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Associations between Maternal Attention-Deficit/Hyperactivity Disorder Symptoms and Parenting

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Abstract

Mothers of children with attention-deficit/hyper-activity disorder (ADHD) are at increased risk for an ADHD diagnosis themselves, which is likely associated with impairments in parenting. The present study utilized a multi-method assessment of maternal ADHD and parenting to examine the extent to which maternal ADHD symptoms are associated with maladaptive parenting. Participants included 70 6–10 year old children with DSM-IV ADHD and their biological mothers. Results suggested that mothers with higher levels of ADHD symptoms reported lower levels of involvement and positive parenting and higher levels of inconsistent discipline. During observed parent–child interactions, maternal ADHD symptoms were negatively associated with positive parenting, and positively associated with negative parenting and repeated commands before giving the child an opportunity to comply. Given prior research suggesting that maladaptive parenting behaviors are risk factors for the later development of conduct problems among children with ADHD, these findings have important clinical implications for family-based assessment and treatment of ADHD.

Keywords

Attention-deficit/hyperactivity disorder; Parenting; Parent–child interactions; Adult ADHD

Although attention-deficit/hyperactivity disorder (ADHD) once was viewed exclusively as a childhood disorder, it is now well understood that the disorder persists into adulthood in the vast majority of clinic-referred cases identified during childhood (Barkley et al. 2002; Weiss and Hechtman 1993). While the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; APA 2000) criteria for ADHD have been widely criticized for their lack of developmental sensitivity (Faraone et al. 2000a; McGough and Barkley 2004), the core symptoms of inattention and hyperactivity/impulsivity, associated impairments in social and academic/occupational domains, and patterns of comorbidity appear to be largely consistent across development (Faraone et al. 2000b). However, whereas the social impairments associated with ADHD during childhood have been widely researched, the adult literature is quite limited in this regard. In particular, researchers and clinicians alike have long theorized that the attention problems, impulsivity in decision making, and affective lability associated with adult ADHD may negatively impact social relationships, such as parenting and parent–child interactions (Weiss et al. 2000). Yet, to date, few empirical studies have carefully examined this important domain of functioning in adults with ADHD.

Examining the nature of parenting and parent–child interactions of adults with ADHD is a critically important area of inquiry for a number of reasons. First, heritability for ADHD exceeds 0.80 (Faraone et al. 2005). Existing family studies suggest both that parents with ADHD are more likely to have offspring who are also diagnosed with ADHD (Biederman et al. 1995, 2002) and that parents of children with ADHD are more likely to have ADHD themselves (Chronis et al. 2003). Both parental psychopathology and parenting behavior have been identified as important environmental risk or protective factors in developmental outcomes for children with ADHD (Chronis et al. 2007; Johnston and Mash 2001). ADHD in both parents and offspring likely contribute to the reciprocal negative interactions within these families, which may in turn negatively impact the child’s developmental course. Moreover, relations between parental attention problems and attenuated response to parent training programs for children with ADHD have been documented in two published studies (Evans et al. 1994; Sonuga-Barke et al. 2002). Thus, examination of relations between parental ADHD symptoms and parenting has important clinical implications for both children and adults with the disorder.

A small number of empirical studies have documented poorer parenting and family functioning associated with adult ADHD. Biederman et al. (2002) reported that the presence of parental ADHD was associated with higher levels of family conflict and lower family cohesion. Likewise, Arnold et al. (1997) found that paternal involvement was related to negative, critical, overreactive and authoritarian discipline among fathers with more ADHD symptoms, but not in fathers with fewer ADHD symptoms. In a recent study using a clearly-identified sample of mothers who met DSM-IV criteria for ADHD, mothers with ADHD reported less consistency in their parenting and less monitoring or knowledge of their children’s activities, and generated solutions to child behavior problems of lesser quality on an analogue child-rearing task compared to a control group of mothers without ADHD (Murray and Johnston 2006). Thus, there exists some empirical evidence to suggest that core symptoms of adult ADHD (e.g., inattention, impulsive responding) are associated with maladaptive parenting behavior. However, these studies relied largely on self-report measures in examining the relations between parental ADHD symptoms and parenting.

Observational methodology has long been utilized to examine the interactions between children with ADHD and their parents, both cross-sectionally and longitudinally (see Danforth et al. 1991, for a review). Cross-sectional studies have found that the interactions between children with ADHD and their parents are characterized by negative behavior on the part of both parents and children. Specifically, children with ADHD are less compliant, more oppositional, and less often able to follow parental requests through to completion (e.g., Cunningham and Barkley 1979; DuPaul et al. 2001). In turn, parents of children with ADHD are more negative and reprimanding, issue more frequent commands, and are less responsive to their children’s requests for attention than parents of non-disordered children. Therefore, observational methodology has been used consistently to demonstrate a greater frequency of negative reciprocal interactions between children with ADHD and their parents. These negative interactions are further exacerbated by the presence of oppositional-defiant disorder (ODD), which co-occurs in a substantial proportion of children with ADHD (Barkley et al. 1992; Johnston 1996).

ADHD symptoms, which are more likely to be present in parents of children with ADHD, may compromise a mother’s ability to effectively parent her child with ADHD. Maternal inattentive symptoms may be associated with a lesser degree of involvement or difficulty monitoring the child’s activities. Mothers with high levels of ADHD symptoms may also experience difficulty implementing consistent rules and consequences in response to child misbehavior. Parents who are impulsive may have great difficulty inhibiting their responses and may be emotionally reactive, making them more likely to use harsh or physical

punishment. Hyperactive or impulsive parents may also issue an excessive number of commands without allowing the child an opportunity to comply. Finally, inconsistent parenting may result from a parent with ADHD forgetting to follow through with consequences, failing to attend to the child's misbehavior, or impulsively applying a consequence that is either inappropriate for the situation or inconsistent with previous discipline. For all of these reasons, mothers with higher levels of ADHD symptoms may display parenting deficits relative to mothers without ADHD characteristics.

