PARENTING BEHAVIOR AS A PREDICTOR FOR CHANGES IN DEVIANT BEHAVIOR IN BOYS WITH ADHD

by

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Abstract

This study examines the degree to which parenting behaviors have a concurrent or predictive relationship to the severity of oppositional defiant (ODD) and/or conduct disordered (CD) behaviors among boys with Attention-Deficit/Hyperactivity Disorder (ADHD). Specifically, the parenting variables assessed were parental Over-reactivity, Restrictiveness, and Nurturance. Fifty-five mothers of male children with ADHD, aged 7 to 10 years old, completed several measures of parenting behavior and child disruptive behaviors. All mothers completed these measures at Time 1, and a subsample of 25 completed them again 1 year later (Time 2). Measures included the Parenting Scale and the Child Rearing Practices Report (at Time 1), and behavioral rating scales describing the number and severity of child ODD (at Times 1 and 2) and CD (at Time 2) behaviors. Two hypotheses were tested. The first hypothesis was that concurrent associations among measures at Time 1 would show a positive correlation between the severity of ODD symptoms in children and mothers’ reports of Over-reactive and Restrictive parenting behaviors, and a negative correlation with Nurturing parenting behavior. The second hypothesis was that increases in the severity of the child’s ODD and CD behaviors at Time 2 could be predicted based on mothers’ Time 1 reports of more Over-reactive and Restrictive parenting behavior, and/or less Nurturing parenting behavior. Consistent with predictions of the first hypothesis, high parenting Restrictiveness was correlated with greater child ODD behavior, and high Nurturance was correlated with lower ODD severity. Perhaps because of insufficient power for testing the second hypothesis, only high parenting Over-reactivity scores were marginally correlated with increases in child ODD/CD severity over time. These results suggest that the transactional model does appear to be a model through which both positive and negative parenting behaviors are related, at least concurrently, to the severity of child ODD/Aggressive behaviors. The evidence also seems to suggest that the negative aspects of parenting, specifically harsh and controlling parental behaviors, are able to predict changes in severity of ODD/CD behavior among children with ADHD.
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Parenting Behavior as a Predictor for Increased Deviant Behavior in Boys with ADHD

Introduction

Disruptive behaviors, such as inattention, impulsivity, hyperactivity, and non-compliance, are the most common problems for which children are referred for mental health services (Kazdin, Siegel, & Bass, 1990). These behaviors, and the diagnostic categories that they form, are often referred to as externalizing disorders because of their impact on the world around the child. Of these externalizing disorders, Attention Deficit Hyperactivity Disorder (ADHD) is a major concern because of its correlation with poor academic functioning, poor social adjustment, and its comorbidity with depression and the other externalizing childhood disorders: Conduct Disorder (CD) and Oppositional Defiant Disorder (ODD) (Szatmari, Boyle, & Offord, 1989).

This paper focuses on parenting behavior as a predictive factor in the development and maintenance of ODD and CD among ADHD children. As background to this research question, I first define and describe ADHD, including a discussion of the subtypes within this diagnosis and the problems that are commonly associated with a diagnosis of ADHD. Second, I describe ODD and CD behaviors, and review evidence regarding the comorbidity of these behaviors with ADHD. Following this descriptive information, I outline the models that have been proposed to link ADHD with ODD/CD behaviors. In particular, I focus on a transactional model that highlights ADHD behaviors and parenting difficulties as risk factors in the development of ODD/CD behaviors. I review the evidence for this model and end by outlining the contributions of this study to an understanding how ADHD and ODD/CD behaviors are linked.

ADHD
The prevalence rate of ADHD is 3-5% among school-aged children, affects males six to nine times more often than females in clinical samples, and is three times more often in community samples (American Psychiatric Association (APA), 1994; Barkley, 1998a). ADHD is characterized by difficulties with attention, impulsivity, and hyperactivity in more than one environmental situation, such as at home or at school, and by a presentation of symptoms before the age of 7 (APA, 1994). The DSM-IV currently recognizes three subtypes of ADHD: the predominantly inattentive (ADHD-I), the predominantly hyperactive/impulsive type (ADHD-HI), and the combined type (ADHD-C).

The predominantly inattentive subtype (ADHD-I) is characterized by the individual’s failure to pay attention to details or tendency to make many careless mistakes on work or school tasks. The predominantly hyperactive/impulsive subtype (ADHD-HI) is characterized by excessive movement, restlessness or appearing as though “driven by a motor.” Impulsivity also may be evident by behaviors such as engaging in reckless or dangerous activities without any reasonable consideration of the potential consequences. The combined subtype (ADHD-C) is characterized by the individual displaying a significant number of both inattentive and hyperactive/impulsive symptoms. The diagnosis of a particular subtype is dependent upon which type(s) of symptoms are predominant. The DSM-IV requires a minimum of six symptoms from the Inattention category to meet criteria as ADHD-I or six Hyperactive-Impulsive symptoms to be classed as ADHD-HI. When the child displays six symptoms from both Inattentive and Hyperactive/Impulsive categories, a diagnosis of ADHD-C is made. Although the DSM-IV specifies only the minimum number of symptoms required in each subtype, researchers have recently noted the need for consideration of the number of symptoms of the alternate type that should be allowed (e.g., how many inattentive
symptoms are allowed within a diagnosis of predominantly hyperactive-impulsive subtype) (Milich, Balentine, & Lynam, 2001). The differentiation between the subtypes of ADHD is important to the question of this thesis because other researchers have found that ODD and CD behavior are more likely to co-occur with the ADHD-HI or ADHD-C types than with the ADHD-I type (Neuman, et al., 2001; Wolraich, Hannah, Pinnock, Baumgaertel, & Brown, 1996).

Children with ADHD frequently experience difficulties in academic, social, and interpersonal realms. For example, academic problems, especially reading disabilities, can be chronic throughout the child’s academic life leading to poorer grades, lower test scores, and lower teacher evaluations than found among non-ADHD children (Molina & Pelham, 2001). Social problems are also life-long and pervasive for children with ADHD. They often have difficulty in making and maintaining friendships, as they are usually considered intrusive, boisterous, and annoying to playmates (Johnston, Pelham, & Murphy, 1985; Milich & Landau, 1989). As a consequence, children with ADHD are at great risk for peer rejection. Indeed, some studies have indicated that children with ADHD may actually be more disliked by classmates than those who are seen only as aggressive or instigators of fighting (Milich & Landau, 1989). In addition, numerous studies have demonstrated that the disruptive behaviors of children with ADHD are associated with diminished functioning of the family and increased levels of stress among parents (Anastopoulos & Barkley, 1990; Befera & Barkley, 1985; Mash & Johnston, 1990).

In summary, ADHD can create difficulties in the child’s functioning in various settings, such as home and family life, peers and social development, and school, academic, and occupational performance. The results of these problems are often long lasting. One of
the greatest concerns is, however, when ADHD is comorbid with other behavioral disorders, such as ODD and CD.

**ODD, CD and Comorbid ADHD/ODD/CD**

The prevalence rate of ODD among children ranges from 2-16%, depending on the sample and methods of assessment employed (APA, 1994). Typically, individuals with a diagnosis of ODD display a recurrent pattern of behavior over a period of 6 months that is negativistic, disobedient, defiant, and/or hostile towards authority figures, and that impairs the individual’s ability to function personally, socially, or occupationally (APA, 1994; Johnston & Murray, in press). However, it is important that caution be exercised in making any diagnosis since transient oppositional behavior is very common in preschool children and adolescents (APA, 1994). The prevalence rates for ODD tend to be greater in males before puberty, but are more equal between genders after puberty. Males also tend to have more confrontational behaviors and the symptoms are more persistent than for females (APA, 1994).

CD, defined as serious social rule violations, including physical aggression, theft, truancy, or property destruction, is estimated to occur in 2 to 9% of children, although, as with ODD, rates across studies have ranged from below 1% to above 16% depending on the sample and methods used (APA, 1994; Johnston & Hommersen, in press). CD is more common among boys with a ratio of approximately 3 or 4 boys to 1 girl, although it remains a relatively common mental health concern among girls as well (Johnston & Hommersen, in press). Conduct disorders also are more prevalent among children of lower socioeconomic status (Loeber, Burke, Lahey, Winters, & Zera, 2000).
In the research literature, methods vary in which ODD and CD behaviors have been operationalized. In some studies (e.g., August, Realmuto, Joyce, & Hektner, 1999; Lindahl, 1998; Wakschlag & Hans, 1999), formal DSM-IV diagnoses of these disorders are given. In other research (e.g., Campbell, Breaux, Ewing, & Szumowski, 1984; Campbell, Breaux, Szumowski, & Ewing, 1986; Campbell & Ewing, 1990), behavioral characteristics of the disorders, as well as associated behaviors such as aggression, are measured dimensionally. In this study, I will follow the latter approach, and use the term ODD/CD to refer to mothers’ reports of the levels of oppositional defiant and conduct disordered behaviors that the child displays.

