MOTHER-SON INTERACTIONS IN FAMILIES OF CHILDREN WITH
ATTENTION-DEFICIT/HYPERACTIVITY DISORDER

by

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Abstract

This study compares a general pattern or style of parenting behaviors, termed responsiveness, in mothers of sons with comorbid Attention-Deficit/Hyperactivity Disorder (ADHD) and Oppositional Defiant Disorder (ODD), mothers of sons with ADHD only, and mothers of nonproblem sons. Participants include 87 mothers with sons ranging in age from 7 to 9 years. Twenty-five sons were in the comorbid ADHD and ODD group, 24 in the ADHD group, and 38 had no behavioral difficulties. Mothers were videotaped in a small laboratory room while playing with their sons and engaging in a clean up task with them. Maternal responsiveness was assessed using a previously developed observational coding protocol. Mothers of sons with comorbid ADHD and ODD were found to be significantly less responsive than mothers of nonproblem control sons. However, mothers of sons with only ADHD were neither significantly less responsive than mothers of nonproblem sons, nor significantly more responsive than mothers of sons with ADHD and ODD. This study replicated previous findings of mothers using more positive affective tone and being more involved in the free play compared to the clean up condition, offering further validation for the maternal responsiveness coding protocol. This study builds upon existing literature finding greater disruption in parenting behavior in families of children with ADHD and ODD compared to families of nonproblem children. The results of this study highlight the importance of distinguishing families of children with ADHD and ODD from families of children with ADHD only, particularly when examining parenting variables. The findings of this study offer some support for the clinical utility of including responsiveness training as a component of parent training interventions for ODD in children with ADHD.
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Introduction

Many parents will attest that raising their child has been one of the most challenging, albeit rewarding, experiences of their adult lives. When a child has behavioral difficulties, such as those associated with Attention-Deficit/Hyperactivity Disorder (ADHD) or Oppositional Defiant Disorder (ODD), the daily challenges of family life place even greater demands on parents' resources. This paper begins with a brief discussion of ADHD and ODD, their associated risks, and the role of family environments in shaping symptom expression, followed by a summary of the research on parent-child interactions. Over the past 3 decades, two lines of research on parenting and child development have emerged. One body of research, much of it reflecting social learning theory, has investigated parenting by measuring the frequency of discrete parenting behaviors, such as commands (Patterson, 1982). The second line of research, driven by a more developmental focus, has studied more generalized levels of parenting behavior or style and allows researchers to consider both the specific parenting behavior and its appropriateness in the context of the parent-child interaction (Darling & Steinberg, 1993). Among families of children with behavioral difficulties, researchers have reported differences in both the frequency of discrete parenting behaviors and in more generalized parenting style compared to families of nonproblem children (e.g. Gomez & Sanson, 1994; Shaw, Owens, Giovannelli, & Winslow, 2001). The primary objective of this study is to compare one form of generalized parenting style, termed responsiveness, among mothers of sons with ADHD and comorbid ODD, mothers of sons with ADHD alone, and mothers of sons without behavioral difficulties.
Characteristics of ADHD

Children with ADHD represent approximately 4% of the elementary-school aged population and account for a significant number of referrals to children's mental health services (American Psychiatric Association, 1994). ADHD is characterized by developmentally inappropriate levels of sustained attention, impulsivity, and poor regulation of motor activity in relation to situational demands (American Psychiatric Association, 1994). Diagnostic criteria require that these symptoms be present before 7 years of age, impair the child's functioning, occur cross-situationally, and have persisted for at least 6 months. Epidemiological research has found that in community samples, boys are three times more likely than girls to be diagnosed with ADHD (Szatmari, Offord, & Boyle, 1989b). However, in clinical samples of children who have been referred for treatment of ADHD, boys outnumber girls six to one (Barkley, 1998). ADHD is now regarded as a chronic condition and 60% of children with ADHD continue to have symptoms as adults (Weiss & Hechtman, 1993).

ADHD in children can present as developmentally inappropriate elevations of two groups of symptoms: inattention and hyperactivity-impulsivity (American Psychiatric Association, 1994). Examples of symptoms of inattention include: failing to pay attention to details, making careless mistakes, and not listening. Hyperactive-impulsive symptoms include: fidgeting, being out of one's seat, running or climbing excessively, talking excessively, difficulty waiting one's turn or blurting out answers before a question has been completed. ADHD can present as three distinct subtypes: 1) combined subtype, where the child displays six or more symptoms in both of the inattentive and hyperactive-impulsive groups; 2) predominantly inattentive subtype, characterized by the child
displaying at least six of the inattentive symptoms and less than six of the hyperactive-impulsive symptoms; and 3) predominantly hyperactive-impulsive subtype, where the child displays at least six of the hyperactive-impulsive symptoms and less than six of the inattentive symptoms. Children with ADHD are at increased risk for several concurrent difficulties and negative outcomes. ADHD is associated with conduct problems and oppositional and defiant behaviors. As many as 50 to 70% of children with ADHD have a comorbid conduct disorder (CD) or ODD (Biederman, Newcorn, & Sprich, 1991). ADHD also is associated with low academic achievement (Szatmari, Offord, & Boyle, 1989a; Wilson & Marcotte, 1996), increased legal problems (Weiss & Hechtman, 1993), substance abuse problems (Weiss & Hechtman, 1993; Wilson & Marcotte, 1996), poor peer acceptance, and disrupted parent-child relationships (Buhrmester, Camparo, Christensen, Gonzalez, & Hinshaw, 1992; Johnston, Pelham, & Murphy, 1985; Szatmari et al., 1989a).

Children with ODD are characterized by a pattern of disobedient, hostile, negativistic, and defiant behavior. To be diagnosed with ODD, children must present with elevated levels of at least four of eight symptoms and symptoms must occur more frequently than is typical among other children of the same developmental level (American Psychiatric Association, 1994). Examples of some of the eight symptoms include: often loses temper, argues with adults, deliberately annoys other people, and often is touchy or easily annoyed (American Psychiatric Association, 1994). ODD is distinguished from more severe CD by a lesser intensity of aggressive and defiant behaviors, as well as the absence of the serious violations of the rights of others, which occur with CD.
Role of Parenting Behavior in the Expression of ADHD and ODD Symptoms

ADHD is believed to have multiple etiologies, most of which are biologically based, including genetic factors, prenatal exposure to cigarette smoke (see Barkley, 1998, for a review of studies; also Millberger, Biederman, Faraone, Chen, & Jones, 1996), and pregnancy or birth complications (Barkley, DuPaul, & McMurray, 1990; Hartsough & Lambert, 1985). However, expression of problems associated with ADHD, for example ODD, appears to have a stronger relationship with social and environmental factors than with biological factors (Anderson, Hinshaw, & Simmel, 1994; August, Realmuto, Joyce, & Hektner, 1999; Barkley, 1998; Campbell, Breaux, Ewing, & Szumowski, 1986; Johnston & Mash, 2001). The development of ODD in children appears to be strongly related to family variables such as coercive parenting, parental psychopathology, marital conflict, and less family cohesion (Moffitt, 1990; Whalen & Henker, 1999; see also Carlson, Tamm, & Hogan, 1999, for a review of studies).

