostic Interview Schedule for Childhood. Only 18 boys had CD; 31 had ODD but not CD. Because of the small number of CD cases and because many cases of comorbid ADHD/ODD will escalate to CD (Hinshaw et al., 1993), we chose to combine these into the comorbid subgroup. This resulted in 49 boys (61%) in the comorbid subgroup and 31 (39%) in the “pure” ADHD subgroup, a ratio comparable to other samples (Biederman, Newcorn, & Sprich, 1991). However, we point out in Results when a different pattern of findings would have resulted from treating the CD and ODD boys as different groups. Note that the boys in the “pure” ADHD group did not have ODD or CD, but may have had other comorbid diagnoses such as mood or learning disorders, which we did not screen out. All data for the boys with ADHD were obtained while they were receiving placebo medication, after a minimum 24-hour washout period from active medication.

Comparison boys without ADHD were recruited from the community through newspaper advertisements and recruitment announcements at area schools. Screened by the same procedures, they were excluded if they met criteria for ADHD (N = 1). None met criteria for CD. We included three comparison boys who met criteria for ODD to avoid an artificially healthy comparison group.

Parent Measures

Psychopathology. The study design required an assessment of parent history of childhood behavior problems and selected adult psychiatric disorders. To provide a dimensional and categorical measure of their childhood history of ADHD symptoms, parents completed the 61-item self-report Wender Utah Rating Scale (WURS; Wender, 1985). The field lacks an agreed-upon method for retrospective assessment of ADHD as
a category and a dimension. Although the WURS also includes symptoms of mood and learning problems in addition to classic ADHD symptoms (so that it is not a "pure" ADHD measure), it has the advantages of economy and published validity data. Ward, Wender, and Reinherz (1993) suggested empirical cutoffs using 25 items that best discriminated adults with and without a childhood history of ADHD. A score of 46 or higher on their 25-item list served as a categorical definition of past childhood ADHD. Total scores on the 25-item scale (mothers, alpha = .93; fathers, alpha = .88) served as the dimensional measure of parental childhood ADHD symptoms.

Parent adult psychopathology was assessed with selected modules from the Diagnostic Interview Schedule for DSM-III-R (DIS-3-R). The DIS-3-R is a structured, extensively-studied NIMH diagnostic interview developed for lay interviewers and with nonclinical populations in time-limited assessment (Helzer & Robins, 1988; Robins, Helzer, Cottler, & Golding, 1989). It has been used in national prevalence studies of psychiatric disorder (e.g., Kessler et al., 1994) and has shown moderate test–retest stability (Helzer, Spitznagel, & McEvoy, 1987; Vandiver & Sher, 1991). The DIS-3-R was administered in person in 1993, 1994, and 1995, but via telephone to the 1991 sample. Data suggest that structured diagnostic interviews conducted on the telephone yield similar results to in-person interviews (Wells, Burnam, Leake, & Robins, 1988), which was also true for the present sample. (Rates of diagnoses by phone and in person were compared in the ADHD and comparison groups; 12/13 chi-square comparisons were nonsignificant, with only maternal alcohol use differing—it was diagnosed less often in 1991 [by phone].) We evaluated generalized anxiety disorder, major depressive disorder, manic, alcohol abuse or dependence, cocaine abuse or dependence, and antisocial personality disorder (cocaine and mania were not screened in the present study, except for generalized anxiety disorder, which had a poor agreement with the full DIS (K = .07; Bucholz, 1995).

Personality assessment. Parents completed the Neuroticism, Extraversion, Openness Five Factor Inventory (NEO-FFI; Costa & McCrae, 1985). We administered the 181-item NEO-PI in 1991, 1993, and 1994 and the 60-item NEO-FFI in 1995, retrieving the NEO-FFI factors, which are embedded in both versions, for all cohorts for the current study. Thus, the NEO scales comprised the same items for all four cohorts. The NEO has been normed on community samples, has yielded scale and test–retest reliability coefficients between .85 and .93, and displays good external validity in relation to observer ratings (Costa & McCrae, 1985; McCrae & Costa, 1987). The NEO is the primary instrument associated with the Five-Factor model of personality, a model derived from an extensive factor analytic literature (John, 1990). The primary scales and their scale reliabilities (coefficient alpha for mothers/fathers) in our sample were Neuroticism (.86/ .83), Extraversion (.75/ .78), Openness (.75/ .76), Agreeableness (.66/ .69), and Conscientiousness (.83/ .83). Sole reliance on self-report data in the assessment of personality is recognized as providing a limited perspective; additional observer ratings completed by persons who know the subject well increase validity (Kenrick & Funder, 1988). Accordingly, parents also rated their spouses on the same five factors. To avoid an obvious comparison of self with spouse, these ratings were administered using a different form, with a set of 42 items termed the Big Five Inventory (see John, 1990; John, Donahue, & Kentle, 1991). This inventory has excellent convergent validity with other Big Five measures (John et al., 1991). Spouse-rated scale alpha reliabilities in our sample (mothers being rated/fathers being rated) were: Neuroticism (.90/ .88), Extraversion (.70/ .86), Openness (.81/ .81), Agreeableness (.86/ .88), and Conscientiousness (.85/ .88). The self and spouse ratings showed acceptable convergent and divergent validity. Self–spouse convergences (mothers/fathers) were moderate for Neuroticism (.44/ .44), Extraversion (.52/ .36), Openness (.34/ .46), and Conscientiousness (.52/ .44), and marginal for Agreeableness (.16/ .33), with 9 of 10 ratings of the off-diagonal correlations were nonsignificant (2/20 mother and 0/20 father variable pairings reached p < .05), and ranged from .00–.26 for mothers and .00–.23 for fathers. These findings were similar to self–spouse correlations in the personality literature (Costa & McCrae, 1985) and we opted to average the self and spouse ratings to create the personality scores. The five composite NEO variables correlated .05– .45 for mothers and .05– .39 for fathers.