The current study utilized a multi-method approach to examine associations between maternal ADHD symptoms and parenting in families of 6–10 year old children with ADHD. It was hypothesized that maternal ADHD symptoms would be associated with parenting deficits, measured using both self-report and observational methodology. Specifically, it was expected that mothers with more ADHD symptoms would engage in more negative and inconsistent parenting practices. However, the predicted associations between maternal ADHD symptoms and positive parenting techniques were less clear. Mothers with more ADHD symptoms may be less apt to notice or attend to their children's behavior and therefore be less likely to respond with positive attention. On the other hand, mothers with more ADHD symptoms may be more enthusiastic and exuberant, resulting in more warm or involved parenting. It has been suggested that mothers with higher levels of ADHD symptoms may display more positive parenting toward their offspring with ADHD because there is a greater degree of similarity or fit between the mother and child (Psychogiou et al. 2007).

This study is the first to utilize both self- and collateral-reports of maternal ADHD symptoms obtained via interview and self-report methods, and both self-report and observation of parenting behavior to examine this question. Different advantages exist to obtaining self-report and observed measures of parenting. While self-report parenting scales provide information about parenting that occurs outside of the contrived research setting and low base rate behaviors, investigators must be aware of the potential biases that may be present in self-reported parenting behavior. This is particularly an issue when examining associations between parenting and mothers' self-reported characteristics, which share method variance. Observational measures provide rich objective data but may be prone to observer effects (Gardner 1997). Thus, a multi-method approach, using both self-report and observed parenting to the collection of parenting data enables a more comprehensive examination of these constructs.

Also, the gold standard for adult ADHD assessment involves obtaining multi-informant reports regarding past and current symptoms of ADHD and co-occurring disorders using interview and self-report methodology (McGough and Barkley 2004). Obtaining information from multiple sources is critical given concerns about individuals' awareness of their own ADHD symptoms. It is for this reason that we collected collateral reports of participants' childhood and current ADHD symptoms from family members and spouses.

Method

Participants

Participants included 70 mother-child dyads recruited via mailings and presentations to local physicians, schools, and mental health professionals in the Washington, DC metropolitan area. For inclusion in the study, children: (1) met full DSM-IV criteria for ADHD according to well-validated parent and teacher report instruments and diagnostic interviews; (2) had an estimated IQ above 70; (3) were between the ages of 6 and 10; and (4) resided with their biological mothers. Children taking stimulant medications were included, but were rated by parents and teachers while off medication for 1–2 days. In order to increase variability in

observed child behavior, parent-child interactions were also conducted while children were unmedicated.

Mothers were not selected on the basis of an ADHD diagnosis, but were expected to display a broader range of ADHD symptoms than would be expected in the general population given the strong heritability of ADHD (Faraone et al. 2005). In order to isolate relationships between maternal ADHD symptomatology and parenting, mothers who met current DSM-IV criteria for any Axis I disorder other than ADHD were excluded from participation. Mothers taking stimulant medication were also excluded, as stimulant medication had the potential to minimize or mask ADHD-related deficits in parenting.

Eighty-one mothers were assessed. Eleven were deemed ineligible: 5 were excluded because the child did not meet full DSM-IV criteria for ADHD; 3 were excluded because the child had an estimated IQ below 70; and 3 were excluded on the basis of the mother's current Axis I disorder. Participant characteristics are presented in Table 1. As depicted in this Table, the sample was racially and socioeconomically diverse; total family income ranged from \$32,500 to \$385,000 and approximately 64% of the sample was non-white.

Procedure

Mothers and children expressing interest in the study completed a brief telephone interview in which appropriateness for the study was assessed according to the inclusion/exclusion criteria described above. When families appeared appropriate based on the telephone screen, parent and teacher measures were mailed to the home, and participants were instructed to return the measures completed prior to coming to the laboratory session. Mothers and children attended a single, 2.5-h assessment session, during which diagnostic interviews were administered and a parent-child observation was conducted. Upon arrival at the assessment session, participants were provided with a detailed explanation of the procedure and provided written informed consent. Participants were paid \$40 for this laboratory visit.

Assessment of Maternal ADHD

Maternal ADHD symptoms were assessed using multiple instruments (diagnostic, dimensional) with available normative data, multiple informants (e.g., self, parent, spouse), and tools for differential diagnosis (McGough and Barkley 2004). Participants were administered Mood (Major Depression, Dysthymia, Bipolar), Anxiety (Generalized Anxiety Disorder), Substance Abuse, and Antisocial Personality Disorder modules from the Structured Clinical Interview for the DSM-IV, Non-Patient Edition (SCID; First et al. 1996) to assess for the presence of other psychiatric disorders that may co-occur or better account for their ADHD symptoms or parenting and treatment-related behaviors, and participants were excluded on the basis of any current diagnosis on the SCID. The SCID is a widely-utilized, semi-structured interview with adequate psychometric properties that assesses the presence of current and lifetime symptoms of DSM-IV disorders.

Consistent with the methods employed in the adult ADHD literature, the SCID was supplemented with modified modules from the Schedule for Affective Disorders for School-Aged Children (K-SADS) assessing past and current symptoms of ADHD, ODD, and conduct disorder (CD) in adults (Biederman et al. 2002; Faraone et al. 1995, 2000a, b). Interviewers were trained to reliability on the SCID and modified K-SADS by the first author and carefully supervised throughout the study. Interviews were videotaped and twenty percent of the interviews were coded by an independent rater. Kappas were 1.00 for ADHD (1.0 for current ADHD), 1.00 for anxiety disorders, 1.00 for mood disorders, and 1.00 for all other disorders.

Whenever possible, past and current collateral reports of ADHD symptoms were obtained from individuals who lived with or were in close contact with the mothers during the period in question. Fifty-one current collateral informants were contacted and provided reports: 36 were spouses/significant others, 10 were friends, 3 were siblings, one was a co-worker, and one was of unknown relationship to the participant. Forty-five collateral informants provided retrospective reports of the mothers' childhood and, when they felt confident in their ability to, current symptoms: 34 were parents, 6 were older siblings, 2 were close family friends, 2 were aunts/uncles, and 1 was a cousin. Research assistants interviewed mothers' collateral informants via telephone using the past and current versions of the modified K-SADS. Detailed analysis of collateral data is presented elsewhere (Belendiuk et al. 2007). Separately for childhood and current ADHD, DSM-IV symptoms of ADHD were considered present if they were endorsed by either the participant or the collateral reporter as present to a clinically significant degree on the modified K-SADS. Maternal ADHD symptoms ranged from 0–17 (inattention: 0–9; hyperactivity/impulsivity: 0–8) in this sample (Table 2).

