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# Preschool Boys with Pervasive Hyperactivity: Early Peer Functioning and Mother–Child Relationship Influences

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## Abstract

*This study compared the peer functioning of a community sample of preschool boys with pervasive hyperactivity ( $N = 33$ ) and comparison boys ( $N = 34$ ), and examined the extent to which any differences in peer functioning between these groups could be explained by comorbid child conduct problems and parenting factors. The quality of boys' peer relations was assessed on the basis of teacher and observer ratings of peer-related behavior at preschool. The quality of parenting and boys' behavior at home were assessed using the Parental Account of Children's Symptoms Interview, the Parenting Scale, and videotaped mother–son interactions. Boys with hyperactive behavior problems showed higher rates of aggressive, noncompliant, and nonsocial behaviors, and lower rates of prosocial behavior and peer acceptance than boys in the comparison group. These between-group differences in social functioning remained significant following statistical control for the effects of conduct problems, highlighting the wide range of peer difficulties associated with preschool hyperactivity. Results of further analyses suggest that the quality of early mother–child interactions and the behavioral features of hyperactivity may make unique contributions to the development of peer relationship difficulties in preschool children with pervasive hyperactivity.*

*Keywords:* hyperactivity; preschool children; peer relations; parenting; parent–child interaction

The social relationship problems of children with attention-deficit hyperactivity disorder (ADHD), including serious interpersonal difficulties and peer rejection, are well recognized (for reviews see Henker & Whalen, 1999; Hinshaw & Melnick, 1995). Furthermore, a converging range of evidence suggests that social dysfunction in children with hyperactive behavior problems may be associated with a range of adverse behavioral and academic outcomes, such as educational underachievement, substance abuse, and conduct problems (Greene, Biederman, Faraone, Sienna & Garcia-Jetton, 1997; Parker & Asher, 1987). Although the deleterious effects of peer difficulties have been well documented, the social relationship problems of hyperactive children have

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proven difficult to treat (Hinshaw & Melnick, 1995), suggesting a need for a better understanding of the development of these problems.

It is widely recognized that hyperactive behavior problems originate in early childhood, yet the nature and quality of hyperactive children's peer relationships prior to school entry have received minimal research attention. There are a number of compelling reasons for undertaking further research with preschool samples. First, evidence suggests that preschool peer relationship problems tend to persist (Campbell, Ewing, Breaux & Szumowski, 1986), and are correlated with early social and academic adjustment at school (Ladd & Price, 1987). Second, there is some evidence to suggest that negative peer behaviors and reputations are likely to become more entrenched and resistant to change among school-age children than at younger ages (Bierman & Montminy, 1993). This highlights the possibility that early interventions targeted at the peer-related problems of hyperactive children may have a greater chance of success than remediation efforts during middle childhood. For these reasons it is argued that further research on the nature of hyperactive children's early peer problems is likely to be important for both early detection and treatment, and for the development of an improved understanding of the developmental origins of the social relationship difficulties experienced by these children during middle childhood.

The interpretation of findings from the few studies of the peer relations of hyperactive children under age 5 is complicated by differences in sampling and group classification. For example, a number of studies show that preschool children with hyperactive and conduct behavior problems tend to be more aggressive (Campbell & Cluss, 1982; Schleifer, Weiss, Cohen, Elman, Cvejic & Kruger, 1975), negative and disruptive (Campbell, Pierce, March, Ewing & Szumowski, 1994; DuPaul, McGoey, Eckert & Vanbrakle, 2001), and less prosocial (Hughes, White, Sharpen & Dunn, 2000) than their nonproblem peers, whereas other research suggests they are no less likely than comparison children to engage in social interaction (Campbell & Cluss, 1982; Campbell *et al.*, 1994). However, as these studies did not distinguish between hyperactivity and conduct problems, it is possible that some of the between-group differences may reflect the effects of comorbid disorders such as conduct disorder. In two further studies which compared children with pure hyperactivity and conduct problems, hyperactive preschoolers engaged in less parallel and group play, and fewer peer conversations, but were not more aggressive or socially disengaged than comparison children (Alessandri, 1992), or less prosocial (Pavuluri, Luk & McGee, 1999). Given the high degree of overlap between hyperactivity and conduct problems, there is clearly a need to examine the extent to which the apparent peer difficulties of hyperactive preschoolers arise as a result of hyperactive behavior problems, conduct difficulties, or both.