ADHD is the condition that appears to be most commonly associated, or comorbid, with ODD and CD, and is thought to precede the development of ODD or CD in the majority of cases (McMahon, & Estes, 1997). In a review of 29 studies, Biederman, Newcorn, and Sprich (1991) found that ADHD and CD were comorbid approximately 30% to 50% of the time. The prevalence rate for CD in an ADHD population is therefore approximately three to five times greater than in a non-ADHD population, which raises the question of why such a high comorbidity between the disorders exists.

A Model Linking ADHD to Comorbid ADHD/ODD/CD

Several possible mechanisms have been proposed through which ODD behavior and parenting behaviors are related. First, Patterson and his colleagues (Jones, Reid, & Patterson, 1975; Patterson & Cobb, 1973; Patterson, Littman, & Bricker, 1967) hypothesized that negative reinforcement plays an important role in the escalation of disruptive and oppositional behaviors. Within their coercion theory, the person who initiates the coercive event (the attack) trains the “victim” (the person who ends a coercive event with a positive or
neutral reaction) how and when to reinforce the “attack” (Patterson, 1982). When the “victim” gives in, the coercive event ends immediately, which negatively reinforces the “victim” with the removal of the attack and teaches the victim to give in when similar future events occur (Patterson, 1982). The “attacker” is positively reinforced through having their demands met, which increases the likelihood that the “attacker” will create future coercive events (Patterson, 1982). This pattern of behavior may occur when the parent reacts to a child’s noncompliance in a harsh or controlling manner (an attack), and the child becomes oppositional or defiant (a counterattack) (Bandura, 1973). Assuming the child’s action is successful in reducing parental demands, the child learns to use similar resistance in the future. If these types of parent-child interactions, and the learning they entail, were the sole cause of ODD, we would expect that the percentages of ODD behavior would be equal throughout the population, and not elevated to any greater extent among children with ADHD. However, as stated above, ADHD is highly comorbid with ODD.

It is possible that ADHD symptoms may lead to the child being exposed to less than optimal parenting practices more often than children who do not display these behaviors (Johnston & Mash, 2001). In this section, I outline a model that has been proposed to explain the frequent association between ADHD and ODD/CD. The transactional model proposes a reciprocal interaction between the child’s biological characteristics and the environment, such as parent-child interactions. In support of a biological basis for ADHD, the risks for the development of the disorder have been found to be between 11 and 18 times greater in monozygotic twins than in non-twin siblings or dizygotic twins of a child with ADHD (Barkley, 1998b). Within the transactional model, these biological influences are linked to the child’s environment and influence the course of symptoms development over time. It is
this interaction of biological vulnerability with environmental risks (e.g., ineffective parenting) that is seen as predisposing the child to the development of ODD or CD. For example, this may occur through a negative interaction of child and parenting factors (Sameroff, 1987; Sameroff, & Fiese, 2000; Simons, Chao, Conger, & Elder, 2001). The child's ADHD may act as a stressor leading to a decline in effective parenting and the use of more harsh or coercive parenting behaviors (Johnston & Mash, 2001; Johnston, Murray, Hinshaw, Pelham, & Hoza, 2002). In this example of the transactional model, initial child difficulties would increase parenting problems, and these parenting difficulties would, in turn, be associated with increased child behavioral difficulties, eventually leading to ODD or CD behaviors in children with ADHD (Johnston et al., 2002, Patterson, 1982).

Due to the reciprocal nature of the parent-child interactions of the transactional model, not only will ineffective parenting increase the probability of ODD and CD behaviors, but these types of disruptive child behaviors will in turn negatively affect parenting (Johnston et al., 2002; Lytton, 1990). Characteristics of both the parent and the child with ADHD ultimately combine to increase the probability that children with these behavioral problems will be exposed to ineffective parenting (Simons, et al., 2001). Thus, this transactional model asserts that the quality of parenting is an important factor in the relationship between childhood ADHD and ODD/CD.

Research Evidence for the Transactional Model

There is an increasing body of research that supports the use of such a transactional model when assessing the development and maintenance of comorbid ADHD/ODD/CD. Campbell et al. (1984) conducted a 1-year follow-up study of 32 parent-referred 3-year-olds with early signs of hyperactivity, equivalent to ADHD symptoms, and other externalizing
problems, and 27 same-aged controls. Although the authors did not make diagnoses of ADHD at the start of the study, they did focus on the stability of child behavior, and found that approximately half the children exhibited ADHD-like behaviors, and continued to have adjustment difficulties at home, at school, and with peers at the 1-year follow-up. Ratings of aggression also remained stable at the 1-year follow-up, and, although activity levels declined, they remained higher than among the control children. This same group of investigators continued to follow this cohort of children to 3-year and 6-year follow-ups, and found that these problem behaviors continued to persist at ages 6 and 9 (Campbell, Breaux, Szumowski, & Ewing, 1986; Campbell & Ewing, 1990). In sum, this research suggests that the initial severity of the child’s aggressive and ADHD-like behavior is an important predictor of continuing problems. In addition, and consistent with the transactional model, it was found that the mothers’ power assertive and/or negative styles of interacting with the child at the first assessment was predictive of ADHD and comorbid ADHD/ODD/CD behaviors at ages 6 and 9 (Campbell et al., 1986; Campbell & Ewing, 1990). As noted above, these results are consistent with a model in which (a) power assertive parenting and negative parent-child interactions have adverse effects on child behavior over time, and (b) early child behavior difficulties (such as hyperactive behaviors) elicit power assertive parenting approaches, and (c) both the child and parent characteristics serve to increase parent-child conflicts (Campbell & Ewing, 1990; Edwards, Barkley, Laneri, Fletcher, & Metevia, 2001). Although it also might be argued that this relationship appears over time because mothers with a harsh style of parenting are more likely to rate their children as disruptive, Campbell and her colleagues showed that the same relationship emerges when teacher, rather than
mother, ratings of child behavior are used, which contradicts the argument of rater bias (Campbell & Ewing, 1990).

More recent studies using DSM-IV diagnoses for ADHD and comorbid ADHD/ODD/CD found similar results to those of Campbell and her colleagues. Wakschlag and Hans (1999) followed 77 African-American children, who were first assessed in infancy, up to the ages of 8 to 11 years, examined the responsiveness of mothers to their infants as a predictor of the development of behavior problems. All families were recruited from the same urban hospital, obstetrical clinics for low-income women, including a specialized clinic for drug dependent women. Thirty-six of the children had prenatal exposure to opioid drugs, and 41 were not exposed to any opioid drugs. Their results indicated that early parenting behaviors predicted the development of ODD and CD behaviors in these youth, but not the development of ADHD. These parenting behaviors included poor supervision, harsh or inconsistent discipline and/or low involvement in their child’s activity. Other parental factors Wakschlag and Hans (1999) found correlated to the risk of the child developing ODD/CD behaviors included parental psychopathology, single parenthood, low maternal education and socioeconomic status, and a small social support network. Again, these factors were not related to the child’s ADHD symptoms. Lindahl (1998) conducted a study of one hundred and ten 7 to 11 year olds, examining the relationship between family processes and children’s disruptive behavior, specifically the relationship between parenting behaviors and ADHD or comorbid ADHD/ODD. The results indicated that coercive and controlling parenting behaviors differentiated families of nonproblem children from families of children with ADHD and/or ODD, but these behaviors were not significantly different among the clinical groups (ADHD vs. ODD vs. ADHD/ODD). In contrast, responsive and consistent parenting
did differentiate the clinical groups, being greatest in the ADHD group and lowest in the ODD group. A limitation of this study is that it only provides a one-time look at the relationship between family functioning and disruptive behavior, and therefore does not allow for predictions concerning how these parenting behaviors may lead to changes in ODD/CD symptomatology over time. August, Realmuto, Joyce, and Hektner (1999) conducted a 4-year longitudinal study to examine the developmental progression of comorbid ADHD/ODD. They looked at a community sample of three hundred and eight 6-10 year-old children with ADHD and focused on the persistence and desistance of ODD, as well as emergence of new cases of CD. Children were classified as non-disruptive, ADHD, and/or ODD based on a structured interview. Over the 4-year period, 57% of the children who displayed ODD symptoms at the start of the study continued to exhibit behaviors consistent with an ODD diagnosis, 43% of the participants later failed to meet criteria, and only 1 participant (~2.3%) was found to have developed a CD diagnosis. Most importantly, the authors found that negative parenting practices and mothers' psychiatric disorders best predicted the persistence of ODD symptoms, but were not predictive of continued or developing ADHD symptoms. In sum, these studies show a strong positive correlation between harsh disciplinary methods, general patterns of negative, coercive, and controlling parenting behaviors, and the development and persistence of ODD behaviors in families of children with ADHD, as well as a negative correlation between responsive and consistent parenting and ODD symptoms. These studies also suggest that these parenting characteristics are much less likely to be associated with ADHD symptomatology.