Participants also completed the Conners Adult ADHD Rating Scale (CAARS), a dimensional measure of current ADHD symptoms in a form suitable for adults. The CAARS is a 93-item, reliable and valid measure of ADHD symptoms that assesses the core features of ADHD as seen in children and adolescents, while adding content unique to adult expression of ADHD (Conners et al. 1999; Erhardt et al. 1999). The individual completing the form must indicate if they experience the ADHD symptom on a scale ranging from “Not at all, never” to “Very much, very frequently.” It has excellent psychometric properties and provides essential normative data. The DSM Inattentive Symptom (CAARS-IA), DSM Hyperactive/Impulsive Symptom (CAARS-HI), and Total ADHD Symptom (CAARS-ADHD) subscales were used in analyses of self-reported and observed parenting. We also explored correlations between the empirically-derived subscales (Inattention/Memory; Hyperactivity/Restlessness; Impulsive/Emotional; Low Self-Esteem) and parenting, as DSM-IV ADHD symptoms have been criticized for their lack of developmental sensitivity and these empirically-derived factors reflect the manifestation of ADHD in adulthood. Alphas for the CAARS scales in this sample were: CAARS-IA=0.90; CAARS-HI=0.83; CAARS-ADHD=0.92; Inattention/Memory=0.88; Hyperactive/Restless=0.87; Impulsive/Emotional=0.89; Low Self-Esteem=0.86 (Table 2).

As associations between maternal depression, child ADHD, and parenting have been established (Chi and Hinshaw 2002; Fischer 1990; Johnston 1996; West et al. 1999), the Beck Depression Inventory, Second Edition (BDI-II; Beck et al. 1996) was included as a continuous measure of maternal depressive symptoms to be considered in analyses. On each of the 21 items that comprise the BDI, mothers indicated which of 4 statements most accurately reflected how they felt over the previous 2 weeks. A total score was obtained by summing over items, with greater scores indicating a greater degree of depression.

Assessment of Child ADHD

The diagnosis of child ADHD was made using parent and teacher rating scales and a parent interview assessing symptoms and impairment associated with ADHD. Mothers and teachers completed the Disruptive Behavior Disorders (DBD) symptom checklist (Pelham et al. 1992) and mothers were administered the K-SADS (Orvaschel and Puig-Antich 1995). The K-SADS is a semi-structured, clinician-administered interview, which has well-established reliability for the diagnoses of ADHD, ODD and CD (Ambrosini 2000) and is highly related to Child Behavior Checklist and the Conners Parent Rating Scale scores (Kaufman et al. 1997). Twenty percent of these diagnostic interviews were coded by an independent rater. Kappas were 0.86 for ADHD, 1.00 for ODD, and 1.00 for CD.

On self-report measures and interviews, parents and teachers were asked to report on the child's behavior while off medication. Symptoms were considered present if they were endorsed by either the parent or the teacher as occurring to a clinically significant degree on any of these measures (Piacentini et al. 1992).

Cross-situational impairment necessary for a DSM-IV diagnosis of ADHD was evaluated using parent and teacher forms of the Children's Impairment Rating Scale (CIRS; Fabiano et al. 2006). On the CIRS, raters assess impairment and need for treatment across multiple domains. Ratings were made on a 7-point scale, with scores above the midpoint indicating clinically significant impairment. Test-retest correlations for the parent CIRS range from 0.51–0.69 ($p < 0.001$) and for the teacher CIRS from 0.40–0.58 ($p < 0.001$). Cross-informant reliability is 0.56 for the global impairment item. Moreover, the CIRS has demonstrated concurrent validity with other established paper-and-pencil measures of impairment and accurately discriminated between children with ADHD and those without the disorder (Fabiano et al. 2006).

The Vocabulary and Block Design subtests of the Wechsler Intelligence Scale for Children, 3rd Ed. (Wechsler 1991), were administered to rule out children with an estimated IQ below 70. This method of estimating IQ has been used to control for IQ in several studies (e.g., Seguin et al. 2004; Todd et al. 2002), and has been determined to be the most appropriate IQ estimation procedures for use with clinical samples of children, with a correlation of 0.92 with full scale IQ (Campbell 1998).

Parenting

The Alabama Parenting Questionnaire (APQ; Shelton et al. 1996) is a 42-item measure on which parents are asked to indicate the frequency with which they implement the following parenting practices: Involvement, Positive Parenting, Poor Monitoring/Supervision, Inconsistent Discipline, and Corporal Punishment. Items are rated on a 5-point scale, ranging from 1 ("never") to 5 ("always"). Internal consistency for all scales is moderate to high (Shelton et al. 1996), and test-retest reliability across a 3-year interval averages 0.65 (McMahon et al. 1997). Within this sample, alphas for individual subscales were: 0.79 for Involvement; 0.86 for Positive Parenting; 0.68 for Poor Monitoring and Supervision; 0.76 for Inconsistent Discipline; and 0.54 for Corporal Punishment.

The present study also utilized observational tasks commonly employed in the literature on parent-child interactions in families of preschool and elementary-aged children with ADHD (Danforth et al. 1991). Parents and children engaged in 2 tasks: (1) 5-min free play; (2) a 10-min "homework" task in which the child completed a grade-appropriate math worksheet while the parent was instructed to provide assistance "as they see fit."

Parent-child interactions during these tasks were coded using the Dyadic Parent-Child Interaction Coding System (DPICS; Robinson and Eyberg 1981, current revised version 2000). Discrete parent and child behaviors were coded continuously with a resulting total frequency for each behavior. We utilized the following composite categories that are commonly reported in the literature: Positive Parenting (DPICS-PP; includes praise, positive affect, and physical positive); Negative Parenting (DPICS-NP; includes negative command, critical statements, and physical negative); Total Commands (DPICS-TC; includes indirect commands and direct commands), and, in order to evaluate child effects on observed parenting, Total Child Deviance (DPICS-CD; includes whine/cry/yell, physical negative, smart talk, destructive, and noncompliance) (Chronis et al. 2007; Eyberg et al. 2001; Robinson and Eyberg 1981; Webster-Stratton 1985, 1987, 1992, 1998; Webster-Stratton and Hammond 1990; Webster-Stratton and Spitzer 1992). In addition, we included the "No Opportunity for Child to Comply" category (DPICS-NOCC), which is counted each time the

mother gives a command, but reissues another command before 5 s have elapsed, regardless of whether the child has begun complying or not. We expected that these categories would best capture deficits in parenting related to maternal ADHD symptoms.