**Child Measures**

Observations of overt antisocial behaviors. Pre-trained observer teams watched children from the “sidelines” of the playground and classroom 4 days per week in a brief time-sampling procedure. Observers listened through headphones to a pacing tape (3 sec to find the child, 5 sec to observe, 3 sec to record), and recorded child behaviors on a checklist, with multiple cycles of observation per period. Children were listed in multiple sets of randomly varied orders for each observer. The goal was to observe naturalistic class sizes—approximately 24 children, half ADHD and half non-ADHD, with 3–4 observers per period. As aggression has a low base rate, many time points were sampled—typically about 15 observation days and more than 300 time points for the comparison boys, and about 7 observation days and more than 100 time points for each of the ADHD boys on placebo. Frequency of each behavior divided by total number of observed behaviors yielded a proportion score that varied between 0 and 1 for physical or verbal aggression (fighting, hitting, kicking, pushing, willful destruction of another’s property, threats of aggression) and noncompliance (disruption, defiance, and rule violations). Two extreme aggression scores (z > 5) were truncated (to 0.5 and 1.0 SD’s beyond the next highest score, respectively). Overlaps were built into the observer lists for approximately 17% of the observations, unknown to the observers, so that inter-rater agreement on behavior observations could be calculated. Given low base rates of aggression, chance nonoccurrence agreements were substantial, deflating reliability statistics. Inter-observer Kappas across all four summers ranged from .65 to .72, although both base rates of behavior and level of rater agreement varied from summer to summer. Second, because our unit of analysis pertained to overall rates of aggressive and noncompliant behaviors across the days of the summer program rather than moment-by-moment sequential interactions, we also calculated the correspondence between the overall number of same-category tallies made by each observer within a pair. Thus, if observer A scored 10 instances of aggression but observer B scored 14, we counted 71% overlap. Across all observer pairs, the agreement for aggression was 50%, and for noncompliance was 65%. Despite its marginal reliability, we retained aggression for the regression analysis because of its theoretical importance. Aggression and noncompliance correlated r = .51 in the ADHD group and r = .44 in the comparison group (r = .59 overall). To correct skewed distributions, scores were log transformed for the regression models.
Laboratory assessment of covert antisocial behavior. Covert antisocial behavior is difficult to assess objectively in children, precisely because the behavior is covert. Hinshaw and colleagues (e.g. Hinshaw et al., 1992, 1995) developed and validated a laboratory procedure to evaluate covert behaviors. Children were left alone in a room to complete some paper and pencil tests; they were tempted by a partially open desk drawer containing small objects and money (three or four quarters and two $1.00 bills). Afterwards, they were debriefed regarding the procedure. Parents consented to the study in advance; ethical issues are discussed by Hinshaw et al. (1992). Each child’s extent of stealing and property destruction were scored dimensionally from an immediate room check. Reliability and validity have been established (see Hinshaw et al., 1995 for further details). Stealing and property destruction were significantly correlated and formed an empirical factor in principal components analysis (Hinshaw et al., 1995); they were combined by summing unweighted raw scores and log-transforming the result to form the covert dependent variable for the present study. The covert score correlated \( r = .35 \) with aggression and \( r = .34 \) with noncompliance. Using largely the same sample, Hinshaw et al. (1995) reported that aggression loaded on an overt antisocial factor, stealing and property destruction loaded on a separate covert factor, and noncompliance loaded on both factors, thus appearing to occupy the “midpoint” in factor space.

Results

Preliminary Sample Description

Demographic variables are summarized in Table 1. Child groups were equivalent in age and SES. As often happens, the boys with ADHD had lower Verbal IQ scores than the comparison boys. The groups differed substantially on clinical indices such as the CBCL, with the comparison youngsters very close to national norms (mean = 50 is the national mean for CBCL scales), the ADHD group approaching the clinical range, and the ADHD + ODD/CD group near or above clinical cutoffs (CBCL, \( T = 70 \)). Confirming the validity of the ADHD diagnosis in the two clinical groups, the two ADHD groups did not differ from each other on the CBCL Attention Problem Subscale, whereas both groups scored higher than the comparison group. Confirming the comorbid subgroups, all three groups differed significantly on the observational measures of child overt antisocial behavior (aggression and noncompliance); the two ADHD groups did not differ significantly, however, on the covert scale.

