

# Family Correlates of Oppositional and Conduct Disorders in Children With Attention Deficit/Hyperactivity Disorder

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Comorbidities among children with ADHD are key determinants of treatment response, course, and outcome. This study sought to separate family factors (parental psychopathology and parenting practices) associated with comorbid Oppositional Defiant Disorder (ODD) from those associated with Conduct Disorder (CD) among children with Attention Deficit/Hyperactivity Disorder. Clinic-referred families ( $n = 149$ ) were diagnosed using DSM-IV criteria. Parents completed measures of parenting practices. Comorbid ODD and CD were significantly associated with maternal negative/ineffective discipline. Comorbid CD, but not ODD, was significantly associated with lack of maternal warmth and involvement, paternal negative/ineffective discipline, and with paternal Antisocial Personality Disorder (APD). However, the risk of CD posed by parenting appeared concentrated among children without a father having APD. While consistent discipline appears important for addressing comorbid ODD and CD, paternal psychopathology and the quality of the relationship between mother and child may pose risk specifically for comorbid CD. Efforts to prevent and/or treat CD should consider not only provision of structure and prudent discipline, but also the affective qualities of the relationship between the primary caretaker and child.

**KEY WORDS:** ADHD; comorbid disorders; parenting; parent psychopathology.

Most children with ADHD develop a comorbid disruptive behavior disorder (DBD; Jensen, Martin, & Cantwell, 1997). The most common is Oppositional Defiant Disorder (ODD), characterized by chronic argumentativeness, defiance and anger, but the more pernicious Conduct Disorder (CD), involving serious violations of societal norms, is present in a quarter to half of all cases (Barkley, DuPaul, & McMurray, 1990; Biederman, Newcorn, & Sprich, 1991; Szatmari, Boyle, & Offord, 1989). The social impairment, course and prognosis, and response to treatment in ADHD cannot be understood without considering comorbidities. Children having both ADHD and CD have more learning problems, neuropsy-

chological deficits, and poorer prognosis with high rates of antisocial outcomes (Jensen et al., 1997). The combination of ADHD and CD is associated with an earlier age of onset for CD and more persistent and serious conduct problems (Lahey, McBurnett, & Loeber, 2000). ODD is generally considered a milder disorder than CD, but it is far from benign: it is associated with functional impairment and disturbed interpersonal relations, and in some cases it progresses to CD. However, many cases of prepubertal ADHD + ODD do not progress to the prepubertal form of CD (Lahey et al., 2000), which is the classic early-onset pattern associated with persistent and serious antisocial behavior (Farrington, 1995; Moffitt, 1993). Despite extensive research into risk factors for CD, little attention has been given to specifying those associated with comorbid ODD and those that are specific to comorbid CD. Knowledge of these factors is important for both preventing and treating these serious comorbid conditions.

Multiple risk factors related to heredity and family environment have been linked to each of the disruptive

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behavior disorders (Johnston & Mash, 2001). ADHD itself is familial (Barkley et al., 1990; Biederman, Faraone, Keenan, Knee, & Tsuang, 1990; Faraone, Biederman, & Milberger, 1994; Frick, Lahey, Christ, & Loeber, 1991). The association between paternal APD and child CD in boys has been replicated in several studies (Biederman, Munir, & Knee, 1987; Frick, Lahey, Loeber, & Stouthamer-Loeber, 1992; Lahey et al., 1988). Frick et al. (1992) report an association between APD and ODD, although not as strong as for APD and CD. In an ADHD sample, Pffner et al. (1999) also report that paternal APD predicted comorbid CD, and to a lesser extent comorbid ODD, in boys. Together, these studies suggest strong familial risk via APD for the development of CD in ADHD children, and a significant, but weaker association between APD and ODD. Parental depression also has been linked to disruptive behavior in children, perhaps via common familial vulnerabilities (e.g., Biederman et al., 1991), via an association with parental antisocial behaviors, or due to the difficulty of raising children with a disruptive behavior disorder. There is less evidence for a specific association between parental anxiety and disruptive behavior disorders, particularly when comorbid anxiety in the child is controlled (e.g., Biederman et al., 1991; Pffner et al., 1999).

Parenting practices form a second set of family risk factors. Studies examining interaction patterns among families with children having ADHD have found parents to be more directive, commanding, and negative than parents of children without ADHD (Johnston & Mash, 2001). Dysfunctional parenting may partly be a reaction to the difficulties of raising a child with ADHD, but it may also serve an etiological role in the emergence of comorbid disruptive behavior disorders among youth with ADHD (see Johnston & Mash, 2001). However, dysfunction is not always found in families with an ADHD child (Cunningham, Benness, & Siegel, 1988; Schachar & Wachsmuth, 1991), and difficulties that are found are often mild. These inconsistencies may indicate that parenting problems, far from being ubiquitous in ADHD, may be specific to subgroups of children with ADHD who also have ODD or CD. Consistent with social learning theory, children with oppositional and conduct problems often have families characterized by coercive interaction styles, inconsistent discipline, lack of parental involvement, and lack of positive and warm interactions between parent and child (Fletcher, Fischer, Barkley, & Smallish, 1996; Loeber & Tengs, 1986; Patterson, Reid, & Dishion, 1992). Recent studies with ADHD children suggest that certain kinds of dysfunctional parenting, including maternal lack of responsiveness (Johnston & Mash, 2001; Johnston, Murray, Hinshaw, Pelham, & Hoza, 2002), lack

of warmth and positive involvement, overly negative discipline (Kashdan et al., 2004), lax and inconsistent parenting, and a lack of cohesion among family members (Lindahl, 1998), are related to comorbid oppositional or conduct problems rather than ADHD *per se*. Negative parenting practices also predict persistence of comorbid ODD rather than ADHD (August, Realmuto, Joyce, & Hektner, 1999).