Normative data have been established for this coding system (Robinson and Eyberg 1981). Reliability coefficients from these studies typically range from 0.65 to 1.0, depending upon the behavioral category. Reliability data for the current study are reported below. The validity of the DPICS has been investigated through studies examining treatment outcome (Eyberg and Matarazzo 1980) and comparisons between non-disordered children and those referred for oppositional/aggressive behaviors (Aragona and Eyberg 1981; Robinson and Eyberg 1981). For instance, Robinson and Eyberg (1981) found the DPICS to discriminate between normal and treatment families, such that it correctly classified 100% of control families and 85% of treatment families.

A team of two undergraduate coders was trained by a graduate student in the use of the DPICS until 80% agreement was attained. After studying the coding manual, coders participated in six full days of training to review and discuss coding procedures and to practice coding videotapes of the mother-child interactions. Throughout the course of the study, coders participated in weekly face-to-face meetings to identify areas of disagreement, recode difficult tapes together, and discuss behaviors within each category to improve reliability for future coding. Reliability checks were conducted throughout the study in order to maintain an acceptable level of agreement among coders. Thirty percent of these tapes were coded by both coders to assess inter-rater reliability. Both coders were blind to mother and child assessment information. Overall reliability was computed by calculating $\text{Agreements} / (\text{Agreements} + \text{Disagreements})$ (Robinson and Eyberg 1981; University of Washington Parenting Clinic 2000). Inter-observer agreement coefficients were 0.89 for Positive Parenting, 0.83 for Negative Parenting, 0.89 for Total Commands, 0.82 for Total Child Deviance, and 0.86 for No Opportunity.

Analyses based on observational data were conducted with a subset of the larger sample ($n=61$), due to a range of technical difficulties with the digital recording of parent-child interactions. Families with and without usable observational data were compared on demographic, mother, and child variables. There were no differences between families for whom tapes could be coded and those that could not be coded on any of these variables.

Descriptive data for maternal parenting variables are presented in Table 3.

Results

Correlational Analyses

Correlations between all measures of maternal ADHD symptoms (based on mother and collateral report) and parenting (based on self-report and observational data) are presented in Table 4. These preliminary correlations revealed a general pattern of results that were explored further with regression analyses. When self-reported parenting was considered, there was evidence that APQ Positive Parenting and Inconsistent Discipline were significantly related to maternal ADHD symptoms as measured by both the CAARS and the KSADS. In addition, APQ Involvement was significantly negatively related to CAARS-ADHD. Thus, maternal reports of parenting suggested that maternal ADHD symptoms were associated with lower levels of Positive Parenting and Involvement, and higher levels of Inconsistent Discipline.

When parenting was measured using the DPICS observational coding system, Negative Parenting (DPICS-NP) during the play situation was significantly positively related to

maternal ADHD on both the CAARS and KSADS. During the homework task, KSADS ADHD symptoms were significantly negatively related to Positive Parenting (DPICS-PP). Mothers' tendency to repeat commands before giving the child an opportunity to comply (DPICS-NOCC) during homework was positively related to maternal ADHD on both the CAARS and KSADS. In addition, Total Commands (DPICS-TC) issued during the homework task were positively related to CAARS ADHD symptoms.

Correlations between the ADHD measures and the BDI-II are presented in Table 5. ADHD dimensions of inattention and hyperactivity were highly correlated with one another across measures and informants; therefore, regression analyses simply examined total ADHD symptoms as a predictor of self-reported and observed parenting. Additionally, BDI-II scores were very highly correlated with maternal ADHD scores (both inattention and hyperactivity dimensions) across measures and informants.

Correlations between observational and reported measures of parenting and child deviant behavior were also examined. Only one parenting dimension was represented on both the APQ and DPICS coding system: Positive Parenting. APQ Positive Parenting was significantly correlated with DPICS-PP during free play ($r=0.37, p=0.006$), but not with DPICS-PP during the homework task ($r=0.16, p>0.05$). While there were no other overlapping parenting dimensions measured using both observed and self-report methodologies, correlation analyses were conducted to explore further the relationship between observed and self-report parenting variables. DPICS-NP during homework was negatively related to APQ Involvement ($r=-0.29, p=0.026$), and DPICS-NOCC during the homework task was positively related to APQ Inconsistent Discipline ($r=0.294, p=0.024$). All other relationships between reported and observed parenting variables were non-significant. Observed Child Deviance during the play and homework tasks did not correlate significantly with either child ADHD or ODD symptoms (all p 's >0.05).

Regression Models

We then conducted regression analyses to examine whether maternal ADHD symptoms were associated with self-reported and observed parenting behaviors when relevant control variables were considered. For the KSADS, we utilized the "or rule" and for the CAARS, we focused on the DSM scales for simplicity of presentation and to allow comparison with other published studies.

Results of preliminary analyses suggested that child age was not related to any of the parenting variables, and thus was not considered in subsequent analyses. The BDI-II was significantly associated with Inconsistent Discipline on the APQ ($r=0.38, p=0.002$), but no other measures of parenting; therefore, BDI-II was included as a covariate in analyses predicting Inconsistent Discipline. However, given the strong correlations between maternal ADHD measures and the BDI-II in our sample (Table 5), collinearity was a concern in regression models including both maternal ADHD symptoms and BDI-II. Thus, results of analyses predicting Inconsistent Discipline are presented both with and without BDI-II in the model.

Given that approximately 48% of our sample of children had a comorbid ODD diagnosis, we conducted t -tests to determine whether group differences in parenting existed between mothers of children with and without ODD. Mothers of children with ODD reported lower rates of corporal punishment on the APQ relative to mothers of children without ODD, $t(67)=-2.845, p<0.01$. Child ODD diagnosis was also associated with a lower frequency of DPICS-NP during the free play task ($t(55)=-2.571, p<0.05$), and a higher frequency of DPICS-PP during the homework task ($t(57)=3.121, p<0.01$); therefore, child ODD was accounted for in these analyses.