Thus, the transactional model appears to play an important role in explaining the development and maintenance of ODD and CD symptoms. The above studies suggest that
ODD and CD symptoms are highly influenced by environmental factors, most prominent of which is parenting behaviors (August, et al., 1999; Lindahl, 1998; Wakschlag & Hans, 1999). These disorders have also been shown to be highly comorbid with ADHD, for which research supports largely biological causative factors, suggesting that the child's ADHD related behaviors negatively influence the parent-child interactions, creating an environment that in turn elevates the risk of the child developing and persisting in displaying ODD or CD behaviors.

The Current Study

Throughout this review of the literature, negative parenting behaviors have been shown to be associated with problematic child behaviors, typically being highly correlated with the development and persistence of ODD in children with ADHD (August, et al., 1999; Lindahl, 1998; Wakschlag & Hans, 1999). Parenting behaviors have been measured and defined in a variety of ways across different studies. In this study, I use the term parental Over-reactivity to refer to a general pattern of coercive and controlling parenting behaviors, setting narrow limits on the child's behavior, endorsement of strict rules, requirements, and restrictions and/or harsh disciplinary methods. This definition is consistent with other studies in this area (Arnold, O'Leary, Wolff, & Acker, 1993; August, et al., 1999; Deković, Janssens & Gerris, 1991; Lindahl, 1998; Wakschlag & Hans, 1999). Parental Over-reactivity will be operationalized in this study using the Over-reactivity Scale from the Parenting Scale (Arnold, et al., 1993), and the Restrictiveness Scale from the Child Rearing Practices Report (CRPR) (Deković, Janssens & Gerris, 1991).

I also examine the protective influence of positive parenting behaviors on the development of child ODD symptoms. Throughout this study I use the term Nurturance to
refer to parenting behaviors that are accepting of the child, encouraging, warm, and open to communication between parent and child, characterized by a preference to reason with their child during conflict situations rather than punish them (Deković, Janssens & Gerris, 1991). This term corresponds to the Nurturance Scale on the CRPR.

This study uses 55 male children, ranging in age from 7 to 10 years at the first assessment, who have been diagnosed with ADHD by a mental health professional (family physician, child psychologist or psychiatrist, etc.) prior to the commencement of the study. This study contains two phases. In the first phase, Time 1, my hypothesis is that the measures of parenting behavior are associated with the concurrent severity of childhood ODD behaviors, specifically that Over-reactivity and Restrictiveness will be positively correlated with ODD type behaviors, and Nurturance will be negatively correlated with ODD behaviors. In the second phase, at Time 2, my hypothesis is that changes in the severity of the child’s ODD and CD behaviors at Time 2 will be predicted from the measures of parenting behavior at Time 1, specifically that high parental Over-reactivity and Restrictiveness will predict an increase in ODD and CD behaviors, whereas high parental Nurturance will predict a decrease in ODD and CD behaviors. Given the limited sample size in this study, testing of this second hypothesis remains exploratory. Other information on maternal depression, hostility, and interpersonal sensitivity (scales from the Brief Symptom Inventory), family socioeconomic status of the family, and ADHD subtype of the child will be recorded to account for any predictive effects these factors may have.

This study is important because unlike previous studies it focuses on whether parenting behaviors remain an important influence on the development of ODD among older children with ADHD. Another unique contribution of this study is the ability to study the
potential of opposite types of parenting behaviors and their relationship, both concurrent and predictive, with ODD and CD behaviors in children with ADHD.

**Method**

*Participants*

Fifty-five mothers and sons were recruited from various community sources (e.g. newspaper advertisements, parenting group newsletters) and invited to participate in this research through the Parenting Lab at the University of British Columbia. The university’s ethics committee approved this research. On the first visit (Time 1), mothers were briefed concerning what the study entailed and gave consent for themselves and their child to participate in the study. If the child showed the ability and understanding necessary to give consent, then he also was required to give consent before participating; otherwise assent for participation was obtained. Mothers who had passed the 1 year anniversary of their first visit by the time of this study were invited to return to the Parenting lab for a second visit (Time 2). At each visit, mothers were paid $20 for their time. Boys received a t-shirt for participating.

In this study, boys ranged in ages from 7 to 10 years (x = 8.58 years, sd = .87 years) at Time 1, and mothers ranged in ages from 26 to 48 years (x = 37.91 years, sd = 5.31 years). Three mothers reported that they were single/never having been married, 43 reported that they were married or in a common law relationship, 8 reported that they were divorced or separated, and 1 mother did not report her marital status. Only one child in this study was adopted; all other mothers were the biological parent of the child in the study. The majority of mothers self-identified their ethnicity as Canadian (45.5%), while 34.6% self-identified as Caucasian or European, 5.5% self-identified as Jewish, 3.6% as East Indian, and 1.8% as
African, and 9.1% did not report ethnicity on the questionnaire. The sample was of relatively high socioeconomic status. Using the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975), 52.7% of mothers received ratings in the upper or upper middle class, 7.3% of the sample was rated as middle class, and 18.3% rated as lower middle or lower class. Two participants, or 3.6%, did not report their SES.

All boys in this study had been diagnosed with ADHD by a health professional (family physician, child psychologist or psychiatrist, etc.) prior to the commencement of the study. A phone screen based on the Disruptive Behavior Rating Scale (DBS, also known as the ADHD Rating Scale; DuPaul, Power, Anastopoulos, & Reid, 1998) was used to verify the presence of ADHD behaviors. This measure consists of 18 items based on DSM-IV criteria for ADHD. Parents were asked to rate their child’s behavior over the past 6 months. For each item, parents select a single response that best describes the frequency of the behavior for their son on a 4-point scale, ranging from “Not at all” (0) to “Very much” (3), where higher scores reflect greater ADHD-related behavior. Scores are considered categorically to determine whether the child meets the required number of symptom behaviors for a diagnosis of ADHD according to DSM-IV criteria. Ratings of “Pretty much” (2) or “Very much” (3) are used to indicate the presence of a symptom. The measure yields high test-retest reliability ($r = .85$) and internal consistency ($\alpha = .92$; DuPaul et al., 1998). The test also has moderate inter-rater agreement using parent and teacher ratings. The measure was validated against the Abbreviated Conners’ Teachers Rating Scale (DuPaul et al., 1998), and several studies support the reliability and validity of the measure (e.g., Johnston et al., 2002). Subtype of ADHD was recorded based on DSM-IV criteria (for list of criteria refer to DSM-IV). Of the participating children, 22.2% were of the inattentive
subtype, 11.1% were of the hyperactive/impulsive subtype, and 66.6% were of the combined subtype. Subtype of ADHD was considered to determine if parenting behavior was related to the type of ADHD the child displayed.

Due to the lower number of girls who are diagnosed with ADHD, and the different symptoms girls often present as opposed to boys (APA, 1994; Barkley, 1998a), only male children were used in this study. Also, although studying and comparing mothers and fathers would be preferable, this was not possible due to time and financial constraints, and therefore only maternal reports were used in this study. In cases where the mother had more than one son who met criteria for the study, she was asked to report on only one child selected at random. In some cases, boys were on medication for the treatment of ADHD. The type of medication and dosage was recorded both at Time 1 and Time 2, but at both times mothers were asked to rate their son’s behavior when not on stimulant medication. Most mothers report that this is not difficult to do, as the children do not continuously receive medication (e.g., parents often take their children off stimulant medication during the weekend). At Time 1, 61% of participants were reported to be on medication, and at Time 2, 62% of the participants were reported to be on medication.

Procedure

Mothers and sons visited the Parenting Lab during the period of February 2001 to February 2003 as part of an ongoing study in which the parents are observed giving instructions and feedback to their child for specific lab tasks (Johnston, personal communication, July 2002). Following their lab visit, mothers were asked to take home questionnaires, and return the completed packages that consisted of the Parenting Scale (PS), Child Rearing Practices Report (CRPR), the Child Behavior Checklist (CBCL), the Brief
Symptom Inventory (BSI), and the ADHD and ODD Rating Scales as part of this study. These measures were used for the Time 1 data analysis. At the follow-up visit, Time 2, mothers were asked to complete the CD rating Scale and the School Problem Behavior Questionnaire, in addition to again completing all measures from Time 1.

Control Measures

Demographic measures. In addition to the measures described below, a variety of demographic characteristics were assessed such as: ethnicity, and socioeconomic status (SES) using the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975). These demographic characteristics were collected at Time 1, and have been used to describe the sample and as controls in the analyses.