Children's strategies of self-regulation and interaction are strongly related to their socialization and to parental use of control (Kuczynski, Kochanska, Radke-Yarrow, & Ginius-Brown, 1987). These parental factors may be particularly salient for children with ADHD who experience difficulty with internalizing strategies for self-regulation and self-control (American Psychiatric Association, 1994; Anastopoulos, DuPaul, & Barkley, 1991; Barber, Milich, & Welsh, 1996) and the development of non-coercive strategies for controlling others (Winsler, 1998). Pettit and Bates state: "disciplinary encounters between parents and their children provide a crucial context for the learning of strategies for controlling oneself and for controlling others" (1989, p. 413).
Both the presence of negative parental behaviors, as well as the absence of positive parenting behaviors, can contribute to child behavior problems. Pettit and Bates (1989) hypothesize that behavioral problems, characterized by child noncompliance, become established in families where the mother is low in positive involvement with the child and the child is socially demanding. Maternal negativity, for example maternal statements or actions signifying discouragement, nonacceptance, or disapproval of the child's activities, has been found to predict ODD behaviors in boys with ADHD even with the effects of child negative behavior and maternal psychopathology controlled (Anderson et al., 1994). Similarly, longitudinal research has found that negative and directive parental behavior in the child's preschool years predict maternal and teacher reports of children's hyperactive and aggressive behaviors at ages 4, 5 and 6 years (Campbell et al., 1986). In addition, negative maternal affect and intrusive controlling behavior toward children at age 4 predicted hyperactive and noncompliant behaviors at age 9 (Campbell, Pierce, Moore, Marakovitz, & Newby, 1996). Because of their difficulty developing prosocial styles of interaction and internalizing self-control strategies, children with ADHD may be particularly sensitive to the negative outcomes associated with the absence of positive parenting behaviors and/or the presence of negative parenting behavior. It appears that conceptualizing the etiologies of ADHD and comorbid behavioral disorders as "involving active transaction across biologic, cognitive, familial, and social/environmental levels [is] likely to yield greater explanatory power for the genesis and progression of attention deficits, hyperactivity, and associated aggression than are static disease-entity notions" (Hinshaw, 1994, p. 6).
Research on Parent-Child Interactions

Discrete parenting behaviors, such as commands, praise or displays of affection, that are directed at a child are one component of an overarching context of parenting style that includes more molar aspects of parenting behaviors and attitudes (Darling & Steinberg, 1993). Baumrind (1967) characterized parenting style as representing two conceptually distinct dimensions: parental restrictiveness and parents' willingness to socialize their child by engaging in behaviors that promote the internalization of parental standards. Baumrind distinguished authoritarian, authoritative, and permissive parenting styles as three qualitatively different types of parental control. Baumrind (1967) viewed authoritative parents as the most beneficial to children and found that the set of practices associated with this style of parenting reached beyond parental control to include maturity demands, communication style, and nurturance. Baumrind (1967) posited that groups of parents who differ in specific behaviors, such as the way they used control, differ along other dimensions as well, and she used the term parenting style to describe this generalized context of parenting behaviors.

Maccoby and Martin (1983) built upon Baumrind's approach and conceptualized parenting along two orthogonal dimensions: responsiveness and demandingness. Responsiveness can be characterized as contingent responding to the child's behavior or "as parental sensitivity and adaptation to the child's signals, states, and needs…" (Maccoby & Martin, 1983, p. 39). Demandingness represents parental expectations of the child's integration into the family, and is reflected in parents' maturity demands, supervision, disciplinary efforts, and confrontation of child misbehavior (Maccoby & Martin, 1983). In their meta-analysis examining parenting style and child externalizing
behaviors, Rothbaum and Weisz (1994) identified responsiveness and restrictiveness as overarching dimensions of parenting style. Patterns of parenting behaviors that would be characteristic of responsiveness are parental approval of their child, synchrony of communication, affection, and noncoercive or authoritative control.

Looking at parenting style may provide more or different information about ongoing parent-child interactions and their relation to child behavior compared to looking at the frequency of discrete parenting behaviors in isolation (Pettit & Bates, 1989). Research in developmental psychology has suggested that aspects of parenting such as responsiveness and affective quality are positively associated with child compliance (Parpal & Maccoby, 1985; Wahler & Meginnis, 1997) and increased dyadic satisfaction between mother and child (Parpal & Maccoby, 1985). Responsive parent behaviors such as anticipatory guidance of the child, monitoring of the child's activities and expression of affection, also may provide an important context for the prevention of problem behaviors (Pettit & Bates, 1989). The absence of positive, responsive parental behaviors may be as important in the development of child behavior problems as is the presence of specific negative parent behaviors (Carlson, Jacobvitz, & Sroufe, 1995; Pettit & Bates, 1989). This line of reasoning has been supported by Rothbaum and Weisz (1994) who reported that low parental responsiveness, but not parental restrictiveness, predicted increases in child externalizing behavior.

Aspects of responsiveness in parenting, such as the acuity of monitoring of child behavior and the resulting adjustment and appropriateness of parenting behavior cannot be assessed when looking at the frequency of discrete parenting behaviors. Examining discrete parenting behaviors assesses whether parents provide praise or if they are engaged
in controlling behavior, but fails to consider if these behaviors are well-timed or appropriate to the situational demands and the child's needs. Looking at the goal, the overall intention, or the psychological meaning of the parent-child interaction allows the researcher to assess these more general aspects of parenting style (Kuczynski, et al., 1987; Pettit & Bates, 1989). Other parenting behaviors that may exemplify responsiveness include parental sensitivity to the developmental requirements of a task, providing praise and affection appropriate to the child's maturity level, and the ability to engage the child in joint-problem solving by using scaffolding, a non-directive style of assistance that provides support for the child's autonomy and self-regulation (Winsler, 1998). Parents who are high on responsive behavior would be able to accurately monitor child behavior and withdraw adult control and assistance as soon as the child is able to take on responsibility for a task, or they may assist their child with tasks by using conceptual questions. By looking at responsiveness in the parent-child interaction, parental behavior can be assessed for its appropriateness in both perceiving and addressing the child's needs.

**Parenting in Families of Children with ADHD or ADHD and ODD**

As previously mentioned, the connections between parenting and children's behavior problems may be particularly important for children with ADHD. Johnston and Mash (2001) have hypothesized that responsive and sensitive parenting in families of children with ADHD may protect against the associated risks of developing CD, ODD, or other aggressive or antisocial behaviors. In addition, children with ADHD who may have little predisposition to ODD but who live in a chaotic and unresponsive family environment may show ODD symptoms that are intensified to clinically significant levels (Johnston & Mash, 2001). Longitudinal research following a sample of lower socio-
economic status families from infancy to the child's early school years, reported that maternal insensitivity and overstimulation or nonresponsive physical intimacy during infancy predicted both distractible and hyperactive child behavior at follow-up, even when the effects of child temperament were controlled (Carlson et al., 1995). Other research has reported that after controlling for the effects of infant and family risk factors, the absence of maternal responsiveness in infancy, predicted children's subsequent CD or ODD, but not ADHD at age 10 (Wakschlag & Hans, 1999).