We also examined correlations between observed child deviance and parenting behavior in the context of the parent–child interaction. Child deviance during the homework task was associated with DPICS-TC ($r=0.37$, $p=0.004$) and DPICS-NOCC during the homework task ($r=0.43$, $p=0.001$). Therefore, child deviance during the homework task was controlled in analyses predicting these variables. Results of regression analyses are presented in Table 6.

Finally, we explored differences in parenting behavior as a function of maternal ADHD diagnosis. According to procedures outlined by McGough and Barkley (2004), an adult ADHD diagnosis was assigned if at least 6 symptoms of inattention or hyperactivity/impulsivity were endorsed by mothers or past collateral informants during childhood, and at least 4 ADHD symptoms were endorsed currently (using the “or rule”). Based on these criteria, 12 mothers in our sample (17%) met ADHD symptom criteria. No measure of maternal impairment was available; therefore, these analyses were considered exploratory.

Involvement

Maternal APQ Involvement was negatively related to CAARS-ADHD, such that mothers higher in ADHD symptoms reported lower levels of parental involvement (Table 6). Additionally, regression analysis revealed that mothers who met ADHD criteria significantly differed from non-ADHD mothers in their level of involvement ($\beta = -0.296$, $p < 0.05$, $r^2 \Delta = 0.082$), with mothers meeting ADHD symptom criteria reporting lower levels of involvement with their children.

Positive Parenting

Total ADHD symptoms on the KSADS (KSADS-ADHD) were marginally associated with observed DPICS-PP during the homework task; however, when child ODD diagnosis was included in the model, this relationship was reduced to non-significance (Table 6). Similarly, when maternal ADHD diagnosis was examined categorically, DPICS-PP in the homework task was not significantly different among ADHD and non-ADHD mothers when child ODD diagnosis was included in the model ($\beta = -0.166$, $p < 0.05$, $r^2 \Delta = 0.027$).

In contrast, CAARS-ADHD was negatively associated with APQ Positive Parenting (Table 6). Mothers who met symptom criteria for ADHD also displayed significantly lower levels of positive parenting on the APQ ($\beta = -0.286$, $p < 0.05$, $r^2 \Delta = 0.082$).

Inconsistent Discipline

KSADS-ADHD significantly predicted APQ Inconsistent Discipline ($\beta = 0.332$, $p < 0.01$). When BDI was included in the model, this relationship was reduced to a trend, perhaps due to collinearity (Table 6). Total ADHD symptoms, as measured by CAARS-ADHD, also predicted APQ Inconsistent Discipline. Similar to analyses using the KSADS, when BDI-II score was controlled, this relationship was reduced to a trend (Table 6). ADHD diagnostic status of the mother also did not predict levels of Inconsistent Discipline ($\beta = 0.211$, $p > 0.05$).

Negative Parenting

KSADS-ADHD was significantly associated with DPICS-NP during the free play segment of the parent–child interaction (Table 6), suggesting that mothers with higher levels of self-reported ADHD symptoms were more likely to display negative parenting during play.

When examining maternal ADHD categorically, mothers' ADHD status predicted levels of DPICS-NP during the free play task ($\beta = 0.314$, $p < 0.05$, $r^2 \Delta = 0.099$), whereby mothers with ADHD displayed higher levels of DPICS-NP.

No Opportunity for Child to Comply with Commands

KSADS-ADHD was also significantly associated with DPICS-NOCC during homework ($\beta = 0.328, p < 0.05$). However, this association was reduced to nonsignificance when DPICS-CD during homework was entered into the model (i.e., controlling for “child effects”). Similarly, mothers with ADHD did not display significantly higher DPICS-NOCC during the homework task after DPICS-CD was accounted for in the regression model examining diagnostic status of the mothers. However, when maternal CAARS-ADHD scores were examined, maternal ADHD was positively associated with DPICS-NOCC, which remained significant at a trend level when DPICS-CD during this task was controlled. That is, the number of times the mother did not give the child an opportunity to comply with her commands during the homework task was somewhat higher for mothers with higher levels of ADHD symptoms.

Discussion

The present study utilized a multi-method assessment of maternal ADHD and parenting to examine the extent to which maternal ADHD symptoms are associated with impairments in parenting. Across assessment methods, results indeed suggested that maternal ADHD symptoms are associated with maladaptive parenting. Specifically, maternal ADHD symptoms were related to lower levels of maternal-reported involvement, positive parenting, and consistent discipline. During the homework task, maternal ADHD symptoms were negatively associated with behavioral observations of maternal positive parenting, and positively associated with repeated commands. During the free play segment, maternal ADHD symptoms were positively associated with observations of negative parenting. Exploratory analyses examining mothers meeting symptom criteria for ADHD were largely consistent with results examining maternal ADHD symptoms continuously.

Overall, we found fewer associations between maternal ADHD symptoms and parenting during the play segment of the parent–child interaction relative to the homework segment. This is consistent with prior research suggesting fewer differences observed between the behavior of ADHD and non-disordered children and their parents during free play relative to structured task situations (Danforth et al. 1991). Nevertheless, the fact that mothers with higher levels of ADHD symptoms displayed more negative parenting during the free play segment suggests that, even when they are not in a situation that requires them to place demands on their children, they are more likely to be negative and critical with their children. Notably, this relationship held when child ODD diagnosis was considered. Moreover, observed maternal behavior during the parent–child interaction task was not significantly associated with BDI-II scores and therefore these relationships were not accounted for by maternal depressive symptoms.

Given prior literature suggesting that impaired interactions among children with ADHD and their parents may be exacerbated by child ODD, we also explored the impact of child ODD diagnosis on our findings. With few exceptions, our results remained regardless of child ODD diagnosis. In fact, child ODD was associated with only a few of the parenting behaviors measured here. These relationships were somewhat contrary to expectation: child ODD diagnosis was associated with lower levels of parent-reported Corporal Punishment, lower levels of observed Negative Parenting during free play, and higher levels of observed Positive Parenting during the homework task. This may suggest that parents of children with comorbid ODD are more permissive across contexts; however, this finding awaits replication.