ADHD Ratings Scale – IV (See Appendix B for samples). The ADHD Ratings Scale – IV (also known as the Disruptive Behavior Rating Scale, or DBS) (DuPaul, Power, Anastopoulos, & Reid, 1998), which is the same measure used for the participant ADHD symptom screen, was used to account for existing levels of ADHD behaviors, and was used to assess both Time 1 and 2 levels of ADHD behaviors. In this context, scores were used dimensionally, and were therefore added across all items (total scores).

Brief Symptom Inventory (See Appendix B for sample). The Brief Symptom Inventory (BSI) (Derogatis, 1993) is a standardized self-administered measure commonly used to reflect psychological symptoms in psychiatric, medical and community non-patients. The BSI consists of 53 items that are rated on a five-point scale of distress, ranging from “not at all” (0) distressing to “extremely” (4) distressing. Parents were asked to rate according to how much the specific problem has caused discomfort over the past month. For this study, we examined three of the BSI scales: Depression, Hostility, and Interpersonal Sensitivity.
Using a sample of 719 psychiatric outpatients, the BSI was found to have an internal reliability (Cronbach alphas) of .85 for the Depression scale, .78 for the Hostility scale, and .74 for the Interpersonal Sensitivity scale (Derogatis, 1993). Test-retest reliability over a two-week period for 60 patients was assessed and found to be .84 for the Depression scale, .81 for the Hostility scale, and .85 for the Interpersonal Sensitivity scale. Convergent validity was assessed using the MMPI, and correlations were found for the Depression scale to range between .43 to .72, ranging between .31 to .56 for the Hostility scale, and between .44 and .63 for the Interpersonal Sensitivity scale. Studies suggest that the BSI can function as a highly effective screening measure across diverse medical circumstances (Derogatis, 1993). Mothers were asked to complete this measure during their initial visit.

**Parenting Measures**

*Parenting Scale (See Appendix B for sample).* The Parenting Scale (PS) (Arnold, et al., 1993) was developed to identify parental discipline “mistakes” that relate, either theoretically or empirically, to child externalizing problems. The 30 items were constructed as hypothetical situations to which the best answers are not always obvious, and thus response bias is less likely to be a factor in parental responses (Irvine, Biglan, Smolkowski, & Ary, 1999). Mothers were asked to fill out the questionnaire in the way that best described their parenting behaviors over the past 2 months. The Over-reactivity Scale refers to coercive and controlling parenting behaviors and/or harsh disciplinary methods. Internal consistency of the original measure indicated an alpha coefficient of .82 for the Over-reactivity Scale (Arnold et al., 1993). The test-retest reliability was assessed over a 2-week period on a group of 22 mothers, 9 with behavior problem children and 13 with nonproblem children and was determined to be .82.
Arnold and colleagues (1993) tested the validity of the PS using a group of 77 mothers \( (n = 26 \text{ clinical, and } n = 51 \text{ non-clinical}) \). Scores on the PS were related to mothers' reports on the Child Behavior Checklist (CBCL) Externalizing Scale, the short form of the Marital Adjustment Test (SMAT), and the Beck Depression Inventory (BDI) (Arnold et al., 1993). The Over-reactivity Scale was significantly correlated \( (r (76) = .54, p < .001) \) with the CBCL, with the SMAT \( (r (62) = -.35, p < .01) \), and with the BDI \( (r (63) = .30, p < .05) \).

A study by Harvey, Danforth, Ulaszek, and Eberhardt (2001) examined the validity of the PS for parents of children with ADHD. One hundred and nine families in which the children (aged 8-12 yrs) had been diagnosed with ADHD and 70 families with non-problem children completed the measure. The authors also used one of two standardized measures of child behavior problems, either the CBCL (Achenbach, 1991) or BASC (Reynolds & Kamphaus, 1992). Factor analyses supported the Over-reactivity factor identified in previous studies of the PS. Over-reactivity scores were significantly higher among parents of ADHD children than those of non-ADHD children, and this effect appeared to be accounted for by the presence of comorbid aggression and/or conduct problems among the ADHD children. Overall, the results support the validity of the parenting scale for use with parents of ADHD children and indicate particular sensitivity to the presence of comorbid ODD/CD problems in this group. In this study, mothers completed this measure during their initial visit.

*Child Rearing Practices Report (See Appendix B for sample).* Block (1965) originally developed the Child Rearing Practices Report (CRPR) as a 91-item Q-sort measure of parental behaviors and attitudes about child rearing. Rickel and Biasatti (1982) revised the measure into a 40-item questionnaire, using a 6-point scale, ranging from 1 (not at all descriptive of me) to 6 (highly descriptive of me). For this measure, parents are not given a
time frame, but are instead asked to give an overall description of their parenting behaviors. Using principal-component factor analysis with varimax rotation, Rickel and Biasatti found support for two factors that were labeled as Nurturance and Restrictiveness. Nurturance was described as warm and accepting parenting values and practices. Restrictiveness describes parenting behaviors that are characterized by a high degree of control, setting narrow limits on the child’s behavior, endorsement of strict rules, requirements, and restrictions. The Nurturance and Restrictiveness Scales are totaled for the items in each scale (Restrictiveness contains 22 items, and Nurturance contains 18 items). This structure has been replicated in subsequent studies on different populations using mothers of children ranging in age from 6 to 12 years (Deković et al., 1991), and shows internal consistency scores of .74 for Nurturance and .83 for Restrictiveness (Johnston, Scoular, & Ohan, 2003). Analyses also indicate significant differences between parents of popular children and parents of rejected children (Deković et al., 1991) such that parents of rejected children had higher scores on the Restrictiveness Scale, whereas parents of popular children had higher scores on the Nurturance Scale. In this study, mothers completed this measure during their initial visit.

Child Behavior Measures

**ODD and CD Ratings Scale – IV (See Appendix B for samples).** For the purpose of this study, scales similar to the ADHD Rating Scale (DuPaul, Power, Anastopolous, & Reid, 1998) were created for ODD (8 items) and CD (15 items) behaviors, and were based on the DSM-IV behavioral criteria for these disorders. Parents were asked to rate their child’s behavior over the past 6 months. These scales were based on the format of the ADHD Rating Scale due to the similar nature of the questionnaires, and the high test-retest reliability ($r = .85$) and internal consistency ($\alpha = .92$) of the ADHD Rating scale (DuPaul et al., 1998). The
same type of 4-point scale, ranging from “Not at all” (0) to “Very much” (3), with higher scores reflecting greater ODD or CD-related behavior, was used for the two new measures. Total scores are added across all items. The ODD Rating Scale has shown to have internal consistency of .81 in a previous study (Johnston, Scoular, & Ohan, 2003). In this study, the internal consistency of this measure was .91 at Time 1 and .82 at Time 2, which is consistent with the ADHD Rating Scale.

The CD Rating Scale is similar in content and format to the ADHD and ODD Rating Scales and is therefore assumed to have similar reliability and validity. For this measure, mothers were asked to rate their child’s behavior over the past 3 months. The internal consistency of the CD Rating Scale was also assessed in this study at Time 2 and was .74. Mothers were asked to complete the ODD Rating Scale measure during both their initial and follow up visits, but the CD Rating Scale was only collected during the follow up visit.

*School Behavior Problems Questionnaire (See Appendix B for sample).* To broaden assessment of CD behaviors beyond the home context, a brief measure was constructed to examine behavioral difficulties the child was experiencing at school. This measure contains five questions, asking about truancy, in-school suspensions, out of school suspensions, detentions, and formal reprimands. For this measure, parents were asked to rate their child’s behavior over the past 3 months. The questions are rated as: “Never,” “Once,” “Twice,” and “Three or more times.” If the response is three or more times, mothers were asked to report the number of times. Mothers were also asked to describe any other problems their son had at school and the number of times this problem occurred. Total scores were added across all items. Using Time 2 ratings, this measure was found to have an $\alpha = .63$. Mothers were completed this measure during their follow up visit.
Child Behavior Checklist (See Appendix B for sample). The Child Behavior Checklist (CBCL) (Achenbach, 1991) is a standardized self-administered measure commonly used in childhood behavioral disorder research. The measure consists of 113 items that describe behaviors of children and youth, and the items are factored into problem scales. Parents are asked to describe their child's behavior over the past 6 months by rating a 2 if the item is "very true or often true," a 1 if the item is "somewhat true," and 0 if the item is "not true" for their child. A single interviewer interviewed 72 mothers of non-referred children over a 1-week period in order to measure the test-retest reliability for the CBCL, which is considered to be high, ranging from .92 for the Attention Scale to .90 for the Aggression Scale. The internal consistency scores are high, .86 for the Attention Scale and .94 for the Aggression Scale. The content and criterion-related validity of the CBCL have been strongly supported through 4 decades of research and refinement, and it has been shown to discriminate significantly between demographically similar referred and non-referred children (Achenbach, 1991). For this study, I used the child's score on Aggression Scale, which was constructed to tap ODD symptom behaviors, and the Attention Scale, which was constructed to tap ADHD symptom behaviors. Mothers were asked to complete this measure during both their initial and follow up visits.