Between-group Results

For between-group comparisons, child diagnostic group served as the independent variable and parent measures served as the dependent variables. One-way analysis of variance was computed with continuous parental variables, and chi-square analysis with categorical parental variables. In each case, the independent variable had three levels (Comparison, ADHD, ADHD + ODD/CD). To reduce Type I error in view of the number of outcome variables, we followed a Fisherian strategy by first conducting three-group omnibus tests for each dependent variable. Only if an omnibus test was significant were two-group simple comparisons conducted (Student-Newman-Keuls procedure for dimensional variables and simple chi-square comparison for categorical variables). Power to detect Cohen’s “medium” effect sizes (\( d = .5 \)) exceeded .80 for maternal data and .70 for paternal variables.

We first describe results for parent psychiatric disorders.

Table 1
Demographic Description of Samples

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comparison (( N = 62 ))</th>
<th>ADHD (( N = 31 ))</th>
<th>ADHD + ODD/CD (( N = 49 ))</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Child age (years)</td>
<td>9.0 (1.8)</td>
<td>9.3 (1.8)</td>
<td>9.2 (1.8)</td>
<td>.648</td>
</tr>
<tr>
<td>Mother age</td>
<td>39.3 (5.9)</td>
<td>41.4 (5.6)</td>
<td>40.0 (4.1)</td>
<td>.216</td>
</tr>
<tr>
<td>Father age</td>
<td>40.8 (7.1)</td>
<td>42.8 (7.9)</td>
<td>42.6 (5.8)</td>
<td>.296</td>
</tr>
<tr>
<td>SES</td>
<td>49.4 (12.1)</td>
<td>51.1 (10.1)</td>
<td>48.0 (10.6)</td>
<td>.486</td>
</tr>
<tr>
<td>Grades</td>
<td>2.8 (1.7)</td>
<td>3.0 (1.8)</td>
<td>2.8 (1.7)</td>
<td>.854</td>
</tr>
<tr>
<td>Reading percentile</td>
<td>73.4 (28.0)</td>
<td>66.7 (29.1)</td>
<td>51.1 (33.1)</td>
<td>.001</td>
</tr>
<tr>
<td>WISC Verbal IQ</td>
<td>114.7 (17.0)</td>
<td>111.4 (14.7)</td>
<td>105.6 (18.1)</td>
<td>.021</td>
</tr>
<tr>
<td>CBCL Externalizing</td>
<td>47.3 (8.9)</td>
<td>58.5 (9.0)</td>
<td>70.7 (8.0)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>CBCL Internalizing</td>
<td>51.2 (8.8)</td>
<td>61.4 (10.6)</td>
<td>66.1 (8.7)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>CBCL Attention</td>
<td>53.2 (4.7)</td>
<td>70.9 (8.8)</td>
<td>72.5 (6.9)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Aggression %</td>
<td>0.52 (0.8)</td>
<td>2.36 (2.9)</td>
<td>3.74 (4.8)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Noncompliance %</td>
<td>5.75 (5.3)</td>
<td>13.97 (12.5)</td>
<td>20.06 (13.2)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Laboratory covert test</td>
<td>0.20 (0.6)</td>
<td>0.77 (1.3)</td>
<td>1.27 (1.7)</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

Three group comparisons were by one-way ANOVA (dimensional variables) or likelihood ratio chi-square (categorical variables), with the three-group significance level shown in the \( p \) column. Two-group comparison results are indicated by superscripts, with differing superscripts indicating that two groups differ at \( p < .05 \) (for dimensional variables, this was after the Student-Newman-Keuls method of adjusting for multiple tests). Reading percentile = Woodcock Johnson Psychoeducational Battery Reading Cluster National Percentile Score. WISC = WISC-R (1991) and WISC-III (1993, 1994, and 1995). CBCL scores reflect Child Behavior Checklist T-scores based on maternal report; results for paternal report were generally the same as maternal report and are not displayed.
Table 2  
**Parent Lifetime and Past Year Diagnoses**

<table>
<thead>
<tr>
<th>Comparison</th>
<th>ADHD</th>
<th>ADHD + ODD/CD</th>
<th>National Avg.</th>
<th>3-group p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mothers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major depression</td>
<td>18%</td>
<td>25%</td>
<td>39%</td>
<td>21.3%</td>
</tr>
<tr>
<td>Past year</td>
<td>0%*</td>
<td>18%*</td>
<td>28%*</td>
<td>12.9%</td>
</tr>
<tr>
<td>Generalized anxiety</td>
<td>6%</td>
<td>18%</td>
<td>11%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Past year</td>
<td>2%*</td>
<td>14%*</td>
<td>11%*</td>
<td>4.3%</td>
</tr>
<tr>
<td>Alcohol abuse/dependence</td>
<td>20%</td>
<td>14%</td>
<td>11%</td>
<td>8.2%</td>
</tr>
<tr>
<td>Cocaine abuse/dependence</td>
<td>5%</td>
<td>4%</td>
<td>9%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Antisocial personality disorder</td>
<td>5%</td>
<td>0%</td>
<td>4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Mania</td>
<td>5%</td>
<td>9%</td>
<td>0%</td>
<td>1.7%</td>
</tr>
<tr>
<td>ADHD</td>
<td>4%</td>
<td>7%</td>
<td>13%</td>
<td>3–5%</td>
</tr>
</tbody>
</table>