We utilized multiple methods of data collection, both in the assessment of adult ADHD and in the assessment of parenting. There are currently no well-established guidelines for the

assessment of adult ADHD; however, experts have suggested that collateral information be obtained from significant others to corroborate self-reports of past and current symptoms (McGough and Barkley 2004). This study was the first to incorporate collateral reports of maternal ADHD symptoms in examining relationships with parenting. As we reported elsewhere, the reports of mothers and collateral informants were significantly correlated in the present study, with correlations ranging from 0.37–0.58 (Belendiuk et al. 2007). As depicted in Table 4, collateral informants' reports of maternal ADHD symptoms were significantly positively associated with maternal self-reports of inconsistent parenting.

Interestingly, collateral informant reports of maternal ADHD symptoms were positively associated with observed levels of positive parenting behaviors during the play task. It has been suggested by others that mothers with high ADHD symptoms may be more positive and affectionate with their children with high ADHD symptoms (i.e., the “similarity-fit hypothesis”; Psychogiou et al. 2007). However, this theory was not entirely supported in the present study, as maternal self-ratings of ADHD symptoms and maternal ADHD diagnoses were associated instead with lower levels of positive parenting, as well as higher levels of observed negative parenting. Future research should continue to explore the possibility that parental ADHD may be associated with increased positive parenting behaviors. Such research should examine parenting across situations, as it may be the case that ADHD mothers are better playmates for their children with ADHD but may have greater difficulty in situations that require them to keep their children on task or organized, or that require them to remain calm in carrying out a behavior management plan. Future studies should also examine the interactions of ADHD mothers with their non-disordered offspring, to further examine parenting impairments independent of the influence of child ADHD.

A major strength of this study was the collection of both maternal report of parenting and observations of parent–child interactions. As discussed previously, each of these methodologies has notable strengths and weaknesses, and their combination allows a richer analysis of the relationships in question. Sole reliance on maternal reports of parenting would share method variance with maternal reports of ADHD symptoms. Consistent with findings reported across the child clinical literature, correlations between maternal reports and behavioral observations of parenting and child deviant behaviors were relatively low (De Los Reyes and Kazdin 2005). However, the fact that maternal ADHD symptoms were associated with maladaptive parenting across self-report and observational measures of parenting, as well as interview and self- and collateral-reports of maternal ADHD symptoms, provides convincing evidence that adult ADHD symptoms indeed impair one's ability to parent effectively.

The limitations of this study should be considered. First, the sample size was somewhat limited and mothers in this study had a continuous range of ADHD symptoms rather than formal ADHD diagnoses. We were able to compare mothers who did and did not meet symptom criteria for ADHD, and found results that were largely consistent with analyses using continuous symptoms; yet, we did not formally assess functional impairment in mothers. Therefore, it is certainly possible that the findings reported here may not reflect differences between mothers with and without a clinical diagnosis of DSM-IV ADHD.

Also, in this first study of its kind, we focused exclusively on mothers, as mothers more often take primary responsibility for childcare and thus place more demands on children that are likely to elicit negative behavior (Parke 1995). Future studies should also include fathers, as ADHD is more prevalent in males and existing research suggests that paternal ADHD may be associated with the quality of parenting (Arnold et al. 1997). Studies including both mothers and fathers, as well as an adequate sample of both boys and girls with ADHD, could explore potentially interesting gender-of-parent by gender-of-child interactions.

As one of the very first studies examining this question, we chose to exclude mothers with current Axis I diagnoses other than ADHD in order to isolate the relationship between maternal ADHD symptoms and parenting. This decision may limit the generalizability of our findings, given the high rates of other forms of psychopathology (namely, depression) in mothers of children with ADHD and the high rates of comorbidity among ADHD adults presenting to clinical settings (Biederman et al. 1992, 1993; Chronis et al. 2003; Murphy and Barkley 1996). Indeed, two of three mothers who were excluded following the assessment session were excluded on the basis of current major depression. Nevertheless, we attempted to control for continuous depressive symptoms in relevant analyses. Correlations between maternal ADHD and depression symptoms were so high, however, that collinearity was an issue in these analyses. It may be the case that depression symptoms are simply part of the adult ADHD diagnostic picture, particularly among women, that in controlling for BDI-II, we remove variance central to the construct of interest (Miller and Chapman 2001).

We also chose to exclude mothers who were currently taking stimulant medications, both in order to maintain variability in parent behavior during parent-child interactions and to circumvent potential risks associated with asking mothers to attend the clinic assessment unmedicated (e.g., driving; Barkley et al. 2006, 1993). It is possible that, in doing so, we excluded some of the more severe cases of maternal ADHD for which pharmacological treatment has been sought. Despite this, mothers in our sample had a wide range of both inattentive and hyperactive/impulsive symptoms, which allowed us to detect several interesting associations with parenting. Indeed, seventeen percent of our mothers met symptom criteria for ADHD, which allowed us to explore parenting differences among mothers with and without an ADHD diagnosis.

Despite these limitations, this study provides convincing evidence that maternal ADHD symptoms are associated with parenting marked by lower levels of involvement and positive parenting, and higher levels of inconsistent discipline, negative parenting, and excessive commands. Given the high rates of ADHD among parents of children with ADHD (Chronis et al. 2003) and evidence suggesting that parent training outcomes are attenuated for children whose mothers report high levels of ADHD symptoms (Sonuga-Barke et al. 2002), as well as recent research suggesting that early maternal positive parenting protects against the later development of co-occurring conduct problems among children with ADHD (Chronis et al. 2007), it is clear that these findings have important clinical implications. In particular, children with ADHD whose mothers also have ADHD characteristics may be at risk for adverse developmental outcomes and poor response to behavioral treatments. Therefore, it is recommended that maternal ADHD be routinely assessed in families of children with ADHD and that the presence of maternal ADHD should signal the need for creative approaches to parent training that address the mothers' own symptoms which may impact her ability to deliver positive parenting, consistent follow-through, and concise commands. Future clinical research should be directed at novel behavioral and/or pharmacological approaches to simultaneously addressing maternal ADHD symptoms and parenting deficits present in mothers with ADHD (Chronis et al. 2004; Chronis-Tuscano et al. 2008).