Results

Data Analyses

Data were first inspected for entry errors, missing values, outliers, and the distributions of the variables. It was found that the range of responses for each of the measures was not restricted (Table A1). Missing data was examined for both Time 1 and 2 participants. For Time 1 data, none of the variables had more than 3.6% of values missing,
and most had less than 2% missing. Independent samples $t$-tests and Chi-Squared tests were used to assess differences in demographic variables (SES, age of child, ethnicity) between the mothers who had missing variables and those who did not, and no significant differences were found (all $ps > .10$). Due to the ongoing nature of the study, only approximately half of participants who had reached the 1-year follow-up period and had returned for their second visit at the time of this study’s completion. Approximately half (41.8%) of the sample was not yet available for Time 2 analysis. Of those who were eligible to have returned for their follow up visit, participant attrition was determined to be 21.9%. Independent samples $t$-tests and Chi-Squared tests were used to assess differences in demographic variables between the mothers who returned and those who dropped out (SES, age of child, ethnicity), no significant differences were found (all $ps > .10$).

Inspection of Time 2 data revealed that the range of responses for each of the measures was not restricted (Table A2). Next, the presence of outliers, defined as scores more than 3 standard deviations from the mean of the measure, was assessed. No measure had scores more than 3 standard deviations from the mean at Time 1. At Time 2, three participants scored more than 3 standard deviations from the mean on two of the measures, one on the School Problem Behavior Questionnaire (SPBQ), one on the CD Rating Scale, and one on both measures. All three subjects were excluded from the Time 2 analysis, as extreme cases have a large impact on regression solutions. Finally, the distribution of the data on each variable was considered. The Kolmogorov-Smirnov test of normality indicated that at both times, the assumption of normality was met for all parenting measures, and all child behavior measures except for the SPBQ. It is important to note that since a number of participants had been rated 0 on the measure, no transformation of the rating scores could be
used to correct for the lack of normality. This measure will be examined in the analyses in an exploratory fashion.

**Hypothesis 1 – Concurrent Associations Between Parenting Variables and Child ODD Behavior at Time 1.**

Before testing the Time 1 hypothesis, correlations between the child behavior measures (ODD Rating Scale and CBCL Aggression Scale) were examined to determine if a composite score could be created, using a criterion of \( r \geq .50 \) between the two variables. Given the sizable correlation between ratings on the ODD Rating Scale and the CBCL Aggression Scale \( (r = .78, p < .001) \), a composite score (ODD/Aggression) was formed based on the average of the z-scores from the two measures. A similar process was followed to examine whether composites could be created among the measures of ADHD child behavior used as control variables (ADHD Rating Scale and CBCL Attention Scale). A composite score was created for the ADHD score due to a moderate correlation between the ADHD Rating Scale and CBCL Attention Scale \( (r = .53, p < .001) \). Finally, in the domain of parenting variables, although both the PS Over-Reactivity Scale and the CRPR Restrictiveness Scale were used to assess negative aspects of parenting, there was no significant correlation between these measures \( (r = .15, p > .25) \). Therefore, no composite score for these measures was formed, and each was treated separately in the analyses. Similarly, the CRPR Nurturance Scale was considered alone, despite its negative correlations with the other parenting scales \( (r = -.31, p < .05 \text{ with Over-reactivity, and } r = -.20, p > .10 \text{ with Restrictiveness}) \), as this scale theoretically measures a separate construct: positive aspects of parenting.
Next, potential control variables (SES, child age, child ADHD composite score, and maternal BSI Depression, Hostility and Interpersonal Sensitivity scores) were examined to determine if they were independent from the Time 1 parenting and child behavior variables (Table A3). These correlations suggested a need to control for Time 1 child ADHD symptoms, maternal BSI Hostility and Interpersonal Sensitivity Scales, and SES scores as these variables were significantly related to child ODD/Aggression and to some of the parenting measures. The correlations suggest that mothers who reported more ODD/Aggression in their sons' also reported their sons having more ADHD behaviors, reported themselves as having more psychological distress, and were from families of lower socioeconomic status.

Partial correlations were conducted to determine the relationships between the parenting variables and child ODD/Aggression scores, controlling for the appropriate control variables (Table A4). In partial support of the hypotheses, significant correlations were found between the ODD/Aggression score and the Restrictiveness and Nurturance Scales on the CRPR, but no significant correlation was found between the ODD/Aggression score and the Over-reactivity Scale on the Parenting Scale. Mothers who reported being more Restrictive and less Nurturant behavior also reported more oppositional and aggressive behavior in their sons.

Finally, a hierarchical regression was performed to test the relationship between parenting variables and child behavior accounting for the overlap among the measures of parenting. In the first step of the regression, control variables were entered (child ADHD symptoms, maternal BSI Hostility and Interpersonal Sensitivity scales, and SES scores), followed by the parenting measures entered in step 2. The full regression model was
considered to be significant if $p < .05$. If both steps of the model were significant, the model at the second step was chosen for interpretation only if it added incremental variance to the prediction (i.e., a significant $R^2$ change from step one). The regression model was significant at both steps 1 and 2, but only step 1 added significant incremental variance, $R^2$ change step 1 = .40, $F(4, 44) = 7.36, p < .001$, although step 2 was at trend level, $R^2$ change step 2 = .08, $F(3, 41) = 2.19, p < .10$. Beta weights and $t$ values for the variables contributing to the dependent variable are presented in Table A5. The most significant contribution to the prediction of child ODD/Aggression was from severity of ADHD behaviors. Examining the contribution of parenting factors, we find small to moderate effects, with no significant unique contributions of any of the parenting variables. This suggests that parenting behaviors, specifically Restrictiveness and Nurturance, have relatively weak relationships to the severity of the ODD behaviors after taking into account ADHD behaviors and considering the shared variance among parenting measures.

*Comparison of Time 1 to Time 2 Measures*

Prior to conducting any analysis on the second hypothesis, correlations and paired sample $t$-tests were used to investigate the relation and change in child behavior scores from Time 1 to Time 2. The ODD Rating Scale failed to show any correlation between Time 1 and 2 ratings, $r(19) = .11, p > .50$, although there was a strong correlation for the CBCL Aggression Scale, $r(18) = .58, p < .01$. A paired $t$-test between the ODD scores at Time 1 and 2 did not show any significant difference, $t(19) = .76, p > .25$. The CBCL Aggression Scale showed a trend level decrease in the Time 1 to 2 scores (for means see Table A2), $t(18) = 1.85, p < .10$. It is important to note that despite the small change in mean levels of
ODD/Aggression in this sample, it is still important to look at individual changes, and whether parenting factors can predict these individual changes.

**Hypothesis 2 – Ability of Parenting Variables at Time 1 to Predict ODD Behavior at Time 2**

Similar to Time 1, correlations among variables measuring the same construct were used to guide the formation of composite variables, using the same criterion of \( r \geq .50 \). Correlations of potential control variables, both those from Time 1 and from Time 2 with child behavior at Time 2 were used to guide the selection of control variables for the partial correlations and regression analyses. At Time 2, the composite score for Time 1 ODD/Aggressive behavior was included as a control variable, in order to account for the initial severity of these behaviors. Correlations between the ODD Rating Scale and the CBCL Aggression Scale for the Time 2 data showed only a moderate correlation (\( r (19) = .42, p < .10 \)). The ODD Rating Scale had a strong correlation with the CD Rating Scale (\( r (19) = .60, p < .005 \), and no correlation with the School Problem Behavior Questionnaire (SPBQ) (\( r (17) = .20, p > .25 \)). The ODD Rating Scale was therefore combined with the CD Rating Scale, and the CBCL Aggression Scale and SPBQ were each examined as separate dependent variables. None of the control variables from Time 1 were significantly correlated with the Time 2 ODD/CD composite, the SPBQ at Time 2, or the Time 2 CBCL Aggression Scale, except for the Time 1 ODD/Aggression composite score, which had a strong correlation with both the Time 2 composite of ODD and CD Rating Scales and the CBCL Aggression Scale (Table A6).

To test the second hypothesis, partial correlations were conducted to determine the relationships between the Time 1 parenting variables and Time 2 child measures, controlling for Time 1 ODD/Aggression scores (Table A4). A marginal correlation was found between
the Time 2 composite ODD/CD score and the Time 1 Parenting Scale Over-reactivity Scale, and a close to trend level correlation was found between Time 1 parental Restrictiveness on the CRPR and the Time 2 ODD/CD score ($p = .11$). However, no significant correlation was found between the Time 2 ODD/CD score and the CRPR Nurturance score from Time 1. There were no significant correlations between Time 1 parenting measures and the SPBQ or the CBCL Aggression Scale at Time 2. This suggests that the negative aspects of parenting behaviors are related to the future severity of ODD/CD behavior. Specifically, that more negative parenting behaviors, high PS Over-reactivity and CRPR Restrictiveness scores, are predictive of more severe ODD/CD behaviors, even after initial levels of ODD/Aggressive behaviors are controlled for. However, these results also suggest that positive parenting behaviors, Nurturance scores, were not predictive of severity of ODD/CD behaviors.