The relative contribution of parent psychopathology and dysfunctional parenting to the emergence of coexisting ODD vs. CD in ADHD children has not been studied, but several studies have tried to separate these family factors in predicting CD. Among children with a primary disruptive behavior disorder, Frick et al. (1992) found little relationship between maternal parenting and child conduct problems after controlling for paternal APD, but a strong relationship between paternal APD and child CD after controlling for maternal parenting—leading the authors to conclude that APD was the more important risk factor for CD. Capaldi, Pears, Patterson, and Owen (2003) also found that father antisocial behavior was associated with externalizing problems in young children after controlling for father's parenting practices. Other studies suggest that parenting practices play a partial role (e.g., Frick & Loney, 2002; Smith & Farrington, 2004) or actually are the key factors in the development of primary conduct problems (Patterson et al., 1992). Laub and Sampson (1988) reported that the effects on delinquency of parent criminality and alcohol abuse were mediated by family process variables, most notably, maternal supervision, parental discipline, and parental attachment. Recently, Conger, Neppi, Kim, and Scaramella (2003) reported that continuity in angry, aggressive parenting styles across generations is what accounted for connections in aggressive behavior from one generation to the next. The importance of parenting was also highlighted in a study of ADHD children in which Anderson, Hinshaw, and Simmel (1994) reported that maternal negativity predicted observed noncompliance and laboratory stealing, even after controlling for maternal psychopathology and child negativity.

However, there is also evidence that parent psychopathology might moderate the association between parenting and child conduct problems. McCord (1991) found that criminality in the father appeared to moderate the relationship between parenting and criminality in the sons, although the direction was different across aspects of parenting. For those with a criminal father, affection or confidence in maternal parenting reduced the risk for offspring criminality. However, low parental supervision was associated with criminality only for offspring without a criminal father. This literature highlights the complexities

associated with the linkage among different family factors in predicting conduct problems. One implication is that in some cases, disruptive behavior problems may occur via disruption of normal parenting or via familial transmission of antisocial behaviors, and in other cases a combination of both factors is important for increasing risk. How these factors might differentially predict ODD vs. CD is not known.

In this study, our objective was to disentangle family factors associated with comorbid ODD from those associated with comorbid CD in boys and girls having *DSM-IV*-defined ADHD (all subtypes). One set of analyses examined the association between *parent disorder symptoms* and comorbid CD and ODD, with the prediction that APD symptoms would be most strongly associated with comorbid CD. A second set of analyses tested whether *parenting practices* among mothers and fathers were associated with comorbid ODD and/or CD, with the prediction for greater negative-ineffective discipline and less positive involvement among families with either comorbid ODD or CD. No specific predictions were made about parenting differences between ODD and CD due to a lack of previous research.

## METHOD

### Participants

Participants were 149 children (123 boys, 26 girls) ages 5–11 years (mean = 8.0,  $SD = 1.7$ ) who were consecutive referrals to a university-based research clinic for ADHD. Eleven additional children were evaluated for the study, but either did not meet criteria for ADHD ( $N = 7$ ) or did not complete key measures (e.g., DISC or SCID) required for this study ( $N = 4$ ). Participants were living with at least one biological parent. Seventy-eight percent were Caucasian, 12% were of mixed origin and fewer than 5% were from other ethnicities. Percentage of families in SES categories (Hollingshead, 1975) from low to high was: I: 3%, II: 16%, III: 25%, IV: 39%, V: 17%. Children with an IQ less than 70 were excluded from the study, but all children assessed for this study received IQ scores at or above this level. Full scale IQ on the Wechsler Intelligence Scale for Children-III averaged 103.3 ( $SD = 14.0$ ). All children met *DSM-IV* criteria for ADHD (any subtype).

### Procedure

After parents and teachers completed rating scales and questionnaires and returned them by mail, two clinic visits were scheduled. During the first visit, parents and

children provided consent/assent for their evaluation data to be used in research. A diagnostic child interview was administered to parents while children were administered psychometric testing and self-report questionnaires. During the second visit, parental psychopathology was measured via direct interviews with the parents. In cases where a biological parent was no longer in the home ( $N = 50$  fathers,  $N = 6$  mothers), the referring biological parent was asked to contact or to allow us to contact the other biological parent. Fifty-four percent (30/56) were located and consented to the study. The remaining 26 absent biological parents (23 fathers, 3 mothers) could not be recruited using reasonable effort; in these cases the participating parent completed the interview about psychopathology symptoms in the absent parent. Biological parents living in the home or having significant contact (i.e., shared physical custody) with their children completed the parenting measures. Of those families without a biological parent in the home, 45% had a stepparent living in the home (22 stepfathers, 3 stepmothers). In cases where a stepparent had been living in the child's home for at least 1 year, the stepparent completed the parenting measures ( $N = 21$  stepfathers,  $N = 3$  stepmothers). Parents and children were interviewed by different trained clinicians who were blind to all ratings of child behavior. Child interviewers were blind to parent diagnoses; parent interviewers were blind to all child diagnoses.

### Measures

#### *Demographics*

Child age, ethnicity, and SES (Hollingshead, 1975) were obtained from a questionnaire completed by the primary caretaker.