Comorbid ADHD and ODD in children appears to be associated with the greatest disturbances in family functioning, compared to children with ADHD or to nonproblem children (Anastopoulos, Guevremont, Shelton, & DuPaul, 1992; Lindahl, 1998; Paternite, Loney, & Roberts, 1995). However, families of children with only ADHD also report more family problems compared to families of nonproblem children, although such differences have not been detected as consistently in the literature (e.g. Anastopoulos et al., 1992; Gomez & Sanson, 1994; Johnston & Mash, 2001). For example, parents of children with comorbid ADHD and ODD reported significantly greater stress than parents of children with ADHD, and both groups reported significantly more stress than parents of nonproblem children (Anastopoulos et al., 1992). However, families of children with comorbid ADHD and ODD reported significantly greater family conflict, marital dissatisfaction, conflict over child rearing, and lower levels of family cohesion compared to families of children with ADHD and families of nonproblem children (Lindahl, 1998; Paternite et al., 1995).

In addition to difficulties in general family functioning, parents of children with ADHD and ODD, and parents of children with ADHD alone, experience more difficulty
with parenting compared to parents of nonproblem children. Lindahl (1998) reported that parents of children with only ADHD and parents of children with comorbid ADHD and ODD displayed greater rejection-coercion than did parents of nonproblem children. In addition, parents of children with comorbid ADHD and ODD were less able to structure and/or regulate their sons' behavior and were more likely to employ a more lax and inconsistent parenting style compared to parents of children with ADHD or nonproblem children (Lindahl, 1998). Gomez and Sanson (1994) reported that mothers of children with comorbid ADHD and ODD or CD had more negative mother-child interactions compared to mothers of children with ADHD alone and mothers of nonproblem children. The authors detected no significant differences between the mother-child interactions of mothers of children with ADHD and mothers of nonproblem children. Other research has found that mothers of 6-year-old boys with comorbid ADHD and ODD or CD were significantly more rejecting when their sons were 2 years of age, compared with mothers of sons with only ADHD or no behavior problems (Shaw et al., 2001). In contrast, Johnston (1996) found that parents of children with both comorbid ADHD and ODD and parents of children with only ADHD reported poorer parenting practices compared to parents of nonproblem children. In summary, parents of comorbid children appear to display the most inconsistent or negative parenting behaviors and parents of nonproblem children appear to be the lowest, with parents of children with ADHD falling in the middle.

The greater disruption and difficulty with parenting in families of children with ADHD and comorbid ADHD and ODD compared to families of nonproblem children may be partly a result of the difficulty parents encounter in coping with their child's ADHD
symptoms, a difficulty that may be further intensified by the presence of oppositional behaviors. Johnston and Mash posit that "the stressful, demanding, and intrusive nature of the child's ADHD characteristics is likely to evoke negative reactions from other family members and to exert a disruptive influence on family members and on the psychological functioning of parents" (2001, p. 185). The relationship between family functioning and child characteristics is probably bi-directional, and a transactional relationship may evolve between ADHD symptoms, disrupting family functioning and family factors amplifying and maintaining symptoms of both ADHD and ODD (Johnston & Mash, 2001).

Responsive Parenting of Children with Comorbid ADHD and ODD Versus ADHD Alone

The differences in frequency of discrete parenting behaviors among parents of children with ADHD and ODD, ADHD only, and nonproblem children noted in the previous section may coincide with differences in more global aspects of parenting style. Johnston and colleagues (2002) propose that because responsiveness relates to parents' ability to monitor and adapt to child behavior, parents of children with ADHD may have particular difficulty being responsive due to their child's disorganized and poorly-regulated behavior. Winsler (1998) reported that compared with mothers of nonproblem boys, mothers of boys with ADHD exhibited poorer quality of scaffolding during a teaching task, including failing to modify task demands and provide assistance appropriate to the child's skill level. Mothers of children with ADHD were less likely to withdraw control when it was no longer needed and used more negative verbal control strategies compared to mothers of nonproblem children (Winsler, 1998). These findings provide support for the hypothesis that mothers of children with ADHD are somewhat impaired in their ability to effectively monitor, interpret, and respond to their child's behavior. The
current study will expand on Winsler's (1998) findings by differentiating between mothers of sons with comorbid ODD behaviors and ADHD, mothers of sons with ADHD, and compare these two groups with each other and mothers of nonproblem sons.

Johnston and colleagues (Johnston, Murray, Hinshaw, Pelham & Hoza, 2002) reported that maternal responsiveness was negatively related to conduct problems among children with ADHD. This effect was present even after controlling for the variance in responsiveness due to family demographic characteristics, severity of child ADHD symptoms, maternal depression, and maternal childhood ADHD symptoms. The authors did not find that maternal responsiveness was associated with the severity of ADHD symptoms (Johnston et al., 2002). Johnston and colleagues' study compared maternal responsiveness among mothers of sons with comorbid ADHD and ODD and mothers of sons with ADHD. However, the study did not include a comparison group of mothers of nonproblem sons and the absence of an association between responsiveness and ADHD may have been the result of little variation in ADHD symptoms. By comparing mother-son interactions of sons with comorbid ADHD and ODD behaviors, sons with ADHD, and sons without behavior problems, the current study adds to our understanding not only of the association between maternal responsiveness and child ODD, but also between responsiveness and child ADHD symptoms.

Research Questions

This study compared maternal responsiveness among three groups of mothers: mothers of sons with comorbid ADHD and ODD behaviors, mothers of sons with ADHD, and mothers of sons without behavioral difficulties. Building on previous research examining parent-child interactions in families of children with ADHD, it was predicted
that a continuum of disturbance in family functioning would be present with mothers of sons with comorbid ADHD and ODD behaviors exhibiting the greatest disruption in maternal responsiveness and mothers of nonproblem sons being the most responsive (Johnston & Mash, 2001; Johnston et al, 2002). The primary hypothesis of this study was that mothers of sons with comorbid ADHD and ODD would be significantly less responsive compared to mothers of nonproblem control sons. A second, exploratory hypothesis of the current study was that mothers of sons with ADHD would also be less responsive compared to mothers of nonproblem sons, but more responsive than mothers of sons with comorbid ADHD and ODD.

A minor objective of this study is to further validate the coding system for maternal responsiveness developed by Johnston and colleagues (2002) by examining differences in responsiveness across situations. In their study, Johnston and colleagues measured maternal responsiveness during four tasks. For the free play period, toys and magazines were available in the room and mothers were instructed to play with their sons as they would at home. During the parent busy period, mothers were instructed to complete questionnaires while having their sons sit quietly. For the paper and pencil task, mothers instructed their sons to work on either a math or handwriting task. During the clean up period, mothers had their sons put away toys and pick up small paper dots off of the floor. The authors detected situational effects for several elements of maternal responsiveness including: maternal sensitivity of control and use of authoritative control, maternal positive affect toward the child, maternal involvement with child, and the percentage of intervals where mothers used no control (Johnston et al., 2002). The current study examined maternal responsiveness using only the clean up and free play situations.
These two tasks were selected from the four tasks used by Johnston and colleagues because they provided the greatest distinction in situational requirements for parental control. Because of the unstructured nature of the free play condition compared to the specific task requirements of the clean up condition, one would expect that mothers would use the most control during the clean up task and the least control during free play. It was anticipated that during the free play condition, mothers would use significantly more authoritative methods of control and show more positive affect compared to the clean up task. Mothers were predicated to show less involvement during the clean up condition.