A second limitation of a number of these studies is the use of clinic or self-referred samples. Clinic-referred cases of hyperactivity have been differentiated from community-identified cases of hyperactivity by more severe emotional and conduct problems (Woodward, Dowdney & Taylor, 1997), suggesting that community samples ought to be used when examining the peer correlates of hyperactivity (Taylor, Chadwick, Heptinstall & Danckaerts, 1996). Although the relationship between early hyperactivity and children's peer relationships requires further clarification, there is also a need to investigate other factors that may contribute to the peer functioning of children with hyperactive behavior problems.

One area of research that may be of relevance to an understanding of the associations between early hyperactive behavior and problematic relations with peers concerns the

parenting antecedents or correlates of peer competence (for a review see Ladd, 1999). This research has highlighted associations between childrearing practices, the quality of parent-child interactions, disciplinary style, and the nature and quality of children's interactions with their peers. In particular, parental behaviors associated with positive peer outcomes, such as peer popularity and acceptance, harmonious peer interactions, and prosocial behavior, include an authoritative/democratic interaction style (Dekovic & Janssens, 1992), the ability to verbally engage and participate actively with their child in play interactions (MacDonald & Parke, 1984), and the ability to involve their child in reciprocal, positive, and mutually focused interactions (Mize & Pettit, 1997). In contrast, children exposed to directive parental behavior (direct commands, often accompanied by lack of explanation and negative affect) during parent-child play interactions are more likely to exhibit negative peer behaviors such as hostility (Attili, 1989) and aggression (Rose-Krasnor, Rubin, Booth & Coplan, 1996), and are likely to be less popular with their peers (Putallaz, 1987).

In relation to disciplinary practices, findings reveal that restrictive, power-assertive disciplinary tactics (characterized by punishment, threats, lack of reasoning) are associated with aggression toward peers, lower social skills ratings (Pettit, Dodge & Brown, 1988), and children's disruptive playground behaviors (Hart, DeWolf, Wozniak & Burts, 1992). Similarly, parents of aggressive children have also been found to discipline their children in a permissive, inconsistent manner (Rubin, Stewart & Chen, 1995), whereas coercive parental disciplinary behaviors have been linked with children's antisocial behavior and social rejection (Dishion, 1990).

In contrast, parents who use positive, even-handed, inductive styles of discipline are more likely to have children who relate positively to, and are accepted by their peers (Dishion, 1990; Hart *et al.*, 1992). Inductive disciplinary strategies involve behaviors such as explaining consequences, providing rationales, and limit setting and following through. Furthermore, there is increasing evidence for the importance of parents' use of proactive strategies in predicting children's peer competency (Pettit, Bates & Dodge, 1997; Pettit, Harrist, Bates & Dodge, 1991). Parental proactive control involves anticipatory guidance, such as setting up tasks to avoid conflict (Gardner, Sonuga-Barke & Sayal, 1999) and attempting to guide the child's behavior in future situations (Kuczynski & Kochanska, 1995).

Although existing research has highlighted associations between parenting and children's social development, the relationship between hyperactive children's family and peer group experiences has been given little study. One exception is a recent study by Hinshaw, Zupan, Simmel, Nigg, and Melnick (1997) who examined the peer relationships of 73 boys with ADHD and 60 comparison boys, between the ages of 6 and 12 years. Results showed that authoritative maternal parenting beliefs predicted peer social preference whereas negatively weighted authoritative maternal parenting beliefs predicted negative peer nominations. In particular, authoritative maternal parenting beliefs were stronger predictors of peer status for the ADHD than for the comparison boys. These findings highlight the potential contribution of self-reported parenting attitudes to the peer adjustment of hyperactive children. However, consideration also needs to be given to a more specific and wider range of parenting behaviors likely to contribute to children's social adjustment, using interviewer-inferred and directly observed measures of parenting that tend to show stronger relations with important child outcomes (e.g., externalizing behaviors) than self-report measures (Rothbaum & Weisz, 1994).