Three hierarchical regressions were performed using the Time 1 parenting measures (PS Over-reactivity Scale and the CRPR Nurturance and Restrictiveness Scales) to predict the composite ODD/CD Rating Scale, the SPBQ, and the CBCL Aggression scores at Time 2. These regressions were done to determine the unique predictive ability of the parenting variables after controlling for Time 1 ODD/Aggression and accounting for the overlap among the measures of parenting. Similar to Time 1, full regression models were considered to be significant if $p < .05$. If both steps of the model were significant, the model at the second step was chosen for interpretation only if it added incremental variance to the prediction (i.e., a significant $R^2$ change from step one). The regression model for Time 2 ODD/CD behaviors was marginally significant at both step 1 and 2, although the incremental variance was marginally significant only for step 1, $R^2$ change step 1 = .19, $F(1, 17) = 3.87$, $p < .10$, step 2 $R^2$ change = .22, $F(3, 14) = 1.78$, $p = .20$. Beta weights and $t$ values for the
variables predicting Time 2 ODD/CD behaviors are presented in Table A7. The only significant contribution to the prediction of Time 2 child ODD/CD behaviors was from initial severity of child ODD/Aggression behaviors. The regression model for the Time 2 CBCL Aggression Scale was significant at step 1 and marginally significant at step 2, although the incremental variance was only significant for step 1, $R^2$ change step 1 = .30, $F(1, 17) = 7.23$, $p < .05$, step 2 $R^2$ change = .10, $F(3, 14) = .80, p > .50$. Beta weights and $t$ values for the variables predicting Time 2 CBCL Aggression Scale are presented in Table A8. Only the Time 1 ODD/Aggression score made a marginal contribution to the prediction of Time 2 CBCL aggression. In the regression model for the SPBQ neither step was significant, nor was any incremental variance noted. This is further evidence that that the negative aspects of parenting behaviors are somewhat related to the future severity of child ODD/CD and Aggressive behaviors. Specifically, negative parenting behaviors, PS Over-reactivity and CRPR Restrictiveness scores, are predictive of more severe ODD/CD behaviors, even after initial levels of ODD/Aggressive behaviors are controlled for. However, these results show that positive parenting behaviors, Nurturance scores, were not predictive of severity of ODD/CD behaviors.

**Analysis of the effect of ADHD Subtype on Parenting variables**

In order to consider whether ADHD subtype was related to the parenting variables at Time 1, an analysis of differences in these measures across the ADHD subtypes was conducted using an ANOVA. The results show that there was no significant difference between the subtypes for Over-reactivity, $F(2, 50) = 2.10, p > .10$, Restrictiveness, $F(2, 50) = 2.29, p > .10$, or Nurturance, $F(2, 50) = .33, p > .50$. Thus, parenting measures were not significantly different among parents of children with different subtypes of ADHD. An
ANOVA, of Times 1 and 2 ODD composite scores and subtypes, was also used to test whether there were any mean level differences between the groups. Results show that at Time 1 the Combined type of ADHD, $x = .48$, was significantly higher than the Inattentive Subtype, $x = -.86$, $F_{Time 1}(2, 47) = 14.00, p < .001$. Using Tukey's test to test the homogeneous subsets, it was found that there was no significant difference between the Hyperactive/Impulsive subtype, $x = .30$, and the Inattentive subtype, $p > .25$, or the Combined Subtype, $p > .10$. Results for Time 2 show that the Combined Type ($x = .32$) was again significantly different than the Inattentive Subtype ($x = -.91$), $F_{Time 2}(1, 18) = 10.11, p < .01$. There were no participants at Time 2 with the Hyperactive/Impulsive subtype.

Discussion

Considering the literature, this study is an important step in determining the relationship of parenting factors to the severity of ODD behaviors in children with ADHD for several reasons. First, this study focused on the relationship of ODD behaviors to both negative and positive aspects of parenting, as opposed to previous studies that focused primarily on the negative aspects of parenting (August et al., 1999; Campbell et al., 1986; Wakschlag & Hans, 1999). Thus, this study helps to tease apart how both positive and negative aspects of parenting play into the transactional model relating child oppositional behavior and parenting. This may have implications for developing treatments for child oppositional behavior that incorporate both reductions in negative parenting, as well as working to increase positive parenting behaviors. Second, this study provided preliminary evidence into the ability of these parenting behaviors to predict changes in the severity of child ODD behaviors. This longitudinal work is necessary to test the causal mechanisms underlying the transactional model of parenting and child characteristics in determining
changes in severity of child ODD at this age. Findings from the longitudinal results may aid in future studies to improve prevention and early intervention strategies for ODD.

For the first hypothesis, concerning the concurrent relationships between parenting and ODD behaviors, partial correlations provided support that both positive and negative aspects of parenting are related to child ODD behaviors, after accounting for confounding variables including the severity of ADHD behaviors, SES, and maternal hostility and interpersonal sensitivity. In the regression analyses, it was found that the largest contributor to child ODD/Aggression was the child’s severity of ADHD behavior, which is not altogether surprising given the high level of comorbidity between these disorders (Biederman, Newcorn, and Sprich, 1991; McMahon, & Estes, 1997). Of the parenting variables, Restrictive parenting was related to greater levels of severity in ODD/Aggression in children with ADHD. This finding relates to previous findings that negative parenting is related to greater levels of ADHD and ODD behaviors (August, et al., 1999; Campbell et al., 1986; Wakschlag & Hans, 1999). It is interesting to note that, of the two aspects of negative parenting behavior measured in this study, the CRPR Restrictiveness Scale did show a relationship to ODD/Aggressive child behaviors, but the PS Over-reactivity Scale did not. One possibility for this finding is that items on the PS are more face valid and thus perhaps more susceptible to social desirability in parental responding. Despite the test construction being to create hypothetical situations to which the best answers were not always obvious (Irvine et al., 1999), a study by Johnston, Scoular, and Ohan (2003) found that scores on the PS were related to scores on the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1991); whereas maternal scores on the CRPR were not. This lends some support for this explanation that there may be bias in mothers’ responses on the PS but not on the CRPR.
Another possible explanation for the lack of relationship between the PS Over-reactivity scale and ODD behavior is the difference in samples used in this study compared to other studies of parenting variables and ODD/CD behaviors. This study used a largely community-based sample and, although a requirement of participation in this study was a previous diagnosis of ADHD, participants were not seeking treatment through participation, as was the case in studies to validate the PS (Harvey et al., 2001).

Nurturance, the positive aspect of parenting used in this study, was related to lower levels of ODD/Aggression in children with ADHD at Time 1. In focusing on one of the unique aspects of this study, the negative correlation between these positive parenting behaviors and ODD behaviors suggests that parenting behaviors that are accepting of the child and open to communication between parent and child have the potential of acting as protective factors. This is similar to Lindahl’s (1998) findings that responsive and consistent parenting behaviors differentiated between ADHD, ODD, and comorbid ADHD/ODD groups. Specifically that these parenting behaviors were found to be greatest in the group of children with ADHD and were lowest in the group of children with comorbid ADHD/ODD.

The second hypothesis of the study, that parenting behaviors will predict change in child ODD behavior, is the other unique and important component of this work. Although the concurrent relationships between positive and negative parenting behaviors and severity of child ODD behaviors are important, they tell us nothing about predictors of changes in child ODD behaviors over time. Since the transactional model suggests a circular relationship between the child’s behaviors and parenting behaviors, it is important for the longitudinal portion of this study to be able to show the contributions of parenting in predicting an increase or decrease in child ODD behaviors. Three sets of partial correlations and three
hierarchical regressions were conducted to examine if parenting variables, as a group, would predict changes in child ODD/CD over and above initial levels of ODD/Aggressive behaviors. Not surprisingly, the most crucial predictor of future behavior child ODD/CD in this sample was past ODD/Aggression behavior, as previous studies suggest that child disruptive disorders are stable throughout the child years (Biederman, Monuteaux, Greene, Braaten, Doyle, & Faraone, 2001; Campbell et al., 1986; Prior, Smart, Sanson, & Oberklaid, 2001). Of the parenting variables, however, it is the harsh and over controlling parenting behaviors that best predicted an increase in ODD/CD behaviors from Time 1 to Time 2, after accounting for the initial levels of ODD/Aggressive behavior. Both the PS Over-reactivity and the CRPR Restrictiveness Scales made marginal or close to marginally significant contributions in predicting Time 2 ODD/CD behaviors. It is hypothesized that once an appropriate level of power is attained to test these relationships; significant effects will be found, consistent with previous studies (August et al., 1999; Wakschlag & Hans, 1999).