Method

Participants

Mothers and sons were recruited using posters in community centres, ads in local papers, school newsletters, and visits by lab members to ADHD parent support group meetings. Mothers and sons participated as part of an ongoing study of mother-son relationships in families of children with ADHD and nonproblem children. To be eligible for inclusion, sons had to be between 7 and 9 years of age, and could not have any pervasive developmental delays or cognitive impairments, and mothers and sons were both required to have spoken English for at least 3 years. In addition, sons who were taking short-acting stimulant medication for symptoms of ADHD were required to be off medication for at least 24 hours prior to participating in the study.

Participants included 87 mother-son pairs: 25 mothers of sons with ADHD and ODD behaviors, 24 mothers of sons with ADHD only, and a comparison group of 38 mothers of nonproblem sons. Mothers provided demographic information about their families. Characteristics assessed included: maternal education, marital status, ethnicity,
and the number of other children in the family. Socioeconomic status (SES) was assessed using the Hollingshead Four-Factor Index of Social Status (Hollingshead, 1975), with higher values indicating a lower SES status. Means for child age, number of other children in the family and SES were generated for the three groups (see Table 1). No significant differences were found for child age \( F(2,84) = 2.95, p > .05 \), number of other children in the family \( F(2,84) = .44, p > .65 \), or for SES \( F(2,84) = .82, p > .05 \). Frequencies were compared using Chi-square analyses for marital status, maternal education, and cultural identity (Canadian, European-cdn, European, Asian and Other). Mothers filled in a blank to indicate their cultural group, and groups for the analyses were compiled cultural labels provided by the mothers. No significant differences among groups were found.

Sons in the comparison group had T-scores less than 70 on the internalizing or externalizing problems subscales of the Child Behavior Checklist (CBCL; Achenbach, 1991) and mothers reported their son as experiencing three or less of the DSM-IV diagnostic criteria for ODD (American Psychiatric Association, 1994). Sons in the ADHD group were screened for inclusion using maternal report that a qualified professional diagnosed the ADHD and maternal ratings on the ADHD-IV Rating Scale (ADHD-IV; DuPaul, Anastopoulos, & Reid, 1998). The ADHD-IV is an 18-item questionnaire asking about the child behaviors that compose the DSM-IV diagnostic criteria for ADHD (American Psychiatric Association, 1994). Items enquire about hyperactive-impulsive symptoms and symptoms of inattention. Mothers indicated on the questionnaire using a Likert-type scale (0 = Not at all, 1 = Just a little, 2 = Pretty much, 3 = Very much) how frequently their child displays each symptom. The ADHD-IV also
Table 1

*Group Means on Demographic Variables*

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADHD &amp; ODD  (n =25)</th>
<th>ADHD (n =24)</th>
<th>Nonproblem (n =38)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s age in months</td>
<td>103.16 (10.31)</td>
<td>101.71 (10.69)</td>
<td>97.00 (10.70)</td>
</tr>
<tr>
<td>Number of other children</td>
<td>1.05 (.85)</td>
<td>1.00 (.94)</td>
<td>1.21 (.89)</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>41.69 (13.78)</td>
<td>45.69 (10.85)</td>
<td>45.26 (11.80)</td>
</tr>
<tr>
<td>Percent single mothers</td>
<td>20.83</td>
<td>25.00</td>
<td>19.51</td>
</tr>
<tr>
<td>Cultural Identity (percent)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canadian</td>
<td>60.87</td>
<td>40.91</td>
<td>39.02</td>
</tr>
<tr>
<td>European-Cdn</td>
<td>21.74</td>
<td>31.82</td>
<td>26.83</td>
</tr>
<tr>
<td>European</td>
<td>8.69</td>
<td>9.09</td>
<td>12.19</td>
</tr>
<tr>
<td>Asian or South Asian</td>
<td>0</td>
<td>9.09</td>
<td>14.63</td>
</tr>
<tr>
<td>Other</td>
<td>8.69</td>
<td>9.09</td>
<td>7.31</td>
</tr>
<tr>
<td>Mother’s education (percent)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or less</td>
<td>37.5</td>
<td>16.67</td>
<td>21.95</td>
</tr>
<tr>
<td>Partial college</td>
<td>25.00</td>
<td>29.17</td>
<td>19.51</td>
</tr>
<tr>
<td>University grad.</td>
<td>37.50</td>
<td>54.17</td>
<td>58.54</td>
</tr>
</tbody>
</table>

asks about the age of onset of symptoms and the child's level of impairment as a result of the symptoms. Mothers were considered to endorse a symptom if they rated their sons as displaying the characteristic behavior “Pretty much” or “Very much” of the time. To assess cross-situationality of symptoms, mothers were asked if another adult, typically a schoolteacher, had seen their son when he is not medicated for ADHD symptoms. If another adult had seen the child off medication, mothers were asked to respond to each
question on the ADHD-IV indicating how frequently the other adult would report these symptoms occurring. Sons were included in the ADHD group if mothers reported their sons having at least six symptoms on the inattentive and/or hyperactive-impulsive dimensions that had been present for at least 6 months, the presence of symptoms across two or more situations (as indicated by mothers’ recall of teacher reports), onset before age 7, and the symptoms impairing the child’s functioning. Parent ratings on the ADHD-IV have demonstrated good reliability, Cronbach’s $\alpha = .94$, and criterion validity when correlated with the Hyperactivity Index of the Conners Parent Rating Scale – 48, Pearson $r = .80$ (DuPaul et al., 1998).

The presence of ODD behaviors was assessed using an 8-item scale that has been constructed in a similar manner to the ADHD-IV and composed of DSM-IV criteria for ODD (American Psychiatric Association, 1994). Like the ADHD-IV, mothers indicated on the same 4-point Likert-type scale how frequently their son displayed each symptomatic behavior. Mothers were considered to endorse a symptom if they rated their sons as displaying the characteristic behavior “Pretty much” or “Very much” of the time. Sons were included in the comorbid ADHD and ODD group if they met the above criteria for ADHD and mothers reported their son displaying four or more of the diagnostic criteria for ODD. The rating scale for ODD has demonstrated good reliability, with Cronbach’s $\alpha = .81$ in a sample of mothers of sons with ADHD (Johnston, Scoular, & Ohan, 2003).

The sample of ADHD children who participated in this study is unusual because they were neither a pure community nor clinical sample. It is not a clinical sample because participants were not recruited through referrals for treatment. However, all the
sons with ADHD experienced severe enough symptoms to have been diagnosed and received treatment at some time, which distinguishes this sample from a nonreferred community sample.