**Fathers**

<table>
<thead>
<tr>
<th>Comparison</th>
<th>ADHD</th>
<th>ADHD + ODD/CD</th>
<th>National Avg.</th>
<th>3-group p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major depression</td>
<td>9%</td>
<td>15%</td>
<td>11%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Past year</td>
<td>7%</td>
<td>8%</td>
<td>9%</td>
<td>7.7%</td>
</tr>
<tr>
<td>Generalized anxiety</td>
<td>0%*</td>
<td>4%</td>
<td>11%*</td>
<td>3.6%</td>
</tr>
<tr>
<td>Past year</td>
<td>0%*</td>
<td>4%</td>
<td>11%*</td>
<td>2.0%</td>
</tr>
<tr>
<td>Alcohol abuse/dependence</td>
<td>23%</td>
<td>19%</td>
<td>37%</td>
<td>20.1%</td>
</tr>
<tr>
<td>Cocaine abuse/dependence</td>
<td>17%</td>
<td>0%*</td>
<td>21%*</td>
<td>35.4%</td>
</tr>
<tr>
<td>Antisocial personality disorder</td>
<td>14%</td>
<td>4%</td>
<td>6%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Mania</td>
<td>3%</td>
<td>0%</td>
<td>0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>ADHD</td>
<td>0%*</td>
<td>41%*</td>
<td>13%*</td>
<td>3–5%</td>
</tr>
</tbody>
</table>

National average data taken from Kessler et al. (1994, p. 12; national “cocaine” data is any substance). ADHD childhood prevalence is from the American Psychiatric Association (1994); ADHD = Wender ADHD scale score ≥ 46 (Ward et al., 1993). The final column provides the p-value resulting from the three-group chi-square (when expected cell sizes were < 5, we report Fisher’s exact p-value instead). Superscripts reflect two-group chi-square results. If two columns have different superscripts, they differed at p < .05.

Table 3  
**Parent Personality and Wender Scores**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comparison</th>
<th>ADHD Mean (SD)</th>
<th>ADHD + ODD/CD Mean (SD)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mothers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroticism</td>
<td>(N = 54)</td>
<td>2.84 (0.67)</td>
<td>3.03 (0.63)</td>
<td>.35</td>
</tr>
<tr>
<td>Extraversion</td>
<td></td>
<td>3.44 (0.53)</td>
<td>3.46 (0.53)</td>
<td>.98</td>
</tr>
<tr>
<td>Agreeableness</td>
<td></td>
<td>3.83 (0.46)</td>
<td>3.74 (0.52)</td>
<td>.59</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td></td>
<td>3.91 (0.50)</td>
<td>3.70 (0.64)</td>
<td>.06</td>
</tr>
<tr>
<td>Openness</td>
<td></td>
<td>3.71 (0.59)</td>
<td>3.54 (0.52)</td>
<td>.31</td>
</tr>
<tr>
<td>Wender ADHD items</td>
<td></td>
<td>19.44 (14.7)</td>
<td>25.86 (20.6)</td>
<td>.15</td>
</tr>
<tr>
<td><strong>Fathers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuroticism</td>
<td>(N = 46)</td>
<td>2.91 (0.91)*</td>
<td>3.34 (0.80)*</td>
<td>.01</td>
</tr>
<tr>
<td>Extraversion</td>
<td></td>
<td>3.11 (0.79)</td>
<td>3.33 (0.79)</td>
<td>.42</td>
</tr>
<tr>
<td>Agreeableness</td>
<td></td>
<td>3.58 (0.76)*</td>
<td>3.08 (0.81)*</td>
<td>.006</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td></td>
<td>3.47 (0.76)</td>
<td>3.56 (0.76)</td>
<td>.84</td>
</tr>
<tr>
<td>Openness</td>
<td></td>
<td>3.42 (0.71)</td>
<td>3.41 (0.68)</td>
<td>.86</td>
</tr>
<tr>
<td>Wender ADHD items</td>
<td></td>
<td>23.62 (9.4)*</td>
<td>32.20 (13.7)*</td>
<td>.006</td>
</tr>
</tbody>
</table>

The “p” column shows results of three-group one-way ANOVA. Two-group differences significant at p < .05 by the Student-Newman-Keuls multiple range test are shown by differing superscripts. NEO scales reflect the item mean for that scale. Father personality data include the 24 fathers for whom only spouse report was available. When only self-reporting fathers were included, the result for Agreeableness was p = .04, two group comparisons nonsignificant. Neuroticism was unchanged. Ns vary slightly across personality scales due to incomplete data for some parents on some scales. For fathers’ Wender scores, the respective group sizes were N = 30, 22, and 31.

(displayed in Table 2) and then for parent ADHD dimensional scores and personality scales (Table 3). Table 3 includes national prevalences (for the adult diagnoses, these are from Kessler et al., 1994; for ADHD, from the American Psychiatric Association, 1994) so that our sample prevalence rates can be compared with national averages.

Adult psychiatric diagnoses—mothers. Maternal depression was marginally more common in the two ADHD groups than in the non-ADHD group. More strikingly, groups differed substantially in likelihood that the mother had experienced a major depressive episode in the past year [χ²(2, 140) = 18.8, p < .0001]. Both ADHD groups had higher rates of recent maternal depression than the
comparison group, and the comorbid subgroup substantially exceeded population averages.