It is interesting that, although the PS Over-reactivity scale made marginally significant contributions to predicting future ODD/CD behavior, it failed to have any significant relationship to ODD/Aggression at Time 1. One possibility is that the PS Over-reactivity Scale is more sensitive to CD behaviors than to Aggressive behaviors. However, post-hoc analysis reveals this is not the case; indeed, the relationship of the PS to Time 2 ODD is greater when CD is not included, r (16) = .56, p < .05, than with the composite of ODD/CD, r (16) = .42, p < .10. Another possibility is that conditions had changed somehow between the initial and the follow up visits. Using the sample of those who had returned at Time 2, there were no significant steps in the model of a post-hoc regression for Time 1 parenting variables on Time 1 ODD/Aggression scores. However, a partial correlation
showed a marginal negative correlation between the PS and Time 1 Aggression, $r (15) = -.48$, $p < .10$. Further problems with the PS Over-Reactivity Scale arise when we observe this pattern in its nonsignificant, but negative, correlation and regression with the CBCL aggression scale at Time 2 (see Tables A4 and A8). These results suggest that higher maternal Over-reactivity is related with a decrease in Aggressive behavior over time, which does not fit the theoretical models (Patterson, 1982). This is further complicated in that the CBCL Aggression Scale and ODD Rating Scale are theoretically testing the same construct, and yet have opposite results in terms of their relationship to the PS Over-Reactivity Scale. It is again hoped that replication of this study will be able to show whether this pattern holds true, or whether it is an anomaly in this study only.

Despite observing some promising Time 1 relationships between positive parenting behaviors and ODD/Aggression, the Nurturance Scale failed to predict any changes in the severity of the child’s ODD behaviors between initial and follow-up visits. This may be a problem with the parenting concept of Nurturance being a transient parenting behavior. Another positive parenting behavior, such as attentive or authoritative parenting, may be more appropriate in predicting long-term outcome. Alternately, perhaps within the age range of children in this study, harsh and over-controlling forms of parenting behaviors are more strongly related to child ODD than is nurturance (Simons & Beaman, 1992). Finally, it may also be that there simply is no predictive relationship between positive parenting behavior and future ODD/CD behavior.

Parenting measures were also not significantly related to the SPBQ. This was not entirely unexpected as this measure was not normally distributed, and was not correlated with either the CBCL Aggression scale or either of the ODD or CD Rating Scales. In future
studies, instead of using this measure, it would be better to use teacher ratings of child school behavior, perhaps on the Teacher Rating Form of the CBCL. This would give us another rater of the child’s behavior, as well as a more accurate account of the child’s behavior in the school environment.

While subtype does not seem to impact directly on the parenting behaviors examined in this study, they are related to the severity of ODD symptoms displayed. The Combined subtype as the literature suggests (Neuman et al., 2001; Wolraich et al., 1996) appears to be associated with greater levels of ODD behavior when compared to the Inattentive subtype, whereas the Hyperactive/Impulsive subtype appears to fall somewhere in between these two, not being significantly different from either.

Although evident in the first hypothesis regression analysis, the major limitation of this study is more clearly seen in the analysis of the second hypothesis. While the sample size at Time 1 is adequate to test the partial correlation between parenting behaviors and ODD/Aggression, less than large effects sizes cause problems for the Time 1 regression analysis and the analyses at Time 2. As this is an ongoing study, participants will continue to be followed up, and the data will be analyzed again once all participants have returned.

Another limitation of this study is that only maternal reports were used. Despite the findings of Campbell and Ewing (1990) that contradict the argument of rater bias, it would be useful to have corroborating reports of the child’s behavior, either through observation or reports of another adult. In addition, observational measures of parenting behavior could be added to future studies. This type of multi-method approach would serve to rule out concerns of relationships appearing solely because of shared rater and method variance among measures.
It is recommended that other aspects of parenting behavior be included in future studies. Although the two measures of negative parenting behavior did show encouraging, if somewhat inconsistent results, other areas of what may constitute negative parenting, such as parental laxness or inattentive behaviors, need to be explored. Similarly, other aspects of positive parenting behaviors, such as attentive or authoritative parenting, should be explored in relation to child ODD behavior. Although the Nurturance Scale did show a concurrent relationship with child ODD/Aggressive behavior, it failed to show any predictive ability for determining changes in severity. This may be a problem with the measure used to tap this construct. If this is the case, another positive parenting construct may be able to predict long-term outcome, or positive parenting behavior may simply have no predictive relationship with ODD/CD behavior. Furthermore, it is recommended that future studies look at expanding this study to include investigation of the relationship of parenting behaviors to ODD behaviors in girls, as girls often display different ODD behaviors than do boys, and may be influenced differently by parent-child interactions (Barkley, 1998a). Also, it will be important to study the parent-child interactions of both mothers and fathers, and to include analysis of any interactions between the two, in order to note the differences in mother and father parenting behavior and the effects these may have on the child’s behavior. Finally, it may also be useful to study the effects of positive and negative parenting behaviors at different ages of children, as parenting influences may change depending on the child’s stage of development (Simons & Beaman, 1992).

In sum, encouraging results were found suggesting that the transactional model does appear to be a model through which both positive and negative parenting behaviors are related, at least concurrently, to the severity of child ODD/Aggressive behaviors. In addition,
the evidence seems to suggest that the negative aspects of parenting, specifically harsh and controlling parental behaviors, are able to predict changes in severity of ODD/CD behavior among children with ADHD. Although scores on the Nurturance scale of the CRPR did not appear to have this same predictive ability, it is important to note that other positive aspects of parenting behaviors, such as parental praise or involvement, have yet to be examined.
References


Appendix A

Table A1.

Descriptive Statistics for Sample Measured at Time 1.

<table>
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<th>Measure</th>
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<th>Maximum</th>
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<td>Time 1 CBCL Aggression Scale</td>
<td>53</td>
<td>65.75</td>
<td>10.78</td>
<td>50.00</td>
<td>92.00</td>
</tr>
<tr>
<td>Time 1 CBCL Attention Scale</td>
<td>53</td>
<td>72.23</td>
<td>10.81</td>
<td>50.00</td>
<td>95.00</td>
</tr>
<tr>
<td>Time 1 BSI Hostility Scale</td>
<td>53</td>
<td>1.18</td>
<td>.831</td>
<td>.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Time 1 BSI Depression Scale</td>
<td>53</td>
<td>1.04</td>
<td>.98</td>
<td>.00</td>
<td>3.33</td>
</tr>
<tr>
<td>Time 1 BSI Interpersonal Sensitivity Scale</td>
<td>53</td>
<td>1.23</td>
<td>.86</td>
<td>.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Time 1 PS Over-reactivity Scale</td>
<td>54</td>
<td>27.65</td>
<td>7.27</td>
<td>11.00</td>
<td>44.00</td>
</tr>
<tr>
<td>Time 1 CRPR Restrictiveness Scale</td>
<td>54</td>
<td>60.19</td>
<td>12.56</td>
<td>40.00</td>
<td>94.00</td>
</tr>
<tr>
<td>Time 1 CRPR Nurturance Scale</td>
<td>54</td>
<td>93.63</td>
<td>7.11</td>
<td>69.00</td>
<td>107.00</td>
</tr>
</tbody>
</table>

Note. ADHD = Attention Deficit Hyperactivity Disorder; ODD = Oppositional Defiant Disorder; CBCL = Child Behavior Checklist; BSI = Brief Symptom Inventory; PS = Parenting Scale; CRPR = Child Rearing Practices Report
Table A2.

Descriptive Statistics for Sample Measured at Time 2.

<table>
<thead>
<tr>
<th>Measure</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 ODD Rating Scale</td>
<td>21</td>
<td>11.24</td>
<td>4.45</td>
<td>3.00</td>
<td>18.00</td>
</tr>
<tr>
<td>Time 2 ODD Rating Scale</td>
<td>20</td>
<td>10.20</td>
<td>4.29</td>
<td>3.00</td>
<td>17.00</td>
</tr>
<tr>
<td>Time 1 CBCL Aggression Scale</td>
<td>20</td>
<td>66.05</td>
<td>6.64</td>
<td>51.00</td>
<td>78.00</td>
</tr>
<tr>
<td>Time 2 CBCL Aggression Scale</td>
<td>20</td>
<td>62.60</td>
<td>7.37</td>
<td>50.00</td>
<td>78.00</td>
</tr>
<tr>
<td>Time 2 CD Rating Scale</td>
<td>20</td>
<td>3.40</td>
<td>2.58</td>
<td>.00</td>
<td>8.00</td>
</tr>
<tr>
<td>Time 2 School Problem Behavior Questionnaire</td>
<td>19</td>
<td>1.16</td>
<td>1.68</td>
<td>.00</td>
<td>7.00</td>
</tr>
</tbody>
</table>

Note. N = Number of participants (of the total N at Time 2 = 22) who completed each measure; ODD = Oppositional Defiant Disorder, CBCL = Child Behavior Checklist; CD = Conduct Disorder.
Table A3.