Procedure

This research was approved by my University's ethics review committee. Mothers gave written consent and sons gave written assent to participate. When mothers initially contacted the lab to enquire about participating in the study, a research assistant administered the screening criteria. If the family met criteria for inclusion in the study, mothers and sons visited the parenting lab where they engaged in the experimental tasks described in the following section. Mothers took the CBCL home to complete and returned it by mail. All sons were given a t-shirt for their participation and mothers were reimbursed $20.00 for their transportation expenses.

Mothers were videotaped interacting with their sons in a small laboratory room. The room was arranged to resemble a living room in a home and was equipped with plants, a sofa, a desk, area rug, and numerous toys. The video camera was located behind a one-way observation mirror. Mothers and sons were observed while engaging in three conditions: free play, cooperative game, and clean up. For the free play condition, mothers were instructed to play with their sons as they would at home and were given 7 minutes to play together. During the 3-minute cooperative game, mothers were instructed to teach their sons how to play the tabletop game "Topple" and to take turns playing the game. The clean up task occurred for 5 minutes and mothers were instructed to have their sons pick up toys and pieces of confetti from the floor of the laboratory. Only the free play and clean up conditions were coded for maternal responsiveness. The experimenter
provided mothers with both written and verbal instructions for the cooperative game and clean up tasks.

**Measures**

*Observations.* Maternal responsiveness was assessed using a slightly modified version of the observational coding system developed by Johnston and colleagues (2002). Maternal behavior was coded on six dimensions. Each dimension was measured on a 7-point rating scale, with higher scores reflecting more of the construct measured: 1) Style of Control reflects the extent to which the mother used an authoritative method of controlling the child's behavior. Mothers rated low on this dimension used an autocratic style of control. A mother who uses autocratic control imposes high levels of structure on her child's activities, by using control strategies ranging from direct, harsh commands (without explanations) to physical restraint. In contrast, mothers rated as high in Style of Control encourage their children to participate in decision-making and offer explanations for commands. This dimension was modified slightly from the coding protocol used by Johnston and colleagues (2002). Johnston and colleagues designated a low score on Style of Control to reflect permissive parenting, mid range scores to reflect autocratic parenting and high scores to reflect authoritative control. However, Johnston and colleagues did not detect any permissive parenting in their sample, prompting adjustment of the coding protocol for the current study; 2) Sensitivity of Control assesses the degree to which mothers exerted control in a manner that was sensitive to the child's needs and abilities. This rating also considers how much control is required by the situation. For example, the clean up task would require greater control than the more child-directed free play task. Mothers low on Sensitivity of Control make demands or exert a level of control that is
inappropriate for the situation (e.g. being very restrictive during free play or not using enough control during clean up). Mothers high in Sensitivity of Control are able to match their instructions to the child's level and only intervene when the child requires assistance;

3) Responsiveness refers to a mother's overall ability to appropriately adapt her behavior to her child's abilities, needs and requests as well as his ongoing behavior. Mothers low in Responsiveness are intrusive and their behavior is more likely to be driven by their own agenda rather than the child's needs and behaviors. In contrast, mothers high in Responsiveness are able synchronize their behavior with the affect, ability, or desire of their child, even if this means deviating from the instructions given; 4) Affective Tone measures mother's verbal and nonverbal emotional expression in the interaction. Mothers who display frequent negative affect (e.g. anger, sadness) would receive low scores on this dimension, whereas high scores indicate frequent and/or intense positive affect (e.g. happiness, warmth). Neutral scores reflect relatively equal amounts of negative and positive affect or neutral affect; 5) Acceptance of Child reflects the degree to which mothers praised their sons or showed approval or affection. Mothers with low scores on this dimension are characterized as cold and rejecting and may make negative comments or express disapproval of their sons' behavior in a derogatory manner. Mothers high on acceptance display genuine positive feelings for their sons and praise their efforts regardless of the outcome; 6) Involvement with Child assesses the amount of time mothers spend in verbal and nonverbal interactions with their sons. Mothers low on this dimension engaged in independent activities (e.g., reading a magazine while the son plays), whereas mothers high on this dimension will remain in close proximity to their children or engaged in conversations with them. The number of 1-minute intervals in free play and clean up
where mothers did not engage in any control was recorded and percentage of no control was calculated for the free play and clean up situations.

Three independent coders coded videotaped interactions between mothers and sons. Two of the coders were senior undergraduate students in psychology and the third coder was the study's principal investigator. Coders began by watching the entire interaction to gain a sense of the child's needs and abilities. Coders then viewed the interaction a second time, stopping at 1-minute intervals to rate the mother's behavior on the six dimensions. Ratings were based on verbal content of the interaction, nonverbal actions, and emotional cues such as tone of voice and posture.

Coders were trained using the manualized coding protocol developed by Johnston and colleagues (2002). Training continued until a minimum 80% agreement (defined as coder ratings within one-point of each other on the 7-point scale) across the six dimensions was reached between independent coders. Coders met twice a week for coding meetings and random reliability checks continued throughout the collection of data to ensure that coders did not drift in their ratings of maternal behavior. Reliability was assessed on 39% of randomly sampled sessions and the coders did not know which sessions were being tested for reliability. Interrater reliability was assessed using intraclass correlations. Intraclass correlations for each of the six dimensions are presented in Table 2.

The two undergraduate coders were unaware of the research question of interest and all three coders were blind to which sons in the mother-son dyads had been diagnosed with ADHD or comorbid ADHD and ODD behaviors. Although symptoms of ADHD and comorbid ADHD and ODD form characteristic patterns of child behavior, enough overlap
Table 2

_Intraclass Correlations for the Six Dimensions of Responsiveness_

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Free Play</th>
<th>Clean Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style of Control</td>
<td>.75</td>
<td>.93</td>
</tr>
<tr>
<td>Sensitivity of Control</td>
<td>.89</td>
<td>.84</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>.92</td>
<td>.93</td>
</tr>
<tr>
<td>Affective Tone</td>
<td>.74</td>
<td>.92</td>
</tr>
<tr>
<td>Acceptance</td>
<td>.82</td>
<td>.94</td>
</tr>
<tr>
<td>Involvement</td>
<td>.96</td>
<td>.95</td>
</tr>
</tbody>
</table>

is present in the behavior of these children and nonproblem children that the presence of ADHD cannot be reliably determined from brief observations of child behavior (C. Johnston, personal communication, February 20, 2002). To test whether coders could reliably identify group status, as they finished each tape, coders were asked to guess to which group each the mother-son dyad belonged. The three coders were able to correctly identify 4 of 23 sons with ADHD and ODD, 7 of 23 sons with ADHD only and 30 of 35 nonproblem sons (this guessing process was initiated after coding had begun, so estimates were not available for all participants). Sons with comorbid ADHD and ODD were most frequently mistaken to be sons with ADHD only, and sons with ADHD only were most often guessed to be normal. Coders were inaccurate enough in their ratings that they can be considered to have been unaware of the group status of the mother-son dyads.
Results

Situational Differences in Responsiveness

Prior to investigating situational differences in responsiveness, ratings of maternal behavior were averaged across the 1-minute intervals for each of the six dimensions of maternal responsiveness. Average scores were calculated for both the 7-minute free play and the 5-minute clean up situations.