Groups did not differ in rates of maternal alcohol or cocaine abuse/dependence, antisocial personality disorder, or mania. Regarding generalized anxiety disorder, children groups differed marginally, with episodes in the past year more common among the mothers of the diagnosed than comparison boys. The three groups did not differ in rates of maternal childhood ADHD taken as a category or a dimension. However, if boys with CD were treated as a separate group, mothers of boys with ADHD + CD had higher levels of childhood ADHD symptoms than each of the other three groups [4-group $F(3,127) = 6.61, p = .0003$, with significant post-hoc tests versus the three other groups]. As a category, 27% of the ADHD + CD mothers and only 3% of the ADHD + ODD mothers had ADHD.

**Adult psychiatric diagnoses—fathers.** Groups did not differ significantly in rates of paternal depression, alcohol problems, antisocial personality disorder, or mania. However, anxiety disorder was more common among the fathers of the boys with ADHD + ODD/CD than among the comparison boys. The hypothesis regarding paternal childhood ADHD symptomatology found support. Considered as a category, boys diagnosed with ADHD were more likely than comparison boys or comorbid boys to have fathers who could be diagnosed with past ADHD. ADHD symptoms as a dimension differentiated groups by a large margin, because the fathers of comparison boys reported fewer childhood attention problems than did fathers of boys with ADHD or ADHD + ODD/CD, who did not differ. Cocaine abuse/dependence was less common among the fathers of the ADHD boys than among the fathers of the ADHD + ODD/CD boys, and marginally less than among the fathers of the comparison boys (Fisher’s exact $p = .08$). The effect was due to high rates of cocaine abuse/dependence among the few fathers of boys with ADHD + CD (4/8 or 50%, compared to 9% among fathers of boys with ADHD + ODD). The cocaine finding was nonsignificant when only self-reporting fathers were considered. Also, when ODD and CD groups were separated, antisocial personality disorder was marginally significant [$v^2(3) = 7.03, p = .07$] because 15% of the fathers of the boys with ADHD + CD had antisocial personality disorder, versus 0% for boys with ADHD + ODD.

**Maternal personality traits.** Personality trait scores are summarized in Table 3. Mothers of boys with ADHD evidenced marginally lower levels of trait Conscientiousness than comparison mothers. Groups did not differ in level of the other maternal traits. If CD and ODD were separated, the mothers of ADHD + CD boys had lower levels of Conscientiousness than mothers of ADHD + ODD or comparison boys on post hoc pairwise tests [4-group $F(3,127) = 3.92, p = .010$].

**Parental personality traits.** As predicted, fathers of the boys with ADHD + ODD/CD evidenced lower scores on Agreeableness (suggesting greater hostility) and higher levels of Neuroticism than fathers of the other ADHD boys and than fathers of non-ADHD boys. Contrary to hypotheses, groups did not differ in level of paternal Conscientiousness, Extraversion, or Openness. Analysis of only the self-reporting fathers rendered the two-group comparisons for Agreeableness nonsignificant but did not change the Neuroticism result. Consideration of four groups (ADHD + CD and ADHD + ODD) yielded no change in results except that the effect for Agreeableness was restricted to the fathers of boys with ADHD + CD, who differed from the comparison and ADHD but not from the ADHD + ODD group.

**Statistical Prediction of Dimensions of Child Antisocial Behavior**

For regression models, parent attributes served as the predictor variables and observed child behaviors as the criterion measures. Separate regression models were developed for child aggression, noncompliance, and covert antisocial behaviors. The transformed outcome variables yielded good multivariate conformation to normality assumptions for aggression and noncompliance and moderate conformation for the covert measure. Bivariate correlations among the predictor variables ranged from .00 to .59, supporting a multivariate regression strategy to take into account correlated predictors.

In each regression model, the dummy-coded child group variable was entered first. We combined the ADHD subgroups for the regressions, because *dimensional* measures of comorbid antisocial behavior (rather than categorical comorbid antisocial diagnoses) were now the criterion measure for the analysis. Therefore, the child “group” variable had two levels (ADHD vs. non-ADHD) for the regression analyses, instead of three as before for the between-group analyses. For the final model with each outcome variable, SES was also entered at step 1 to rule out confounds from the influence of SES on antisocial behavior (Rutter, Cox, Tupling, Berger, & Yule, 1975). Parent predictor variables were entered at step 2. Parent measures were thus required to account for variance in child behavior beyond that accounted for by the ADHD-comparison group differences and by SES. Power exceeded .80 to detect main effects of “medium” size ($f^2 = .15$) with five or fewer predictors for fathers and eight or fewer predictors for mothers. To preserve power, categorical and dimensional parent variables were prescreened separately, and surviving variables from each domain then combined into a full model. We adopted a conservative approach to model revision, eliminating variables with squared semipartial correlations <.01 (see Cohen & Cohen, 1983; Pedhazur & Schmelkin, 1991). In the final model, interactions (group * predictor product terms) were entered at step 3 as a set. If the set was significant ($p < .05$), interaction terms were then tested individually (Selvin, 1994). Because the number of mothers and fathers was unequal, they were first analyzed separately and surviving variables were then combined in a final model.