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Table 1

Participant Characteristics ($n=70$)

| Variable | Mean (SD) | % |
|---------------------------------|--|------|
| Child characteristics | | |
| Age (years) | 8.06 (1.2) | |
| Sex (male) | | 71 |
| WISC Verbal (scaled score) | 11.20 (3.9) | |
| WISC Performance (scaled score) | 9.61(3.8) | |
| Race/ethnicity | | |
| Caucasian | | 36.2 |
| African-American | | 40.6 |
| Hispanic | | 4.3 |
| Native American | | 1.4 |
| Mixed | | 7.2 |
| Other | | 1.4 |
| Refused | | 8.7 |
| ADHD Diagnosis | | |
| Combined type | | 78.9 |
| Inattentive type | | 15.5 |
| Hyperactive/impulsive type | | 5.6 |
| Comorbidity | | |
| Oppositional defiant disorder | | 47.9 |
| Conduct disorder | | 19.7 |
| Medication status | | |
| On medication | | 65.8 |
| Not on medication | | 34.2 |
| Mother characteristics | | |
| Age | 38.6 (6.1) | |
| Marital status | | |
| Married | | 71 |
| Divorced/separated/other | | 29 |
| Average education level | 3 or more years of college, but did not receive a degree | |
| Average total family income | \$95,000–99,999 (\$70,000–75,000) | |
| Race/ethnicity | | |
| Caucasian | | 45.6 |
| African American | | 45.6 |
| Hispanic | | 7.4 |
| Other | | 1.5 |

WISC Wechsler intelligence scale for children, 4th ed., DBD disruptive behavior disorders rating scale, ADHD attention deficit/hyperactivity disorder, ODD oppositional defiant disorder, CD conduct disorder

Table 2Maternal ADHD Variables ($n=70$)

| | M | SD |
|---|-------|------|
| KSADS (Number of DSM-IV symptoms) | | |
| Self report inattention | 2.52 | 2.61 |
| Self report hyperactive/impulsive | 2.15 | 1.98 |
| Self report ADHD total | 4.67 | 4.07 |
| Collateral report inattention | 1.30 | 2.00 |
| Collateral report hyperactive/impulsive | 1.46 | 1.91 |
| Collateral report ADHD total | 2.76 | 3.45 |
| Or rule inattention | 2.83 | 2.79 |
| Or rule hyperactive/impulsive | 2.81 | 2.22 |
| Or rule ADHD total | 5.64 | 4.45 |
| CAARS (Sum of item responses) | | |
| DSM-IV Inattention | 7.30 | 5.53 |
| DSM-IV Hyperactive | 6.25 | 4.50 |
| DSM-ADHD Total | 13.55 | 9.23 |
| Inattention/memory | 11.06 | 6.57 |
| Hyperactivity/restlessness | 9.13 | 5.79 |
| Impulsive/emotional | 8.72 | 5.32 |
| Self-esteem | 5.32 | 3.91 |

CAARS individual item scale, 0=Not at all, 1=Just a little, 2=Pretty much, 3=Very much

DSM-IV Diagnostic and statistical manual, fourth edition, *ADHD* attention-deficit/hyperactivity disorder, *KSADS* schedule for affective disorders for school-aged children, *CAARS* Conners adult ADHD rating scale

Table 3

Maternal Parenting Variables

| | M | SD |
|---------------------------------|----------|-----------|
| APQ (<i>n</i> =70) | | |
| Involvement | 38.46 | 5.20 |
| Positive parenting | 24.59 | 3.79 |
| Poor monitoring and supervision | 12.46 | 3.54 |
| Inconsistent discipline | 15.07 | 4.05 |
| Corporal punishment | 5.39 | 1.72 |
| DPICS (<i>n</i> =61) | | |
| Play | | |
| Positive parenting | 10.00 | 7.51 |
| Negative parenting | 4.06 | 4.48 |
| Commands | 9.83 | 7.77 |
| No opportunity | 3.44 | 3.80 |
| Homework | | |
| Positive parenting | 9.20 | 8.77 |
| Negative parenting | 5.69 | 4.56 |
| Commands | 14.19 | 8.85 |
| No opportunity | 7.16 | 6.09 |

APQ Alabama parenting questionnaire, *DPICS* dyadic parent–child interaction coding system

Table 4

Correlations Between Maternal ADHD and Parenting Variables

| | Parenting measures | | | | | | | | | | | | | | | | |
|-------------------------------|---------------------|-----------|---------|----------------------------|--------|----------|--------------------------------|---------|----------|----------|---------|---------|----------|----|----|----|----|
| | APQ (<i>n</i> =70) | | | DPICS Play (<i>n</i> =61) | | | DPICS Homework (<i>n</i> =61) | | | NO | | | TC | | | | |
| | IV | PP | FMS | ID | CP | PP | NP | TC | NO | PP | NP | TC | NO | PP | NP | TC | NO |
| KSADS | | | | | | | | | | | | | | | | | |
| Self report inattention | -0.275** | -0.237* | 0.013 | 0.334*** | 0.107 | 0.032 | 0.291** | 0.168 | -0.004 | -0.270** | 0.106 | 0.127 | 0.203 | | | | |
| Self report H/I | -0.151 | -0.266** | -0.038 | 0.375*** | 0.197 | -0.041 | 0.145 | -0.048 | -0.277** | -0.135 | 0.173 | 0.063 | 0.143 | | | | |
| Self report ADHD total | -0.250** | -0.282** | -0.010 | 0.397*** | 0.165 | 0.002 | 0.262* | 0.089 | -0.133 | -0.242* | 0.151 | 0.114 | 0.201 | | | | |
| Collateral report inattention | 0.019 | -0.113 | 0.074 | 0.293** | -0.045 | 0.316*** | 0.143 | 0.113 | -0.012 | -0.156 | -0.072 | 0.073 | 0.186 | | | | |
| Collateral report H/I | 0.041 | -0.036 | -0.042 | 0.032 | -0.188 | 0.304** | -0.153 | -0.036 | -0.020 | -0.096 | -0.037 | 0.014 | 0.178 | | | | |
| Collateral report ADHD total | 0.034 | -0.085 | 0.020 | 0.187 | -0.130 | 0.357*** | -0.002 | 0.047 | -0.081 | -0.146 | -0.063 | 0.051 | 0.209 | | | | |
| Or rule inattention | -0.191 | -0.217* | 0.020 | 0.347*** | 0.030 | 0.058 | 0.247* | 0.072 | -0.029 | -0.262** | 0.054 | 0.180 | 0.264** | | | | |
| Or rule H/I | -0.012 | -0.167 | -0.100 | 0.230* | 0.073 | 0.163 | 0.068 | -0.052 | -0.237 | -0.135 | 0.103 | 0.079 | 0.200 | | | | |
| Or rule ADHD total | -0.126 | -0.219* | -0.037 | 0.332*** | 0.056 | 0.119 | 0.193 | 0.020 | -0.137 | -0.235* | 0.086 | 0.155 | 0.268** | | | | |
| CAARS | | | | | | | | | | | | | | | | | |
| DSM Inattention | -0.300** | -0.214* | 0.038 | 0.292** | 0.049 | 0.126 | 0.274** | 0.145 | 0.013 | -0.078 | 0.157 | 0.288** | 0.326*** | | | | |
| DSM Hyperactive | -0.364*** | -0.459*** | 0.079 | 0.352*** | 0.029 | -0.051 | 0.155 | 0.015 | -0.205 | -0.130 | 0.233* | 0.121 | 0.247* | | | | |
| DSM ADHD Total | -0.357*** | -0.352*** | 0.061 | 0.347*** | 0.044 | 0.051 | 0.241* | 0.095 | -0.092 | -0.110 | 0.208 | 0.232* | 0.328** | | | | |
| Inattention/memory | -0.229* | -0.257** | 0.239** | 0.281** | 0.071 | 0.045 | 0.237* | 0.071 | 0.004 | -0.082 | 0.043 | 0.119 | 0.141 | | | | |
| Hyperactivity/restlessness | -0.223* | -0.308** | -0.111 | 0.339*** | -0.017 | -0.080 | 0.196 | -0.030 | -0.124 | -0.154 | 0.276** | 0.256* | 0.424*** | | | | |
| Impulsive/emotional | -0.242** | -0.413*** | 0.171 | 0.363*** | 0.139 | 0.036 | 0.171 | 0.181 | -0.248* | 0.018 | 0.130 | 0.176 | 0.252* | | | | |
| Self-esteem | -0.311*** | -0.203* | 0.111 | 0.184 | -0.069 | 0.010 | 0.342** | 0.312** | 0.222 | 0.116 | -0.050 | 0.280** | 0.202 | | | | |