#### *Child Diagnoses*

Child diagnoses were based on the Diagnostic Interview Schedule for Children (DISC; Shaffer et al., 1996). Diagnoses followed a multiple-gating procedure. Screening began with the parent and teacher versions of the Child Symptom Inventory (Gadow & Sprafkin, 1994), a *DSM-IV*-keyed symptom checklist; and parent and teacher versions of the Behavior Assessment System for Children (Reynolds & Kamphaus, 1992). Parents of children who appeared to meet symptom count criteria for any subtype of ADHD were then administered the DISC. Based on the DISC, all children met criteria for a *DSM-IV* diagnosis of ADHD (subtypes: Combined:  $N = 96$ , 64%, Inattentive:  $N = 36$ , 24%, Hyperactive-Impulsive:  $N = 17$ ,

**Table I.** Mean Scores for Demographic Variables and Child Diagnoses by Comorbid Subgroup

	ADHD ( <i>N</i> = 66)	ADHD + ODD (without CD) ( <i>N</i> = 48)	ADHD + CD (with or without ODD) ( <i>N</i> = 35)
Age (years)	8.0 ( <i>SD</i> = 1.7)	7.8 ( <i>SD</i> = 1.6)	8.1 ( <i>SD</i> = 1.8)
% Boys	85%	81%	80%
IQ	105.2 ( <i>SD</i> = 14.1)	99.8 ( <i>SD</i> = 12.6)	102.3 ( <i>SD</i> = 10.3)
Family structure			
Natural parents	62%	69%	54%
Step-parent	18%	6%	29%
Single parent	20%	25%	17%
Socioeconomic status <sup>a</sup>	42.1	41.9	38.2
ADHD subtype			
Combined	51%	77%	71%
Inattentive	32%	19%	17%
Hyperactive-impulsive	17%	4%	11%
Anxiety disorder	38%	42%	60%
Depressive disorder <sup>b</sup>	2%	10%	14%

<sup>a</sup>Hollingshead, 1975.

<sup>b</sup>Sixty-four percent of those with a comorbid depressive disorder also met criteria for a comorbid anxiety disorder.

11%). The resulting rates for comorbid disorders were: ODD without CD: (*N* = 48) 32%, CD: (*N* = 35, 7 without ODD) 24%, a depressive disorder: (*N* = 11) 7%, an anxiety disorder: (*N* = 66) 44% (see Table I for rates of overlapping comorbid disorders). A second clinician listened to approximately 10% of audiotaped interviews and made independent ratings of symptoms. As expected (given the highly structured nature of the DISC interview), inter-rater reliability for each of the diagnostic categories (ADHD, ODD, CD, depressive disorder, anxiety disorder) was 100%.

### Parent Psychopathology

Psychiatric symptoms in the biological parent were assessed using the Structured Clinical Interview for *DSM-IV* (First, Gibbon, Spitzer, & Williams, 1995). Interviewers administering the SCID were blind to the DISC results. Biological mothers and fathers were interviewed separately. In 23 of the cases, the father did not attend and the mother answered the symptom queries about the father. In 4 cases the mother did not attend and the father answered the symptom queries about the mother. The validity of the family history method of having one parent report on symptoms in the other parent has been supported in previous studies (e.g., Pffner, McBurnett, & Rathouz, 2001). A history of CD was not required for parents to be classified with APD in this study, as specified by *DSM-IV*, because parents were inconsistently aware of the other parents' childhood symptoms of CD. A second clinician listened to approximately 20% of audiotaped interviews

and made independent ratings of symptoms. Inter-rater reliability using the kappa coefficient was .85 for father APD and 1.0 for mother APD and mother and father anxiety and depressive disorders.

### Parenting Measures

#### *Alabama Parenting Questionnaire* (Shelton, Frick, & Wootton, 1996)

The APQ measures parenting practices across five domains: Involvement, Positive Parenting, Poor Monitoring/Supervision, Inconsistent Discipline, and Corporal Punishment. Items are rated on 5-point scale (*never to always*). Shelton et al. (1996) report acceptable internal consistency (range .63–.8), and convergent validity across rating and interview methods ( $X = .37$ ). Discriminative validity also has been demonstrated with children having a disruptive behavior disorder more likely to have deviant elevations, especially on the negative parenting scales, than normal children (Shelton et al., 1996). In the present sample, internal consistency for the mother, father and stepfather completed scales was acceptable (alphas ranged between .64 and .88).

#### *Parent-Child Relationship Scale-Brief Version* (Furman & Giberson, 1995)

The 40-item PCRS assesses perceptions of qualities of the parent-child relationship falling under five

dimensions using a 5-point scale (hardly at all to extremely much): Warmth, Disciplinary Warmth, Power Assertion, Personal Relationship, and Possessiveness. Furman and Giberson (1995) report that four of the five dimensions on the PCRS (all but possessiveness) have been significantly correlated with perceptions of these same qualities in the sibling relationship. In the present sample, internal consistencies for the mother, father, and stepfather completed scales were high ( $\alpha > .8$ ).

#### Data Reduction

To reduce the number of redundant parenting variables, we utilized the higher order factor scores derived from factor analyses of these two scales obtained in a large national sample of youth with ADHD (Hinshaw et al., 2000; Wells et al., 2000). The two factors were labeled Positive Involvement and Negative/Ineffective Discipline. The positive involvement factor included 40 items from the APQ Involvement and Positive Parenting scales and the PCRQ Warmth and Disciplinary Warmth scales pertaining to engaging in conversations and activities with child, use of praise and other rewards, general caring, and admiration and respect between parent and child, use of reasoning, and involving child in decisions. The negative/ineffective discipline factor included 24 items from the APQ Inconsistent Discipline and Corporal Punishment scales and the PCRQ Power Assertion scale pertaining to inconsistency in the disciplinary process and the extent of quarreling, parental dominance, physical and verbal punishment, privilege loss, and guilt induction used by parents. In the present sample, internal consistencies (alphas) of these factors for the mother, father and stepfather were high (Positive Involvement: mother = .92, father = .94, stepfather = .97; Negative/Ineffective Discipline: mother = .82, father = .80, stepfather = .81).