**Observed Child Aggression as Outcome**

**Maternal predictors.** As described, the categorical variables (psychiatric diagnoses) were first examined as a set. Antisocial Personality Disorder, Mania, and Cocaine abuse/dependence yielded squared semi-partial correlations <.01 and were therefore eliminated. When
dimensional maternal variables were considered, Openness, Extraversion, and Conscientiousness were eliminated in the same manner. The maternal model thus included Major Depression, Generalized Anxiety Disorder, Alcohol Abuse/Dependence, Neuroticism, Agreeableness, and childhood ADHD symptoms.

**Paternal predictors.** Using the same procedure as for mothers, the relations of father characteristics to child aggression were evaluated. Although interaction terms could be dropped from the models and residuals plots indicated fidelity to regression assumptions, no measures obtained from fathers were related to child aggression, either alone or in a model with the maternal variables.

**Combined maternal and paternal predictors.** Because paternal variables did not contribute, the final maternal model is displayed in the first portion of Table 4 (variables are listed in order of decreasing magnitude of contribution to the model). As the Table illustrates, after SES and child group (ADHD/non-ADHD) were entered at step 1 (R² = .24, p < .001), the maternal variables entered at step 2 accounted for an additional 13% of the variance in child aggression (p = .0005). We then entered group × predictor product terms as a set at step 3 (R² change = .05, p < .05). When examined one at a time, the Neuroticism × Group interaction remained significant and the SES × Group interaction was marginally significant. The interactions signify that different regression slopes pertain to each group. When groups were examined separately, maternal Neuroticism was clearly related to aggression in the ADHD group (beta = .44, p = .0001) and unrelated in the comparison group (beta = −.13, p = .41). Likewise, SES had a noteworthy relation to aggression in the ADHD group (beta = .34, p = .002) but not in the comparison group (beta = −.09, p = .53).

### Observed Child Noncompliance as Outcome

**Maternal predictors.** Using the same procedures as above, maternal Mania and Cocaine use were eliminated. When dimensional variables were screened, only Conscientiousness was retained. Interaction terms were all nonsignificant. At step 1, child Group and SES accounted for 27% of the variance (p < .001). At step 2, maternal characteristics accounted for an additional 14% of the variance in child noncompliance (p change = .0003).

**Paternal predictors.** All paternal psychiatric diagnoses could be dropped from the regression model without the interaction terms.
except Cocaine Abuse/Dependence (beta = .18, p = .08). Personality variables and Wender ADHD symptoms failed to contribute. Thus, paternal cocaine abuse/dependence was marginally associated with higher levels of child noncompliance.

**Combined maternal and paternal predictors.** The final model is displayed in the middle portion of Table 4. Child group and SES were entered at step 1 (R² = .21, p < .001). The parental variables, entered at step 2, accounted for an additional 23% of the variance in child noncompliance (p change < .001). Paternal Cocaine history was rendered nonsignificant; thus, child noncompliance was related only to maternal characteristics. As shown in the table, higher maternal Conscientiousness and maternal Generalized Anxiety Disorder protected against child noncompliance. Child noncompliance also was associated marginally with presence of maternal Antisocial Personality Disorder and Depression. Unexpectedly, maternal Alcohol use was a protective factor.

**Child Covert Antisocial Behaviors as Outcome**

**Maternal predictors.** Again, categorical variables (psychiatric diagnoses) were first examined as a set. None survived the exclusion procedure. No interactions were significant. In short, maternal measures were unrelated to child covert antisocial behaviors in either group.

**Paternal predictors.** All disorders could be dropped from the model without loss of fit, except Cocaine Abuse/Dependence. Dimensional trait variables were next screened; Openness and Conscientiousness survived our elimination criteria. No interactions were significant.

**Combined maternal and paternal predictors.** No maternal variables survived for a final model, so the final model was the paternal model as shown in the bottom portion of Table 4. Paternal Cocaine Abuse/Dependence and higher Openness conferred higher risk of child covert antisocial behavior. The positive association of Conscientiousness with child behaviors was opposite to expectations. SES interacted with child Group, with a stronger association between low SES and higher child covert behavior in the ADHD than the comparison group. Overall, in contrast to overt antisocial behaviors, child covert behavior was associated exclusively with paternal characteristics.

**Test of the Hypothesis of Equal Correlates for Three Antisocial Behaviors**

The regression results suggested that correlates of the three antisocial behaviors differed. We formally tested the proposition that parent correlates were the same for each antisocial behavior with a structural equation model (covariances were analyzed with LISREL-VIII). Along with the three child outcomes, the model included parent predictors that had survived the regression analyses for any one of the outcomes. The model was constrained such that the covariances were the same between each parent variable and the three child outcome variables. Note that in this design a significant chi-square indicates rejection of the model of equal covariances. Results indicated a poor fit, with χ² (22) = 40.04, p = .011 (Adjusted Goodness of Fit Index = .74). Tests of each pair of outcomes yielded the same result (poor model fit in each case). (The presence of paternal Cocaine use in the models sharply reduced the sample size because cocaine use was not assessed in 1995. When paternal Cocaine use was omitted, equal correlates were again rejected χ² (20) = 33.10, p = .033, although the Adjusted Goodness of Fit Index improved to .82. Fit in this case was acceptable if aggression and noncompliance had the same correlates, but the model failed if either was constrained to have the same correlates as covert behaviors.) Thus, the hypothesis that all three antisocial behaviors had equal parent correlates was rejected.