A within-subjects repeated-measures MANOVA, with six dependent variables was used to compare mean differences on the six dimensions of maternal responsiveness across the free play and clean up situations. All mothers were collapsed into a single group for this analysis. Significant situational effects were found for the six dimensions overall, $F(6,81) = 7.25, p < 0.001, \eta^2 = 0.35$, replicating the findings of Johnston and colleagues (2002). The results of the univariate tests for situational effects are displayed in Table 3. The current study found that mothers were significantly less sensitive in their use of control in the free play situation compared to clean up. This difference likely reflects that the clean up situation required that mothers use some level of control, whereas in most instances during the child-directed free play, maternal use of control was less appropriate. Mothers also were significantly more involved and displayed greater positive affect in the free play compared to the clean up situation, albeit at the $p = 0.06$ level for affective tone. The percent of 1-minute intervals where mothers displayed no control was significantly greater in the free play compared to the clean up condition. Replicating Johnston and colleagues’ (2002) findings of situational differences in observations of maternal responsiveness offers further support for the construct validity of the observational coding protocol as a measure of generalized parenting behavior.
### Table 3

**Univariate Tests for Situational Effects**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Free Play</th>
<th>Clean Up</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$F$</td>
<td>$p$</td>
</tr>
<tr>
<td>Style of Control</td>
<td>4.22</td>
<td>.56</td>
<td>4.25</td>
<td>.87</td>
<td>.08</td>
<td>.77</td>
</tr>
<tr>
<td>Sensitivity of Control</td>
<td>3.92</td>
<td>.74</td>
<td>4.24</td>
<td>.89</td>
<td>12.51</td>
<td>.001</td>
</tr>
<tr>
<td>General Responsiveness</td>
<td>4.39</td>
<td>.83</td>
<td>4.47</td>
<td>1.03</td>
<td>.57</td>
<td>.45</td>
</tr>
<tr>
<td>Affective Tone</td>
<td>4.69</td>
<td>.62</td>
<td>4.56</td>
<td>.75</td>
<td>3.59</td>
<td>.06</td>
</tr>
<tr>
<td>Acceptance</td>
<td>4.51</td>
<td>.60</td>
<td>4.49</td>
<td>.74</td>
<td>.09</td>
<td>.77</td>
</tr>
<tr>
<td>Involvement</td>
<td>5.08</td>
<td>.73</td>
<td>4.89</td>
<td>.83</td>
<td>4.9</td>
<td>.03</td>
</tr>
<tr>
<td>Percent no control</td>
<td>21.72</td>
<td>23.66</td>
<td>26.44</td>
<td>12.33</td>
<td>36.64</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

**Data Reduction for Responsiveness Measure**

Principal components analysis was conducted on the six dimensions of responsiveness coded during the free play and clean up situations. For the free play situation, the dimensions loaded on a single component, termed Responsiveness, with an eigenvalue of 4.52 and accounting for 69.65% of the variance. In the clean up situation, the dimensions loaded onto a single component accounting for 72.79% of the variance. All of the six dimensions loaded onto this component with factor loadings greater than .70, with the responsiveness dimension having the highest loading. Factor loadings for each of the six dimensions are displayed in Table 4. This evidence of a single component underlying the six rated dimensions supported the calculation of an overall mean Responsiveness score for each mother-son dyad calculated from the average ratings for
the 1-minute intervals across the six dimensions for both the free play and clean up situations.

Table 4

*Factor Loadings for Observational Ratings of Maternal Behavior*

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Free Play</th>
<th>Clean Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Style of Control</td>
<td>.70</td>
<td>.84</td>
</tr>
<tr>
<td>Sensitivity of Control</td>
<td>.87</td>
<td>.85</td>
</tr>
<tr>
<td>General Responsiveness</td>
<td>.89</td>
<td>.93</td>
</tr>
<tr>
<td>Affective Tone</td>
<td>.87</td>
<td>.89</td>
</tr>
<tr>
<td>Acceptance</td>
<td>.83</td>
<td>.79</td>
</tr>
<tr>
<td>Involvement</td>
<td>.83</td>
<td>.81</td>
</tr>
</tbody>
</table>

*Responsiveness and Child Characteristics*

Mean levels of Responsiveness among mothers of children with comorbid ADHD and ODD, mothers of children with ADHD, and mothers of nonproblem children in the free play and clean up situations were compared using one-way ANOVAs, each tested at an $\alpha = .05$. Maternal Responsiveness differed significantly among the three groups in both the free play, $F(2, 84) = 3.86, p < .05, \eta^2 = .084$ and clean up situations, $F(2, 84) = 3.30, p < .05, \eta^2 = .073$. In the free play situation, Student Newman-Keuls *post hoc* test revealed that mothers of sons with ADHD and ODD were significantly less responsive than mothers of nonproblem sons. Mothers of sons with ADHD were neither significantly more responsive than mothers of sons with ADHD and ODD, nor
significantly less responsive than mothers of normal sons. A similar pattern of between group differences was present for the clean up situation. Student Newman-Keuls post hoc test revealed that mothers of sons with ADHD and ODD were significantly less responsive compared to mothers of nonproblem sons. Mothers of sons with ADHD were not found to differ significantly from either mothers of sons with ADHD and ODD or mothers of nonproblem sons. Table 5 presents the means for the three groups in both the free play and clean up situations.

Table 5

*Mean Levels of Maternal Responsiveness Among Groups*

<table>
<thead>
<tr>
<th></th>
<th>ADHD&amp; ODD</th>
<th>ADHD</th>
<th>Nonproblem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( M )</td>
<td>( SD )</td>
<td>( M )</td>
</tr>
<tr>
<td>Free Play</td>
<td>4.29 ( a )</td>
<td>.54</td>
<td>4.37 ( a, b )</td>
</tr>
<tr>
<td>Clean Up</td>
<td>4.18 ( a )</td>
<td>.83</td>
<td>4.52 ( a, b )</td>
</tr>
</tbody>
</table>

Subscripts indicate significant differences at \( p < 0.05 \)

*ADHD Subtype and Differences in Responsiveness*

Additional analyses were conducted to ensure that differences in maternal responsiveness were not due to differences in ADHD subtype between the two ADHD groups. The ADHD and ODD group differed significantly from the ADHD group in the frequency of boys with inattentive subtype ADHD, hyperactive/impulsive subtype ADHD and combined subtype (meeting diagnostic criteria on both inattentive and hyperactive/impulsive symptom dimensions), \( \chi^2(2) = 9.71, p < 0.05 \). Table 6 displays the frequencies of subtypes for the two groups.
Table 6

ADHD subtypes in the Groups of Sons with ADHD

<table>
<thead>
<tr>
<th>Group</th>
<th>Inattentive</th>
<th>Hyp. / Imp.</th>
<th>Combined</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD &amp; ODD</td>
<td>1</td>
<td>2</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td>ADHD</td>
<td>8</td>
<td>4</td>
<td>11</td>
<td>23*</td>
</tr>
</tbody>
</table>