#### Data Analytic Plan

To test for associations between parent disorder symptoms and comorbid ODD and/or CD, multinomial logistic regression analyses fitted models for symptoms of three parental disorders (APD, depression, and anxiety) and three child diagnostic groups: ADHD only, ADHD + ODD (without CD), and ADHD + CD (with or without ODD). The three child diagnostic groups served as response variables. To test for associations between parenting and comorbid conditions, multinomial logistic regression models were fitted separately for the two parenting constructs (positive involvement, and negative/ineffective discipline) for mothers and fathers and the child diagnostic

groups. Scores on the parenting constructs were converted to z-scores (calculated separately for mothers and fathers) for these analyses. Z-scores for the positive involvement construct were reversed so that higher scores indicated a greater lack of positive involvement. Significant tests of the full model (omnibus tests) were followed by paired comparisons of responses: ADHD + ODD vs. ADHD, ADHD + CD vs. ADHD and ADHD + CD vs. ADHD + ODD.

## RESULTS

Table I presents demographic data, child IQ, ADHD subtype, and comorbid anxiety and depression rates as a function of DBD comorbidities. Comorbid depression showed significant association ( $p < .05$ ) with DBD comorbidities and comorbid anxiety showed significant association with comorbid CD ( $p < .05$ ). ADHD subtype, child age, gender, IQ, SES, and ethnicity/race were not associated with DBD comorbidity. Because of their significant association with comorbid ODD and/or CD and the possibility that these disorders could also be related to parenting or parent psychopathology, models predicting ODD and CD were adjusted for child depression and anxiety. The rate of comorbid anxiety disorder in this study (44%) is somewhat higher than the one-quarter to one third reported in other clinical samples (e.g., Biederman et al., 1991). However, it is similar to that reported in the Multisite Treatment Study for ADHD (39%), which also used the DISC interview for making diagnoses, when the same anxiety diagnoses (i.e., Simple Phobia, Generalized Anxiety Disorder, Separation Anxiety Disorder, and Social Phobia) were used as the basis for determining the presence or absence of anxiety in both studies (Jensen et al., 2001).

#### Parent Psychopathology

Table II presents descriptive statistics on symptoms of parental disorders and Table III presents the results of the multinomial logistic regression models. A conservative interpretation of these results would only consider those models with significant omnibus tests (father APD and depression). To present a complete picture, however, all pairwise comparisons are provided. The hypothesis that parent APD symptoms are associated with ADHD + CD was supported for fathers but not for mothers. Paired comparisons found that each additional symptom of paternal APD increased the odds of comorbid CD (vs. ADHD, with or without ODD) by 1.4. Symptoms of

**Table II.** Mean Symptoms (Standard Deviations) of Parental Disorders Across Child Comorbid Disorders<sup>a</sup>

	ADHD ( <i>N</i> = 66)	ADHD + ODD (without CD) ( <i>N</i> = 48)	ADHD + CD (with or without ODD) ( <i>N</i> = 35)
APD			
Father	.89 (1.45)	.83 (1.04)	2.17 (2.61)
Mother	.27 (1.0)	.35 (.73)	.57 (1.09)
Depression			
Father	1.92 (2.7)	1.50 (2.31)	3.89 (5.32)
Mother	3.74 (4.58)	3.30 (3.80)	5.49 (5.72)
Anxiety			
Father	.60 (1.27)	1.27 (2.27)	.80 (1.39)
Mother	1.70 (2.60)	1.28 (2.10)	2.57 (3.00)

<sup>a</sup>Mean symptoms of parental disorders include the entire sample (including cases providing self-report of symptoms, *N* = 125 fathers, *N* = 145 mothers) and cases for whom symptoms were reported by the attending parent (*N* = 24 fathers, *N* = 4 mothers). Symptoms of anxiety and depressive disorders were missing for one father and three mothers.

depression in the father were also significantly associated with ADHD + CD; each additional symptom of paternal depression increased the odds of comorbid CD by 1.2. When both paternal APD and depression were entered in a model, paternal APD symptoms remained a significant predictor of comorbid CD ( $p = .03$ ,  $OR = 1.3$ ), but depression dipped below conventional levels of significance

( $p = .07$ ) and the odds ratio for depression dropped from 1.2 to 1.1. When an interaction term for symptoms of APD and depression was entered, the term was not associated with CD  $\chi^2(1, N = 148) = 2.3, p > .1$ . Paternal anxiety symptoms and maternal anxiety, depressive and APD symptoms were not significantly associated with comorbid ODD or CD.