Recent studies of the family correlates of hyperactivity provide leads for specific parenting practices and behaviors to include in research on the parenting antecedents

of hyperactive children's peer functioning (Johnston & Mash, 2001; Woodward, Taylor & Dowdney, 1998). These include the efficiency of maternal coping (e.g., consistent, sensitive, and proactive child management strategies) (Woodward *et al.*, 1998), lax (permissive, inconsistent) and overreactive (coercive, power-assertive) disciplinary strategies (Harvey, Danforth, Ulaszek & Eberhardt, 2001), and negative, directive mother-child interactions (Gomez & Sanson, 1994). Additionally, although prior studies have not examined the association between parent-child interactional synchrony (involvement in reciprocal, positive, and mutually focused interactions) and hyperactivity, this relationship quality may also be important to investigate. Participation in synchronous interactions with parents is thought to encourage children's attentiveness and sensitivity to social cues, allowing children to better coordinate their behavior with others (Pettit & Clawson, 1996). As these are tasks that hyperactive children often have difficulty with, this suggests that closer attention perhaps needs to be given to the role of parental responsiveness and parent-child interactional synchrony in the social development of children with hyperactive behavior problems.

Against this general background, the present study compares the peer relationships of hyperactive and comparison preschool boys in order to examine the extent to which differences in children's peer functioning can be explained by: (a) child conduct problems; and (b) the parenting behavior of mothers of hyperactive and comparison boys.

The specific aims of this study were:

1. To compare the nature and quality of preschool hyperactive and comparison boys' relationships with their peers in a preschool setting. We expected that hyperactive boys would show higher rates of aggressive, disruptive/noncompliant behaviors and lower rates of prosocial behavior than would comparison boys.
2. To examine the extent to which associations between hyperactivity and peer relationship difficulties could be explained by the effects of confounding child conduct problems. We expected that associations between hyperactivity and peer functioning would remain significant when the effects of co-existing conduct problems were controlled for.
3. To assess the extent to which parenting behaviors may account for differences in the peer functioning of hyperactive and comparison children. In particular, we focus on maternal interactional behavior, self-reported disciplinary practices, and interviewer-rated efficiency of maternal coping.

Additionally, this study extends previous research by including measures of peer social status. Although associations have been found between peer status and the behavioral dimension of hyperactivity in normal samples of preschoolers (Ladd & Profilet, 1996; Milich, Landau, Kilby & Whitten, 1982; Rubin & Clark, 1983), relatively little is known about the peer status of pervasively hyperactive preschool children.

It was hypothesized that associations between hyperactivity and prosocial behavior and peer acceptance would be accounted for by the quality of mother-child play interaction (as assessed by interactional synchrony and maternal directiveness) and the use of proactive, consistent child management and disciplinary strategies. In contrast, poor maternal coping, observed maternal directiveness, and the use of lax and overreactive disciplinary tactics were expected to account for between-group differences in aggression and noncompliance.

Finally, this study makes greater use of teacher informants than earlier research on hyperactive preschool children's peer relations. Teachers are often better able than observers to judge more qualitative aspects of children's social competence, such as

empathy (Coie & Dodge, 1988), as well as having more frequent opportunities than parents to observe and compare young children's peer interactions (Webster-Stratton & Lindsay, 1999).

## **Method**

### *Participants*

The sample consisted of 33 boys with pervasive hyperactivity and 34 comparison boys, all aged between 47 and 62 months. The mean age of boys in the hyperactive group was 57 months (*SD* 3 months); whereas that of the comparison group was 55 months (*SD*  $\pm$  3.56 months). All children attended preschools within the Auckland (New Zealand) urban area. Seventy percent of the hyperactive group compared to 74 percent of the comparison group were of New Zealand Caucasian descent. Other ethnic origins represented across both groups included Maori, Pacific Island, Asian, African, and non-New Zealand Caucasian. Families were distributed across all occupational categories, with the modal occupational grouping for fathers in the sample being technicians and associated professionals (Statistics New Zealand, 1995). Mothers' education was equivalent to a fourth year high school qualification. Twelve percent of boys in the hyperactive group lived in a single-parent family compared with 5.8 percent of comparison boys. Both groups had a moderate level of family income (average of \$NZ40,000 per year). There were no significant differences between the two groups on measures of ethnicity, occupational status, mother's education, family income, or single parenthood ( $p > .05$ ).