*Subtype information for one son in the ADHD group was not available

To control for the possibility that group differences in responsiveness were due to this difference in distribution of inattentive versus hyperactive-impulsive symptoms, analyses were conducted using only boys with hyperactive-impulsive symptoms. A one-way ANOVA, indicated that maternal Responsiveness differed significantly among the three groups in the free play situation, $F(2, 75) = 3.64, p < 0.05, \eta^2 = .088$. Although the difference between means was statistically significant, student Newman-Keuls post hoc test indicated only one homogenous subset. Reduced power and the increased inequality of cell sizes caused by excluding the nine mothers of inattentive sons from the sample may have resulted in the post hoc tests having insufficient power to indicate significant differences among any two groups. However, the pattern of mean levels of responsiveness among the three groups remains unchanged from the analyses conducted with the full sample. In the clean up situation, maternal Responsiveness differed among the groups at the $p<0.10$ level, $F(2, 75) = 2.83, p = .065, \eta^2 = .070$. Although this difference is not significant at the $p<0.05$ level, the effect size is similar to that found for differences in maternal responsiveness in clean up using the complete sample ($\eta^2 = .073$) and lack of significance may be due to reduced statistical power. The preservation of group differences in maternal responsiveness after controlling for group differences in
hyperactive-impulsive symptoms supports the relationship between child aggressive and oppositional behavior, and decreased in maternal responsiveness independent of ADHD subtype.

Discussion

This study examined responsiveness in mothers of sons with ADHD and ODD, mothers of sons with ADHD only, and mothers of nonproblem sons. Responsiveness was assessed using the observational coding protocol developed by Johnston and colleagues (2002). Mothers were videotaped interacting with their sons during free play and clean up situations and responsiveness was assessed over six dimensions at 1-minute intervals. Results supported a unidimensional solution to the coding ratings, and average scores were calculated across the dimensions and time intervals for each situation. In both situations, as hypothesized, mothers of sons with comorbid ADHD and ODD were significantly less responsive than mothers of nonproblem sons. Mothers of sons with ADHD only were neither significantly less responsive than mothers of nonproblem sons, nor significantly more responsive than mothers of sons with ADHD and ODD. Thus, this study adds to existing literature suggesting that decreased levels of positive parenting behavior are associated with aggressive or oppositional child behavior among children with ADHD, although the links between parenting and ADHD symptoms remain unclear (Anastopoulos et al., 1992; Gomez & Sanson, 1994; Johnston et al., 2002).

As anticipated, mothers of sons with comorbid ADHD and ODD were significantly less responsive than mothers of nonproblem sons. This expands upon research linking differences in the frequency of discrete parenting behaviors to childhood aggressive and oppositional behavior, in both children in general and children with ADHD.
specifically (Anastopoulos et al., 1992; Guevremont et al., 1992; Lindahl, 1998; Paternite et al., 1995). Consistent with previous research, this study suggests that examining more generalized aspects of parenting, such as the acuity of monitoring child behavior and the resulting adjustment and appropriateness of parenting behavior, may complement information about parent-child interactions gained by examining the frequency of discrete parenting behaviors (Johnston et al., 2002; Parpal & Maccoby, 1985; Pettit & Bates, 1989; Wahler & Meginnis, 1997).

The primary contribution of this study is to expand upon existing research finding associations between conduct problems and generalized parenting difficulties such as decreased responsiveness in families of children with ADHD (Johnston et al., 2002; Winsler, 1998). Although the etiology of ADHD is believed to be primarily biologically based, research has indicated that parenting variables play an important role in the development of aggressive and defiant behavior in children with ADHD (Anderson et al., 1994; August et al., 1999; Campbell et al., 1986). Because children with ADHD have difficulty internalizing strategies for self-regulation and self-control (Anastopoulos et al., 1991; Barber et al., 1996), they may be particularly sensitive to the effects of parenting behavior on their development of self-control and the development of non-coercive strategies for controlling others (Winsler, 1998).

Beyond the significant differences found between mothers of comorbid boys and mothers of nonproblem boys, mothers of sons with ADHD were neither significantly more responsive than mothers of sons with ADHD and ODD nor significantly less responsive than mothers of nonproblem sons. Thus, the exploratory hypothesis that mothers of sons with ADHD would differ significantly from the other two groups of mothers was not
supported. However, the average levels of responsiveness shown by the three groups are consistent with previous research in suggesting a continuum of disturbance in maternal responsiveness across the three groups (Johnston et al., 2002). Research examining discrete parenting behaviors has reported that mothers of sons with comorbid ADHD and ODD display significantly more negative parenting behaviors than either mothers of sons with ADHD or mothers of nonproblem sons, and that mothers of sons with ADHD display significantly more negative parenting behaviors than mothers of nonproblem sons (e.g., Anastopoulos et al., 1992; Gomez & Sanson, 1994). It seems possible, based on the pattern of means in the current study, that a continuum of disturbance in parenting style similar to that found with discrete parenting behaviors is present among the three groups. However, the results also suggest that the effect sizes for the differences between the ADHD and comorbid group and between the ADHD and nonproblem groups, are relatively small. Therefore, the larger difference in responsiveness of mothers of sons with ADHD and ODD compared to mothers of nonproblem sons may have greater clinical utility and meaningfulness than the smaller potential differences in maternal responsiveness between mothers of sons with ADHD and mothers of nonproblem sons.

Post hoc analyses were conducted to determine whether differences in subtype between the ADHD groups could be responsible for the differences in maternal responsiveness among the three groups. Chi square analyses indicated significant differences in the distribution of ADHD subtypes between the ADHD and ODD group and the ADHD only group. This finding is not unexpected. Research has found that hyperactive/impulsive or combined ADHD subtypes are more likely to be associated with aggressive and oppositional behavior compared to the inattentive ADHD subtype (e.g.,
Crystal, Ostrander, Chen, & August, 2001; Maedgen & Carlson, 2000; Morgan, Hind, Riccio, & Hall, 1996). To ensure that group differences in child hyperactive-impulsive symptoms were not responsible for differences in maternal responsiveness, mean levels of responsiveness among the three groups were compared, excluding the sons with inattentive subtype of ADHD. Similar to the results found with the complete sample, there was a significant difference in mean levels of responsiveness among the three groups for the free play situation. However, post hoc tests failed to detect significant difference among any of the pairs of groups. For the clean up situation, group differences in maternal responsiveness were significant at the $p < 0.07$ level. These findings offer support for the hypothesis that child aggressive and oppositional behavior is associated with lower levels of maternal responsiveness, independent of hyperactive behavior.