**Table III.** Bivariate Associations Between Child Comorbid Disorder and Parental Disorder Symptoms<sup>a,b</sup>

	Father			Mother		
	$\chi^2$	<i>df</i>	<i>OR</i> (95% CI)	$\chi^2$	<i>df</i>	<i>OR</i> (95% CI)
Antisocial Personality Disorder						
Overall Model	9.9***	2		1.4	2	
ODD vs. ADHD	.2	1	.9 (.7 – 1.2)	.01	1	1.0 (.6 – 1.6)
CD vs. ADHD	6.1***	1	1.4 (1.1 – 1.7)	1.2	1	1.3 (.8 – 2.0)
CD vs. ODD	7.0***	1	1.4 (1.1 – 1.9)	1.0	1	1.3 (.8 – 1.9)
Depression						
Overall Model	9.2***	2		3.6	2	
ODD vs. ADHD	.9	1	.9 (.8 – 1.1)	.9	1	1.1 (1.0 – 1.2)
CD vs. ADHD	4.3*	1	1.2 (1.0 – 1.3)	1.3	1	1.1 (1.0 – 1.2)
CD vs. ODD	6.9***	1	1.2 (1.1 – 1.4)	3.5+	1	1.1 (1.0 – 1.2)
Anxiety						
Overall Model	3.6	2		4.0	2	
ODD vs. ADHD	3.0 <sup>†</sup>	1	1.3 (1.0 – 1.6)	.9	1	.9 (.8 – 1.1)
CD vs. ADHD	.4	1	1.1 (.8 – 1.5)	1.4	1	1.1 (.9 – 1.3)
CD vs. ODD	1.1	1	.9 (.7 – 1.2)	3.6+	1	1.2 (1.0 – 1.4)

<sup>a</sup>Analyses of parental symptoms include the entire sample (including cases providing self-report of symptoms, *N* = 125 fathers, *N* = 145 mothers, and cases for whom symptoms were reported by the attending parent, *N* = 24 fathers, *N* = 4 mothers). Symptoms of anxiety and depressive disorders were missing for one father and three mothers.

<sup>b</sup>These analyses are adjusted for differences in rates of comorbid depressive and anxiety disorders among the child groups.

<sup>†</sup> $p < .1$ . \* $p \leq .05$ . \*\* $p \leq .01$ .

**Table IV.** Mean Item Scores (Standard Deviations) of Parenting Scales Across Child Comorbid Disorders<sup>a</sup>

	ADHD ( <i>N</i> = 64 mothers, <i>N</i> = 54 fathers)	ADHD + ODD (without CD) ( <i>N</i> = 47 mothers, <i>N</i> = 40 fathers)	ADHD + CD (with or without ODD) ( <i>N</i> = 34 mothers, <i>N</i> = 30 fathers)
Positive involvement			
Father	3.7 (.5)	3.6 (.4)	3.6 (.6)
Mother	3.9 (.4)	3.9 (.4)	3.6 (.4)
Negative/ineffective Discipline			
Father	1.9 (.3)	2.0 (.4)	2.1 (.3)
Mother	1.9 (.4)	2.2 (.4)	2.2 (.4)

<sup>a</sup>Mean parenting scores include biological (*N* = 103 fathers, *N* = 142 mothers) and step (*N* = 21 stepfathers, *N* = 3 stepmothers) parents. Parenting measures were missing for four mothers and three fathers.

It might be speculated that mothers would rate partners from whom they were separated as having more symptoms of APD because of negative affect toward them (anger, resentment, etc.) To reduce the chance that results were biased by reliance on mothers' report of paternal APD symptoms, we repeated these analyses using only those cases where self-report of symptoms was available (results not shown). The *OR* obtained for that subsample did not vary from those in the full sample by more than .1 (and in many instances were identical), suggesting that the results for the full sample were not a function of mother biases.

**Parenting Practices**

Table IV presents mean raw parenting scores per item across the three diagnostic groups. Table V provides the

results for all pairwise comparisons (using *z*-scores), but only those with significant omnibus tests are suitable for conservative interpretation. Paired comparisons revealed that a lack of maternal positive involvement showed specific correspondence with CD, increasing the odds of CD, relative to cases with either comorbid ODD or only ADHD by over two times with each unit decrease in positive involvement. (Because parenting practices are measured with *z*-scores, one unit equals one *SD* change.) In addition, the odds for CD and for ODD both more than doubled, relative to cases with only ADHD, per unit increase in maternal negative/ineffective discipline and increased by over one and a half times relative to cases with only ADHD per unit increase in paternal negative/ineffective discipline. Neither paternal nor maternal negative/ineffective discipline distinguished the ODD and CD groups. Paternal positive involvement did not show significant differences

**Table V.** Bivariate Associations Between Child Comorbid Disorder and Parenting <sup>a,b,c</sup>

	Father			Mother		
	$\chi^2$	<i>df</i>	<i>OR</i> (95% CI)	$\chi^2$	<i>df</i>	<i>OR</i> (95% CI)
Lack of positive involvement						
Overall model	3.8	2		14.9**	2	
ODD vs. ADHD	1.7	1	1.3 (.9 – 2.0)	1.0	1	1.2 (.8 – 1.9)
CD vs. ADHD	3.3 <sup>†</sup>	1	1.6 (1.0 – 2.5)	12.2**	1	2.5 (1.5 – 4.1)
CD vs. ODD	.4	1	1.2 (.7 – 1.9)	7.5**	1	2.0 (1.2 – 3.2)
Negative/ineffective discipline						
Overall model	6.3*	2		16.9**	2	
ODD vs ADHD	3.5*	1	1.5 (1.0 – 2.3)	10.2**	1	2.1 (1.3 – 3.2)
CD vs. ADHD	4.7*	1	1.7 (1.1 – 2.8)	11.3**	1	2.4 (1.4 – 3.9)
CD vs. ODD	.2	1	1.1 (.7 – 1.9)	.3	1	1.2 (.7 – 1.9)

<sup>a</sup>Analyses included parenting practices as reported by biological and step parents.

<sup>b</sup>Maternal parenting analyses are adjusted for differences in rates of comorbid depressive and anxiety disorders among the child groups; paternal parenting analyses are adjusted for child anxiety disorders but not depression since child depression was not related to diagnostic groupings in the reduced sample of cases with father parenting measures.