**Discussion**

We extended the assessment of parents of boys with disruptive behavior disorders into the domain of normal-range personality traits, associating parent traits and psychiatric diagnosis with independently observed antisocial behaviors of children with ADHD. Key findings were as follows:

1. Regardless of comorbid diagnosis of ODD or CD, boys with ADHD more often than comparison boys had mothers with a major depressive episode and/or marked anxiety symptoms in the past year, and more often had fathers with a childhood history of ADHD.
2. In addition, compared with the nondiagnosed group, boys with comorbid ADHD + ODD/CD also had fathers with lower trait Agreeableness, higher Neuroticism, and a greater likelihood of Generalized Anxiety Disorder.
3. Distinctions among the predictors of different domains of antisocial behavior were observed. Higher rates of child overt antisocial behaviors, observed in a naturalistic summer program, were associated primarily with maternal characteristics. Both aggression and noncompliance were related to maternal Depression and Anxiety disorders. Whereas child aggression was related to higher maternal Neuroticism and Agreeableness, noncompliance was associated with lower maternal Conscientiousness. In contrast to results for overt behaviors, higher rates of observed child overt antisocial behaviors were associated solely with paternal characteristics, including history of substance abuse/dependence and higher Openness (possibly related to Sensation Seeking).
4. The relation of maternal Neuroticism to child aggression was stronger in the ADHD than comparison group, as predicted, but hypothesized interactions with child diagnosis were not observed for parent Conscientiousness or Agreeableness.
5. Whereas low SES exacerbated antisocial behavior display, especially among the ADHD boys, effects of parent traits and disorders were observed over and above the effects of SES.

Overall, although between-group findings were modest, the regression results supported the inclusion of
normal range personality traits alongside psychopathology in family research on child ADHD and associated antisocial behaviors.

Regarding the hypotheses, support in either the categorical or dimensional analyses was obtained for the importance in relation to child antisocial behavior of maternal depression, Neuroticism, Conscientiousness, and anxiety disorder (as a protective factor) and paternal Neuroticism, Agreeableness, Openness, and substance use history. Hypotheses were not supported for the role of paternal alcoholism or paternal antisocial personality disorder, and support for maternal antisocial personality disorder was weak. The noteworthy latter negative finding was partly due to our combining of ODD and CD boys, as noted in the Results, and to an unusually high frequency of endorsement of antisocial symptoms by the comparison parents (see Table 2). Parent antisocial personality disorder has been linked to child conduct problems in prior family studies (Biederman, Munir, & Knee, 1987; Lahey et al., 1988), and it may be necessary to restrict analyses to child CD to find that effect. Also, those studies used clinic-referred samples; perhaps the most antisocial parents did not volunteer for our study.

The conjecture that parent x child “fit” mechanisms might best account for the emergence of antisocial behavior among boys with ADHD received partial support concerning the effect of maternal Neuroticism on child aggression. Although interactions always bear replication, this interaction has potential theoretical merit. As suggested, higher maternal Neuroticism may interfere with mothers’ ability to cope resiliently with a difficult child temperament (O’Leary, 1995), differentially facilitating development or maintenance of aggressive behaviors in at-risk children such as those with ADHD. In showing this association in children specifically diagnosed with ADHD, the personality data extend prior findings that Neuroticism in parents is related to child externalizing behaviors (e.g. Bates et al., 1991; Belsky & Pensky, 1988; Borduin et al., 1985). Equally important, for mothers the contribution of Neuroticism to child aggression was over and above the statistical contribution of depression.

In contrast, our data failed to support Belsky’s (1984) more speculative proposal that lower parent Extraversion might be associated with greater child behavior problems in a clinical sample. One reason for this negative finding may be that in the Big Five model Extraversion comprises such facets as activity level and sociability, but not impulsivity, which is instead linked with Conscientiousness. Maternal Conscientiousness was marginally lower in the ADHD groups than in the comparison group, and lower maternal Conscientiousness was related to higher levels of child noncompliance in the final model. The prediction that low paternal Agreeableness would relate to child antisocial behaviors was supported in the categorical comparisons but not in the regression data. Perhaps paternal Agreeableness is related only to situationally specific antisocial behavior—in this case that reported by mothers but not that observed in the summer programs.

Mediating variables such as specific parent–child behavioral exchanges were beyond the scope of this study. Imagining causal models without addressing the mediating links between parent personality and parenting practices is difficult, however. Caution is necessary so that parental traits and parenting behaviors are not conflated. Parenting behavior is likely to be influenced by personality—but just as surely, it is not personality alone that shapes parenting. Parenting attitudes and beliefs, social stressors, and immediate contextual factors are also likely to contribute to parenting (Belsky, 1984). For example, among parents with similar levels of Conscientiousness, parenting beliefs and parenting behaviors vary substantially (Clausen, 1993).