Correlations of Child Behavior Measures and Parenting Measure to Control Measures.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Time 1 ADHD/CBCL Attention Score</th>
<th>Time 1 BSI Hostility Scale</th>
<th>Time 1 BSI Depression Scale</th>
<th>Time 1 BSI Interpersonal Sensitivity Scale</th>
<th>Child Age</th>
<th>Socio-Economic Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 ODD/Aggression Score</td>
<td>.55***</td>
<td>.29*</td>
<td>.06</td>
<td>.32*</td>
<td>.08</td>
<td>.41**</td>
</tr>
<tr>
<td>Time 1 PS Over-reactivity Scale</td>
<td>.35**</td>
<td>.24A</td>
<td>.14</td>
<td>.29*</td>
<td>.09</td>
<td>-.20</td>
</tr>
<tr>
<td>Time 1 CRPR Restrictiveness Scale</td>
<td>.35*</td>
<td>.61</td>
<td>.01</td>
<td>-.05</td>
<td>.03</td>
<td>-.15</td>
</tr>
<tr>
<td>Time 1 CRPR Nurturance Scale</td>
<td>.12</td>
<td>-.12</td>
<td>.11</td>
<td>-.07</td>
<td>-.22</td>
<td>.18</td>
</tr>
</tbody>
</table>

Note. Listwise N = 49. ADHD = Attention Deficit Hyperactivity Disorder; ODD = Oppositional Defiant Disorder; CBCL = Child Behavior Checklist; BSI = Brief Symptom Inventory; PS = Parenting Scale; CRPR = Child Rearing Practices Report. Socioeconomic Status (SES) uses the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975). Higher scores indicate low family SES. 

A *p < .10. **p < .05. ***p < .01. ****p < .001.
Table A4.

Partial Correlations between Child ODD/Aggression and Parenting Measures at Time 1\textsuperscript{a} and 2\textsuperscript{b}.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Time 1 PS Over-reactivity Scale</th>
<th>Time 1 CRPR Restrictiveness Scale</th>
<th>Time 1 CRPR Nurturance Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 ((df = 41))</td>
<td>ODD/Aggression Score</td>
<td>.02</td>
<td>- .30*</td>
</tr>
<tr>
<td>Time 2 ((df = 14))</td>
<td>ODD/CD Score</td>
<td>.42\textsuperscript{A}</td>
<td>.39</td>
</tr>
<tr>
<td></td>
<td>CBCL Aggression Scale</td>
<td>- .36</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>School Problem Behavior Questionnaire</td>
<td>.27</td>
<td>.17</td>
</tr>
</tbody>
</table>

Note. \(df\) = Degrees of Freedom; ODD = Oppositional Defiant Disorder; CD = Conduct Disorder; CBCL = Child Behavior Checklist; PS = Parenting Scale; CRPR = Child Rearing Practices Report.

\(\textsuperscript{a}\) Controlling at Time 1 for SES, maternal hostility, maternal interpersonal sensitivity, and Time 1 composite of the ADHD Rating Scale and the CBCL Attention Scale.

\(\textsuperscript{b}\) Controlling at Time 2 for Time 1 composite of the ODD Rating Scale and the CBCL Aggression Scale.

\(\hat{p} < .10\). *\(p < .05\).
Table A5.

Hierarchical Regression of Time 1 ODD/Aggression on Parenting Measures and Control Variables.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 ADHD/Attention Score</td>
<td>.42</td>
<td>2.85</td>
<td>.01</td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td>-.15</td>
<td>-1.17</td>
<td>.25</td>
</tr>
<tr>
<td>Time 1 BSI Hostility Scale</td>
<td>.14</td>
<td>1.13</td>
<td>.27</td>
</tr>
<tr>
<td>Time 1 BSI Interpersonal Sensitivity Scale</td>
<td>.12</td>
<td>.93</td>
<td>.36</td>
</tr>
<tr>
<td>Time 1 PS Over-reactivity Scale</td>
<td>-.08</td>
<td>-.56</td>
<td>.58</td>
</tr>
<tr>
<td>Time 1 CRPR Restrictiveness Scale</td>
<td>.19</td>
<td>1.41</td>
<td>.17</td>
</tr>
<tr>
<td>Time 1 CRPR Nurturance Scale</td>
<td>-.21</td>
<td>-1.58</td>
<td>.12</td>
</tr>
</tbody>
</table>

Note. Listwise N = 49. ADHD = Attention Deficit Hyperactivity Disorder; ODD = Oppositional Defiant Disorder; CBCL = Child Behavior Checklist; BSI = Brief Symptom Inventory; PS = Parenting Scale; CRPR = Child Rearing Practices Report.
Table A6.

Correlations of Time 2 ODD/CD behaviors and Time 1 Parenting Measures with Control Variables in Sample at Time 2.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Time 1 ODD/CD Score</th>
<th>Time 1 ADHD/CBCL Attention Score</th>
<th>Time 1 BSI Hostility Scale</th>
<th>Time 1 BSI Depression Scale</th>
<th>Time 1 BSI Interpersonal Sensitivity Scale</th>
<th>Socio-Economic Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 2 ODD/CD Score</td>
<td>.54*</td>
<td>.18</td>
<td>.13</td>
<td>.17</td>
<td>.13</td>
<td>.31</td>
</tr>
<tr>
<td>Time 2 CBCL Aggression Score</td>
<td>.63**</td>
<td>.15</td>
<td>-.15</td>
<td>-.02</td>
<td>-.33</td>
<td>.13</td>
</tr>
<tr>
<td>Time 2 School Problem Behaviors Questionnaire</td>
<td>-.25</td>
<td>-.11</td>
<td>-.08</td>
<td>.04</td>
<td>-.12</td>
<td>.33</td>
</tr>
<tr>
<td>Time 1 PS Over-reactivity Scale</td>
<td>-.48</td>
<td>-.02</td>
<td>.31</td>
<td>.24</td>
<td>.06</td>
<td>.01</td>
</tr>
<tr>
<td>Time 1 CRPR Restrictiveness Scale</td>
<td>-.02</td>
<td>.29</td>
<td>.32</td>
<td>.03</td>
<td>-.07</td>
<td>.24</td>
</tr>
<tr>
<td>Time 1 CRPR Nurturance Scale</td>
<td>.35</td>
<td>.31</td>
<td>-.14</td>
<td>.21</td>
<td>&lt; .01</td>
<td>-.13</td>
</tr>
</tbody>
</table>

Note. Listwise N = 17. N = Number of participants (of the total N at Time 2 = 22) who completed each measure; ADHD = Attention Deficit Hyperactivity Disorder; ODD = Oppositional Defiant disorder; CBCL = Child Behavior Checklist; BSI = Brief Symptom Inventory; PS = Parenting Scale; CRPR = Child Rearing Practices Report.

*p < .05. ***p < .001.
Table A7.

Hierarchical Regression of Time 2 ODD/CD behaviors on Time 1 Parenting Measures and Control Variables.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Standardized Coefficients</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 Composite of ODD/Aggression</td>
<td></td>
<td>.59</td>
<td>2.56</td>
<td>.02</td>
</tr>
<tr>
<td>Time 1 PS Over-reactivity Scale</td>
<td></td>
<td>.36</td>
<td>1.51</td>
<td>.15</td>
</tr>
<tr>
<td>Time 1 CRPR Restrictiveness Scale</td>
<td></td>
<td>.29</td>
<td>1.35</td>
<td>.20</td>
</tr>
<tr>
<td>Time 1 CRPR Nurturance Scale</td>
<td></td>
<td>.02</td>
<td>.09</td>
<td>.93</td>
</tr>
</tbody>
</table>

Table A8.

Hierarchical Regression of Time 2 CBCL Aggression Scale on Time 1 Parenting Measures.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Standardized Coefficients</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1 Composite of ODD/Aggression</td>
<td></td>
<td>.41</td>
<td>1.77</td>
<td>.10</td>
</tr>
<tr>
<td>Time 1 PS Over-reactivity Scale</td>
<td></td>
<td>-.35</td>
<td>-1.47</td>
<td>.16</td>
</tr>
<tr>
<td>Time 1 CRPR Restrictiveness Scale</td>
<td></td>
<td>.11</td>
<td>.50</td>
<td>.62</td>
</tr>
<tr>
<td>Time 1 CRPR Nurturance Scale</td>
<td></td>
<td>.02</td>
<td>.01</td>
<td>.96</td>
</tr>
</tbody>
</table>