### *Procedure*

A two-stage screening procedure was used to identify boys who were pervasively hyperactive. The first stage involved community screening using teacher and parent questionnaires. The second stage consisted of a parent interview to obtain detailed information about child hyperactivity and conduct problems. This procedure was used because it minimizes the effects of report bias and has been shown to be a valid and reliable method of identifying children with pervasive hyperactive behavior problems (Goodman & Stevenson, 1989; Schachar, Rutter & Smith, 1981; Taylor, Sandberg, Thorley & Giles, 1991).

*Community Screening.* The first stage involved the independent completion of the hyperactive-distractible subscale of The Preschool Behavior Questionnaire (PBQ) (Behar, 1977) by each child's preschool teacher and parent. The PBQ significantly differentiates hyperactive and normal preschool children (Campbell, Szumowski, Ewing, Gluck & Breaux, 1982) and correlates significantly with other measures of hyperactivity, such as the Werry-Weiss-Peters Hyperactivity Scale (WWP; Routh, 1978) (Campbell & Breaux, 1983).

To be included in the hyperactive group, boys were required to obtain a total behavior rating score of  $\geq 4$  (just below the 90th percentile) on the PBQ hyperactive-distractible subscale according to *both* teacher and parent ratings. The comparison sample was selected from the pool of children whose teacher and parent scores, on the hyperactive-distractible subscale of the PBQ, were both less than 4. To be eligible for inclusion in either the hyperactive or comparison groups, the parents of all boys

were required to comprehend sufficient English to enable the independent completion of assessment questionnaires.

Twenty-nine preschools from a range of socioeconomic areas in Auckland were contacted, with 21 centers agreeing to participate. Preschools were selected using a Ministry of Education socioeconomic indicator for schools (Norris, Bathgate & Parkin, 1994), where 1 represents the lowest socioeconomic rating and 10 equals the highest rating. The preschools screened covered the full socioeconomic range from 1 to 10, with a mean of 5.57. Reasons for nonparticipation were unrelated to the nature of the study and socioeconomic ratings were similar for preschools that agreed and did not agree to participate. Teacher PBQ forms were completed anonymously for 598 boys. On the basis of this first stage screen, 203 (34 percent) boys were rated as hyperactive by their teachers. The parents of these 203 teacher-rated hyperactive boys and a sample of 190 randomly selected comparison boys were then sent a PBQ form to complete. Completed parent PBQ forms were returned for a total of 225 boys (62 percent of the teacher-rated hyperactive boys and 46 percent of teacher-rated comparison boys), with 56 (9 percent of the total sampled population) meeting criteria for pervasive hyperactivity and 69 meeting criteria for inclusion in the comparison group.<sup>1</sup> Of the parents of these 125 children, 96 parents were initially interested in participating in the intensive part of the study. However, 29 of these families were unable to take part in this next stage for a variety of reasons, such as moving out of the area, failure to trace, child moved on to school, and difficulties due to parent's work or family commitments. Participants did not differ from nonparticipants on parent-rated hyperactivity scores or the socioeconomic rating of the preschool attended. However, teacher hyperactivity ratings were significantly higher for participant than for non-participant children.

*Reconfirmation of Subject Groups.* Once selected, the group status of each child was reconfirmed by interviewing mothers using the Parental Account of Children's Symptoms (PACS; Taylor, Schachar, Thorley & Wieselberg, 1986). The interviewer was unaware of children's group status. Interviewer training was carried out by the second author who is trained in the use of the PACS interview.

The PACS is a standardized semi-structured interview measure of child behavior at home. Parents are asked detailed questions about hyperactive behaviors and conduct problems. Hyperactive behavior problems assessed by the PACS include: attention span, activity level, and fidgeting in a number of age-appropriate situations like watching television, reading, solitary play, playing with other children, mealtimes, and behavior during shopping trips and family outings. Conduct problems assessed by the PACS include: lying, stealing, defiance, temper tantrums, disobedience, destructiveness, and aggressiveness. On the basis of parental description, the interviewer then rates the child in terms of the frequency and severity of each child's hyperactive and conduct problem symptoms, using operationalized criteria. The original PACS was designed for school-aged children, but more recently has been adapted successfully for use with preschool children (Sonuga-Barke, Lamparelli, Stevenson, Thompson & Henry, 1994). Scores on both versions of the PACS have been shown to be reliable and to have good concurrent and predictive validity (Steinhausen, 1995). Between-group comparisons using the *t*-test for independent samples confirmed that boys in the hyperactive group were significantly more hyperactive ( $p < .0001$ ) and had more conduct problems ( $p < .01$ ), according to PACS scores, than boys in the comparison group.