Johnston and colleagues’ (2002) findings of situational differences in maternal responsiveness were generally replicated in this study, providing further support for the validity of the maternal responsiveness coding protocol. Several dimensions of maternal responsiveness were anticipated to differ between the two situations because of the increased structure and demands of the clean up task compared to the free play condition. This study did not replicate Johnston and colleagues’ (2002) finding of greater use of authoritative control in the free play compared to the clean up condition. This may have been because the coding protocol for this dimension was altered slightly from the one used by Johnston and colleagues. Sensitivity of control was significantly lower in free play compared to clean up, reflecting a similar pattern of means as found by Johnston and colleagues. In most instances, the use of control in the child directed free play would be inappropriate, whereas the more structured clean up requires that mothers exert at least a
minimal level of control over the child’s behavior. This study replicated Johnston and colleagues’ (2002) finding of greater maternal involvement in the free play condition compared to clean up. Findings of greater positive affect in free play compared to clean were replicated at the $p = .06$ level. Johnston and colleagues’ (2002) finding of situational differences in the percentage of 1-minute intervals where mothers exerted no control also were replicated.

Several explanations exist for why some of Johnston and colleagues’ situational differences were not replicated. First, slight changes in the style of control dimension may be responsible for differences between the two studies. Second, this study was conducted on a sample of Canadian mothers whose sons were not receiving treatment for ADHD as a component of the study. In contrast, the Johnston et al. (2002) study reported on baseline assessments of mothers in the United States who were recruited to a study of ADHD treatments. The mothers in this sample also included mothers of nonproblem sons, whereas Johnston and colleagues’ sample consisted of the mothers of sons with ADHD and mothers of sons with ADHD and ODD.

The relationship between maternal responsiveness and child symptoms of ODD offers some support for the clinical utility of training mothers of children with ADHD to be more responsive in their parenting. Most parent training interventions for child behavior problems focus on teaching parents discrete parenting behaviors, for example, teaching parents how to use clear, brief commands or using statements of praise following child compliance. The results of this study indicate that there may be clinical utility in also addressing responsiveness as a component of parent training interventions. In families where maternal behavior is unresponsive and poorly coordinated with her child’s
needs, therapists may need to increase maternal responsiveness prior to teaching discrete parenting skills. Using the example of giving commands, therapists may need to improve maternal responsiveness so that mothers are able to judge when these commands are well-timed, appropriate and correspond to the child’s developmental needs, prior to training mothers in the specifics of giving command. However, as the results of this study indicate, among the three groups there is considerable overlap in maternal responsiveness. Therapists must use caution when incorporating these findings into clinical practice and not automatically interpret symptoms of ODD in a child as indicative of low maternal responsiveness. Assessment of maternal responsiveness should be conducted on an individual basis to determine whether enhancement of responsiveness should be included as a component of therapeutic interventions for a particular family.

The correlational nature of these findings does not provide evidence regarding causal effects between maternal responsiveness and child ADHD or ODD characteristics. Theorists have posited that child oppositional behavior and maternal responsiveness contribute to each other in a transactional manner, with each component acting on the expression of the other in a reciprocal way (Sameroff & Fiese, 2000). One could imagine how lower levels of maternal responsiveness such as inappropriately controlling behavior could increase child resistance and noncompliance, that in turn may lead to an increase in the non-responsive, controlling maternal behavior. In addition, theorists recognize the potential role of third variables, such as environmental stressors, in the transactional relationship between child characteristics and parenting behavior (Sameroff & Fiese, 2000). Longitudinal research with more complex tracking of environmental
characteristics, with changes in maternal behavior and child characteristics over time is needed to fully investigate this potential relationship.

Another line of research, attempting to disentangle potential causal relationships between maternal responsiveness and child behavior, could experimentally manipulate maternal responsiveness and track longitudinal trajectories of child behavior. Researchers could randomly assign mothers of children with ADHD and ODD and mothers of children ADHD only, to a control condition (e.g., standard parent training) or an intervention condition aimed at increasing their levels of responsiveness (e.g., parent training with a responsiveness training component). Researchers could assess changes in both maternal responsiveness and child behavior post treatment. In addition, children could be tracked over a number of years for changes in ADHD or ODD symptoms. A study of this nature could help disentangle potential causal relationships between maternal responsiveness and comorbid ODD in children with ADHD.

A second limitation of the present study is the restriction of range in maternal behavior among the three groups. For all three groups, the means for each of the six dimensions of maternal responsiveness were close to 4 on the 7-point scale. This limited variability is likely due to a number of factors. First, only a small sample of maternal behavior could be observed over the 15-minute period and mothers were interacting with their child in an unfamiliar setting with the knowledge that they were being observed. Because extremes of parenting behavior occur infrequently during typical parent-child interactions, the opportunity to observe mother-son dyads engaging in extreme behavior was reduced by the short time period. The knowledge that they were being observed may have also led some mothers to restrict or inhibit negative parenting behaviors that they
engage in at home or in more private settings. Second, families volunteered to participate in this study primarily to contribute to the understanding of ADHD. This may have resulted in selection of higher-functioning or more generous mothers than would be typical in the general population. These factors may have combined to reduce variability in maternal behavior causing a restriction in range that may have resulted in an underestimation of group differences in maternal responsiveness.

A third limitation of this study was that only mothers were observed. It would have been interesting to observe the responsiveness of both parents. It is possible that the strength of the association between maternal responsiveness and child characteristics may differ in families where the father is high in responsiveness compared to families where the father is low in responsiveness. Measuring paternal responsiveness in addition to maternal responsiveness may help to explain some of the within group variance and provide further understanding into the relationship between parent characteristics and child behavior. Future research could examine mother-son and father-son interactions and their combined relationship to child behavior.

A final limitation of this study was the inability to provide a diagnosis of ODD. As result, the findings of this study generalize to children whose mothers have endorsed enough ODD symptoms to meet DSM-IV criteria for ODD, but who have not been formally diagnosed with ODD. The measures used in this study were not able to assess the level of impairment the child experienced from their symptoms of ODD and the questionnaire measures prevented researchers from eliminating potential causes other than ODD for the child's aggressive and defiant behavior (e.g., recent stressors). It is possible that by not having clinicians interview the families to obtain a formal diagnosis of ODD,
this study may have overlooked important information about some of the families who participated.

The primary contribution of this study is its expansion on existing literature examining the relationship between generalized parenting behavior and child characteristics. This study compared one type of generalized maternal parenting behavior, responsiveness, among mothers of sons with comorbid ADHD and ODD, mothers of sons with ADHD only and mothers of nonproblem sons. As anticipated, mothers of sons with comorbid ADHD and ODD were significantly less responsive than mothers of nonproblem sons. Mothers of sons with ADHD were not found to be significantly more responsive than mothers of sons with ADHD and ODD nor significantly less responsive than mothers of nonproblem sons. This study builds upon existing literature that has suggested decreased levels of positive parenting behavior are most closely associated with aggressive and oppositional child behavior (Johnston et al., 2002; Parpal & Maccoby, 1985; Pettit & Bates, 1989). The findings of this study also highlight the importance of distinguishing children with comorbid ADHD and ODD from children with only ADHD, particularly when researching parent-child relationships. The study offers further support for theories positing that disruptions in parenting once thought to be associated with all families of children with ADHD, may be more characteristic of families of children with comorbid ADHD and ODD. The secondary contribution of this study is to offer further validation for the maternal responsiveness coding protocol by replicating Johnston and colleagues' (2002) findings of situational differences in maternal responsiveness.
References


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