<sup>c</sup>Scores for positive involvement were reversed for these analyses so that greater *ORs* represent greater lack of positive involvement.

<sup>†</sup>*p* < .1. \**p* ≤ .05. \*\**p* ≤ .01.

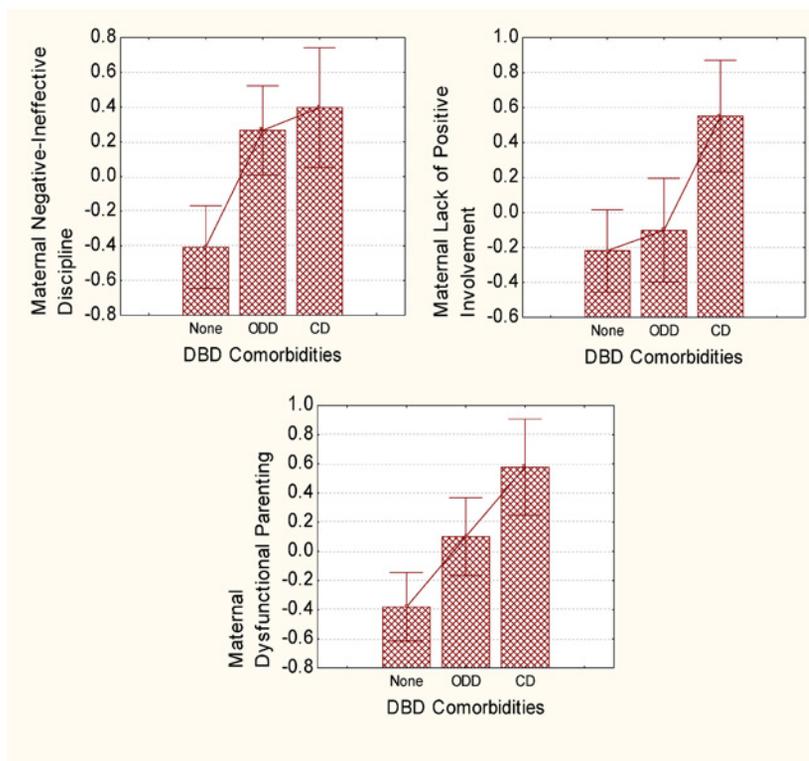
across the subgroups, but it showed a trend for predicting comorbid CD relative to cases with ADHD alone. These analyses were repeated omitting cases with a stepparent. The same pattern of significance and odds ratios were found.

The three parenting variables showing significant associations with comorbid DBDs, that is, maternal positive involvement, maternal negative/ineffective discipline and paternal negative/ineffective discipline, were highly correlated (all  $r$ s > .3,  $p$ s < .0001). To determine the relative contribution of maternal and paternal parenting to comorbid ODD and CD, we evaluated a model including terms for each of these three parenting variables. Maternal positive involvement continued to predict comorbid CD relative to cases with ADHD alone  $\chi^2(1, N = 121) = 10.5, p < .001$ , and those with comorbid ODD  $\chi^2(1, N = 121) = 9.4, p = .002$ , and maternal negative-ineffective discipline continued to predict comorbid CD  $\chi^2(1, N = 121) = 6.9, p < .01$  and ODD  $\chi^2(1, N = 121) = 8.9, p = .003$  relative to cases with ADHD alone. However, paternal negative/ineffective discipline was no longer a significant predictor of comorbid

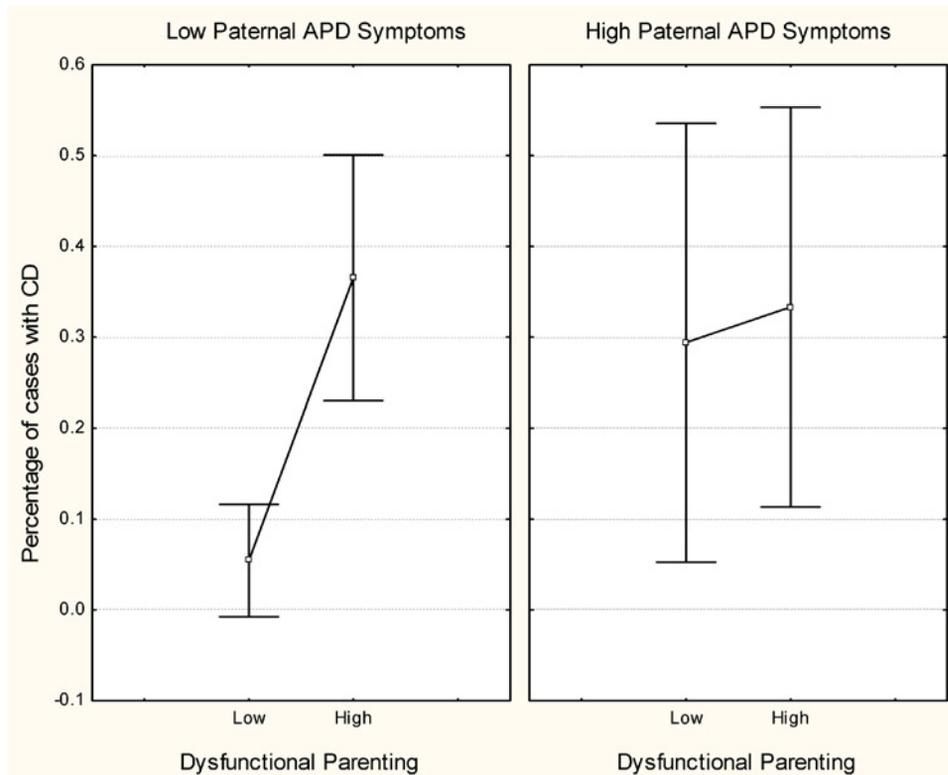
CD  $\chi^2(2, N = 121) = .7, p > .7$ . All other group differences in maternal and paternal parenting were also not significant ( $p$ s > .1).