The regression models combined with the LISREL model fitting results provided external validation for distinctions between aggression, noncompliance, and covert antisocial behaviors in children. Overt antisocial actions (aggression) and noncompliance were primarily related to maternal attributes in combined models, but covert antisocial actions were related solely to paternal characteristics. In fact, the placement of nonconformity on the “midpoint” of the continuum of antisocial behaviors was supported by its sharing of some associations with aggression (e.g. maternal anxiety disorder) and with covert behaviors (e.g. paternal cocaine use, marginally, in the father-only model). Also, the specific suggestion that nonconfrontational (covert) anti-social actions may be “directly” transmitted was supported by our finding that paternal cocaine abuse predicted child covert behaviors. Although not specifically predicted, our finding that paternal Openness was related to child covert behaviors makes sense when seen alongside a possible link between Sensation Seeking and both Openness and substance use (Zuckerman, 1991); it is consistent with studies of Sensation Seeking in relation to ADHD (e.g. Frick et al., 1995).

The regression data also clarify the association of maternal depression with child aggression. As reviewed by Richters (1992), many researchers have been concerned that maternal depression may cause mothers to overstate sons’ behavioral problems, yet the best-controlled studies suggest that depressed mothers do not distort their son’s problems. The present data support the nondistortion perspective by showing that independently observed child aggression in ADHD samples was strongly related to maternal history of depression when maternal personality traits—notably Neuroticism—were partialled. The possibility that child-to-mother influences account for this finding is noteworthy in light of our finding that a recent depressive episode was far more likely in mothers of children with ADHD + ODD/CD than in comparison mothers. In community samples, paternal depression has also been linked to child externalizing problems, but indirectly via marital distress (Miller, Cowan, Cowan, Hetherington, & Clingempeel, 1993). We did not find an association between paternal depression and child behaviors in our clinical sample.

Finally, a notable result of the regression analyses was that maternal history of generalized anxiety disorder was associated with reduced levels of child antisocial behaviors. Several explanations for this finding are possible. One possibility is that children with anxious mothers are less willing to test adult limits than are other children. Or, perhaps anxious mothers are more appropriately controlling of their sons and so those sons
develop more self-control. Another possibility is that children diagnosed with ADHD who have anxious mothers are themselves more internalizing and therefore less likely to exhibit disruptive behaviors (see Pliszka, 1992). Replication is a priority, because anxiety disorder was the least reliable and valid Q-DIS-3R diagnosis.

Methodological Limitations and Future Directions

First, our study was confined to boys and may not generalize to girls. An important qualification of our findings was that paternal characteristics were linked more strongly to child behavior problems when maternal report regarding nonparticipating fathers was considered. Although we obtained more direct father-report data than in some prior studies, these inconsistent results highlight possible method effects. Changes in results when informant data predominated could relate to the unavailability of the most antisocial fathers or to reporting artifacts. Also, our evaluation of child ADHD in parents relied on the WURS, a measure that does not conform to DSM-IV criteria, because it includes mood and learning items that were not separately evaluated. This composition could limit interpretation of findings related to parent childhood ADHD.

Further, only direct, linear relationships between parent and child variables were assessed. This assumption could be misguided, and multivariate path and causal models with larger samples would be needed to examine possible mediators for the associations of parent traits to child behaviors. Likewise, only additive contributions of risk and protective factors were considered. Multiplicative relationships among parent traits (e.g. between maternal and paternal traits) raise possibilities that we did not address (see Belsky et al., 1995).

Third, although power generally exceeded .80 for the final regression models, preliminary models that included interaction terms had lower power and may not replicate in other samples. Also, we did not control other well-known ADHD comorbidities such as anxiety, depression, and learning disorders, as they were not the focus of this investigation. However, these child disorders could have exerted unknown effects on the results. Related to this issue, we did not distinguish different motivational subtypes of aggression in the present study. For example, a key distinction has been made between instrumental (proactive) and reactive aggression (Coie, Dodge, Terry, & Wright, 1991), and it is quite conceivable that parental attributes would relate differentially to this distinction. Finally, some parent risk factors (e.g. depression) are in all likelihood not specific to ADHD (Weissman et al., 1984), and investigations with other clinical groups are needed.

Conclusion

We found that parent personality traits differentiated ADHD boys with and without comorbid disruptive behavior diagnoses and that these were related to objectively observed antisocial behavior of boys over and above the information provided by parent psychopathology. In various analyses, Neuroticism, Agreeableness, Conscientiousness, and Openness revealed promise as parent traits to investigate. Integration of parent personality and psychopathology can enrich descriptive and theoretical models of the development of comorbid antisocial behaviors. These traits are promising candidates for understanding the role of shared environment as well as nonshared effects (via “fit” mechanisms) in the exacerbation of antisocial behaviors in ADHD. Theories of ADHD need to address possible interaction effects between maternal Neuroticism and child diagnosis in predicting child aggression, as well as the striking protective effect of maternal anxiety in the display of child overt antisocial behaviors. We also found that parent correlates differed for subtypes of child antisocial behavior, providing external validation for distinctions between aggression, noncompliance, and covert child behaviors. Examination of models that incorporate parenting behaviors as well as parent personality and psychopathology will be a next step to clarify causal pathways linking parent traits to the development of antisocial behaviors in children with ADHD.

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