APQ Alabama parenting questionnaire, DPICS dyadic parent-child interaction coding system, KSADS schedule for affective disorders and schizophrenia, IV involvement, PP positive parenting, PMS poor monitoring and supervision, ID inconsistent discipline, CP corporal punishment, NP negative parenting, TC total commands, NO no opportunity commands, HI hyperactivity/impulsivity, ADHD attention-deficit/hyperactivity disorder, CAARS Conners' adult ADHD rating scale, DSM diagnostic and statistical manual of mental disorders, fourth edition.

* $p < 0.10$

** $p < 0.05$

100

 $p < 0.001$

 $p < 0.01$

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Table 5
 Correlations Between Maternal Inattention, Hyperactivity/Impulsivity, and Depressive Symptoms (*n*=70)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------------------|----------|----------|----------|----------|----------|----------|---|
| KSADS | | | | | | | |
| 1. Or rule inattention | X | | | | | | |
| 2. Or rule H/I | 0.573*** | X | | | | | |
| 3. Or rule ADHD total | 0.912*** | 0.858*** | X | | | | |
| CAARS | | | | | | | |
| 4. DSM Inattention | 0.687*** | 0.302* | 0.582*** | X | | | |
| 5. DSM Hyperactive | 0.529*** | 0.424*** | 0.544*** | 0.689*** | X | | |
| 6. DSM ADHD Total | 0.669*** | 0.387** | 0.614*** | 0.936*** | 0.901*** | X | |
| BDI | | | | | | | |
| 7. BDI Total | 0.420*** | 0.308** | 0.417*** | 0.401** | 0.503*** | 0.486*** | X |

KSADS Schedule for affective disorders for school-aged children, H/I hyperactivity/impulsivity, ADHD attention-deficit/hyperactivity disorder, CAARS Conners' adult ADHD rating scale, DSM diagnostic and statistical manual of mental disorders, fourth edition, BDI Beck depression inventory

* *p*<0.05

** *p*<0.01

*** *p*<0.001

Table 6
Results of Regression Analyses Predicting Parenting from Maternal ADHD symptoms

| CAARS | | KSADS | | | |
|---|-----------------------|----------|-----------|-----------------------|----------------|
| | <i>r</i> ² | <i>A</i> | <i>B</i> | <i>r</i> ² | <i>B</i> |
| Alabama Parenting Questionnaire (<i>n</i> =70) | | | | | |
| Positive parenting | | | | | |
| Step 1 | Total ADHD | 0.124 | -0.352*** | Total ADHD | 0.048 |
| | | | | Step 1 | -0.219* |
| Inconsistent discipline | | | | | |
| Step 1 | BDI | 0.140 | 0.270** | Step 1 | BDI |
| | | | | Step 2 | 0.286** |
| Step 2 | Total ADHD | 0.036 | 0.216* | Total ADHD | 0.038 |
| | | | | | 0.214* |
| Involvement | | | | | |
| Step 1 | Total ADHD | 0.128 | -0.357*** | | |
| DPICS (<i>n</i> =61) | | | | | |
| HW No opportunity | | | | | |
| Step 1 | Child deviance | 0.204 | 0.392*** | Step 1 | Child ODD Dx |
| | | | | Step 2 | 0.344*** |
| Step 2 | Total ADHD | 0.046 | 0.223* | Total ADHD | 0.040 |
| | | | | | -0.202 |
| HW Commands | | | | | |
| HW No opportunity | | | | | |
| Step 1 | Child deviance | 0.135 | 0.332*** | Step 1 | Child deviance |
| | | | | Step 2 | 0.409*** |
| Step 2 | Total ADHD | 0.158 | 0.157 | Total ADHD | 0.022 |
| | | | | | 0.153 |
| FP Negative parenting | | | | | |
| | | | | Step 1 | Total ADHD |
| | | | | | 0.099 |
| | | | | | 0.314** |

ADHD Attention deficit/hyperactivity disorder, CAARS Conners adult ADHD rating scale, KSADS modified schedule for affective disorders for school-aged children, BDI Beck depression inventory-II, DPICS dyadic parent child interaction coding system, HW homework situation, FP free play segment

* *p*<0.10
 ** *p*<0.05
 *** *p*<0.01