### Moderator-Mediator Models

We first addressed whether paternal APD and depressive symptoms moderated the effects of maternal parenting on child comorbid ODD or CD. Because of the significant correlation between maternal positive involvement and negative/ineffective discipline ( $r = -.35, p < .0001$ ), a composite was formed from the mean of these two variables (positive involvement was reverse scored). The resulting parenting variable showed high internal consistency ( $\alpha = .85$ ) and was termed *dysfunctional parenting* (higher scores indicate more dysfunctional parenting). Paternal negative/ineffective discipline was not included in the composite because its relationship with CD was fully accounted for by the maternal parenting variables. Figure 1 shows association of the dysfunctional parenting composite and its components to ADHD.



**Fig. 1.** Relative levels of maternal parenting practices (in  $z$ -scores) by comorbidity group. Means are bounded by 95% confidence intervals. Scores for positive involvement were reversed so that higher scores represent greater lack of positive involvement.  $N$ s per group: ADHD only: 64, ADHD + ODD: 47, ADHD + CD: 34.



**Fig. 2.** Percentage of children with comorbid CD as a function of paternal APD symptoms and maternal dysfunctional parenting practices. Means are bounded by 95% confidence intervals. *Ns* per group: Low APD/Low dysfunctional parenting: 55, Low APD/High dysfunctional parenting: 52, High APD/Low dysfunctional parenting: 17, High APD/High dysfunctional parenting: 21.

To test moderation, we performed two logistic regression analyses. Each analysis included a term for either paternal APD or depressive symptoms, for maternal dysfunctional parenting, and for the interaction between the corresponding paternal symptoms and parenting. The interaction between parenting and paternal depressive symptoms was not significant ( $p > .4$ ); however, the interaction between parenting and paternal APD symptoms was significant  $\chi^2(1, N = 145) = 4.42, p < .04$ . To probe the source of this interaction, a dichotomized variable for APD was formed defined by high (above the median) and low (equal to or below the median) levels of APD symptoms and a dichotomized variable for parenting was formed defined by high (above the median) and low (equal to or below the median) levels of dysfunctional parenting. The interaction between the dichotomized variables for parenting and paternal APD symptoms was also significant  $\chi^2(1, N = 145) = 3.98, p < .05$ . Post hoc inspection showed the interaction was due to the concentration of the dysfunctional parenting “effect” among families *without* a father having many APD symptoms (see Fig. 2). The association between

parenting and CD was not significant when a father had many APD symptoms  $\chi^2(1, N = 38) = .48, p > .49$  but was significant when a father did not have many APD symptoms  $\chi^2(1, N = 107) = 12.25, p < .0005$ . These analyses were repeated for cases with only self-report of symptoms and omitting stepparent parenting data with the same results.

We also considered whether parenting might mediate the relationship between paternal APD or depression symptoms and comorbid CD. As specified by Baron and Kenny (1986), a potential mediator must be related to the predictor (in this case paternal symptoms), as well as to the criterion variable (in this case child comorbid CD), and the predictor must be related to the criterion. Additionally, when the potential mediator is statistically controlled, the relationship between the predictor and criterion must either be decreased or eliminated. In this study, parenting was not significantly related to paternal APD or depressive symptoms; therefore, the initial requirements for parenting serving as a mediator of the APD-CD and depression-CD relationships were not met. Similarly, there was no evidence for parenting serving as

a mediator of the APD-CD or depression-CD relationship when analyses were repeated using only self-report of symptoms and parenting data from biological parents.

## DISCUSSION

Previous studies of family psychopathology have found weak relationships between paternal APD and child ODD, but much stronger relationships between paternal APD and child CD (Frick et al., 1992; Pffner et al., 1999). This study replicated the CD-paternal APD link but found no evidence that comorbid ODD is associated with a higher rate of paternal symptoms of APD. We also found a weaker link between paternal depression and comorbid CD that was reduced to a nonsignificant level when APD symptoms were included in the model. This suggests that APD symptoms accounted for some of the association between CD and symptoms of paternal depression.

The parenting findings support the validity of distinguishing between negative/ineffective discipline and lack of positive involvement. Negative/ineffective discipline was associated with higher rates of both ODD and CD. In family process theories (e. g., Patterson et al., 1992), negative/ineffective discipline is related to compliance problems and to negative, coercive interchanges. In our study, directionality of effect cannot be determined, but the results are consistent with a bidirectional model (see Johnston & Mash, 2001): the behavioral challenges exhibited by difficult children tax and degrade primary caregivers' limit-setting capabilities and in turn, caregivers' ineffective discipline reinforces children's oppositional and conduct problems.

On the other hand, mothers' lack of positive involvement (including warmth and interpersonal involvement) was associated with an increased risk that a child would develop ADHD + CD rather than ADHD + ODD or ADHD alone. The apparent risk posed by this factor is consistent with long-standing notions that antisocial personality development is often accompanied by impoverished attachment and affective development (e.g., Cleckley, 1951; Greenberg, Speltz, & DeKlyen, 1993; Kochanska, 1993).

When these constructs were combined, the dysfunctional parenting composite showed a linear dose effect across the DBD comorbidities. This dose relationship appears to result from the addition of a CD-specific risk to an ODD-specific risk (keeping in mind the hierarchical organization of disruptive behavior disorders). Although this line of reasoning serves to organize these data, it is important to characterize these interpretations as hypothetical and in need of further testing.

Our investigation of moderator effects is consistent with the idea that CD can result from multiple causal pathways (e.g., Frick & Loney, 2002). This study found that dysfunctional parenting is related to CD primarily in families without paternal APD. If the odds of developing CD were already increased due to the presence of a father with APD symptoms, dysfunctional parenting was not strongly associated with further increase. A possible interpretation is that dysfunctional parenting can lead to failures of socialization and affective development, but that a similar outcome might occur if children inherit temperamental risks from APD fathers. Let us consider, however, that in females compared to males, (a) APD may be expressed with less physical aggression but more verbal/interpersonal manipulation and relational aggression, and (b) personality traits of APD-related psychopathy (egocentricity, emotional shallowness, etc.) may be behaviorally expressed in females as inconsistent effort devoted to parenting and inconsistent affection toward their children. If so, maternal dysfunctional parenting may be, to some extent, a phenotypical expression of a heritable risk *as well as* a cause of CD.

Although the lack of a significant association between mother's APD symptoms and child CD is consistent with findings that fathers' antisocial behavior is more deleterious than that of mothers (e.g., Thornberry, Freeman-Gallant, Lizotte, & Krohn, 2003), it is noteworthy that the *OR* for the relationship of maternal APD to ADHD + CD (compared to the other groups) was fairly high (1.3, versus *OR* of 1.4 for paternal APD). This pattern, similar to that reported by Pffner et al. (1999) using a different sample, suggests either that a larger sample is needed to detect significant differences (due to a lower base rate of antisocial behavior among mothers), and/or that gender-specific measures of antisocial behavior are needed (Lahey et al., 1988). There were also non-significant trends in our data for mothers in the ADHD + CD group to report more symptoms of depression and anxiety. This pattern is consistent with other studies (e.g., Nigg & Hinshaw, 1998), so it, too, cannot be definitively ruled out without a larger sample. In sum, no definitive conclusions can be made about the possible effects of maternal psychopathology until we are confident in our measures of female antisocial personality and test our hypotheses in larger samples.

Negative/ineffective parenting reported by fathers significantly predicted comorbid CD and showed a trend in predicting comorbid ODD. Lack of positive involvement among fathers showed a trend in predicting comorbid CD. However, association of paternal parenting to ADHD comorbidities was statistically accounted for by that of maternal parenting. This is not surprising given that the majority of primary caretakers (who spent the

most time with children) were mothers. Nevertheless, it does not follow that paternal parenting is inconsequential. For example, positive involvement from one parent may become more important in cases where the other parent is low on this dimension. Larger samples with sufficient cases of discordant parenting styles would be needed to investigate interactions between maternal and paternal parenting.

Other limitations should be considered. First, because the study is cross-sectional, it offers only hints about causal models leading to the development of CD and ODD. Our use of terms such as *prediction* and *risk* are not meant to imply causal or temporal relationships. Second, it is likely that parenting factors associated with CD change with age, and our data pertain only to pre-adolescents. Third, our measures of parenting are subject to the biases inherent in self-report and biases associated with each of the informant sources. Observational measures of parent-child interactions may be necessary to understand moment-to-moment relationships between parent and child behavior. Fourth, our sample consisted of a clinic-referred group. This yields important inferences for children who are referred to clinicians, but inferences to the general population with ADHD should be cautioned. Fifth, our sample was restricted to mostly Caucasians and mostly boys from the broad middle class. Generalization to girls and to other ethnicities, as well as possible interactions of family factors with low SES, requires further study. For example, maternal antisocial behavior may be especially important for increasing risk of CD when coupled with socioeconomic disadvantage (Patterson & Capaldi, 1991), which was not well-represented among participants in the current sample.

### Clinical Implications

Drawing clinical inferences depends on assuming that the family correlates reported here are likely to be involved in facilitating, maintaining, or exacerbating disruptive behavior disorders in children with ADHD. Granting that assumption, this study suggests that family-based interventions for school-age children with ADHD target parenting skills on the part of mothers and fathers related to effective limit-setting and discipline (e.g., Anastopoulos, Shelton, DuPaul, & Guevremont, 1993) in order to reduce the risk of comorbid disruptive behavior. Deficiencies in parent-child relations, bonding, involvement, and attachment should also be addressed. It may be particularly important for the parent and child to form a "good-enough" level of attachment and involvement for social-emotional development to progress normally.

In this study, fathers' positive involvement was consistently lower than that of mothers, and CD risk increased as mothers' involvement decreased to the level provided by fathers. This suggests the possibility that increased paternal warmth and involvement (Pruett, 1997) might compensate for maternal decreases (a hypothesis that bears testing in future research). Our finding that maternal dysfunctional parenting was associated with comorbid CD only in the absence of paternal APD does not imply that parenting interventions are not indicated in families with antisocial fathers. It may well be that parenting interventions are less effective for children who have inherited antisocial traits, but this issue can only be addressed experimentally. Although the risk for comorbid CD conferred by having a father with APD may not be overcome by an absence of dysfunctional parenting, interventions with the intensity and duration to result in above-average parenting may do so. The clinician faced with treating ADHD with comorbid disruptive behavior disorders may be able to help families in ways that go beyond increasing structure and managing disruptive behavior. Enriching the quality of attachment and involvement using strategic activity prescriptions (e.g., the "child's game" component in behavioral parent training Forehand & McMahon, 1981), and using other methods of enhancing family environments may add specific therapeutic value to other components of a comprehensive plan to treat ADHD and its comorbid behavior problems.

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