### Measures

After parental consent was obtained, arrangements were made with parents and teachers for a preschool and home visit assessment. All child and parenting assessments were undertaken by a researcher who was unaware of children's group status. Data from parents and teachers was collected concurrently, with preschool and home visits generally taking place on the same day.

*Child Social Behavior at Preschool.* The preschool visit consisted of a naturalistic observation of free play during the course of a two-and-a-half-hour preschool session. In addition, teachers were given questionnaires to complete about the target child's social behavior with peers.

Observed social behavior during free play was measured using a partial interval time sampling procedure in which behavior was observed for a 10-second interval, followed by a 5-second interval for recording. Observations were conducted in 5-minute time blocks for a total of 25 minutes. These 5-minute observation blocks were spaced to allow sampling of the target child's behavior across the preschool session, given our interest in sampling low-frequency categories of behavior such as aggression.

Child behavior was coded using six exhaustive and mutually exclusive categories. These categories were as follows:

1. *Participation* (which consisted of participation in group activities or playing interactively with a peer);
2. *Positive interaction* (which consisted of active engagement in conversation, social initiation, sharing, helping);
3. *Noncompliance/annoying others* (reflecting rule violations, defiance, disruptive behaviors);
4. *Aggression* (both verbal and physical aggression were scored in this category ranging from threatening gestures and swearing at others to hitting, kicking and other forms of assault);
5. *Solitary* (nonsocial but otherwise *appropriate* behavior such as playing alone, parallel play, or watching others participate); and
6. *Disengaged* (such as wandering aimlessly or failing to engage in any activity, or nonsocial *inappropriate* behavior such as playing by self instead of complying with a teacher request to join a group activity).

These behavior categories were based on the coding system of Hinshaw, Han, Erhardt, and Huber (1992), which has been used extensively to compare the social behavior of school-age ADHD and comparison children (Hinshaw & Melnick, 1995; Hinshaw *et al.*, 1997), and to compare teacher and observer ratings of preschool children's externalizing behaviors (Hinshaw *et al.*, 1992).

Scores were calculated by dividing the frequency of behavior in each category by the total number of observation intervals. Interobserver reliability was assessed on the basis of 20 percent of all observations. During these joint observations, each observer was cued to observe and record at the same specified time intervals via a prerecorded audiotape. Reliability analysis revealed a substantial level of inter-rater agreement (Landis & Koch, 1977), with kappa values as follows: disengaged, .59; noncompliance, .73; participation/rule following, .81; solitary, .83; positive interaction, .85; and aggression, .89.

Ratings of social behavior were also obtained from each child's preschool teacher using the Child Behavior Scale (CBS) (Ladd & Profilet, 1996), a 35-item teacher-report measure of young children's aggressive, withdrawn, and prosocial behaviors. For the purpose of this study, the following subscales were rated by teachers: (1) *Prosocial with peers* (seven items; e.g., 'helps other children'); and (2) *Asocial with peers* (six items; e.g., 'likes to be alone'). All scale items were scored on a 3-point scale ranging from 1 (*doesn't apply*) to 3 (*certainly applies*). Scores were then averaged over items to produce prosocial and asocial orientation scores for each child. The CBS subscales are internally consistent and correlate significantly with conceptually related scales of the Achenbach (Child Behavior Profile-Teacher Report Form (CBP-TRF; Achenbach, 1991) (Ladd & Profilet, 1996).

As it was not practical to obtain peer assessments of the target children in the present study, three items derived from the Teacher Checklist of Peer Relations (Coie & Dodge, 1988) were used as measure of *peer acceptance*. These items included 'other children like this child and seek him out for play,' 'this child is accepted by the peer group,' and 'gets along well with other children.' Items were scored in the same way as the Child Behavior Scale items. The internal consistency of this scale, estimated with Cronbach's alpha was good ( $\alpha = .86$ ). It has been shown that during the preschool years, teacher ratings of popularity are often more reliable than peer ratings (Bierman & Montminy, 1993).

*Children's Verbal Abilities.* As language competence has been linked with social functioning (Dimitracopoulou, 1990), children's verbal abilities were also assessed during the home visit using the Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1981). The PPVT-R has been used reliably with 4- to 5-year-old children and correlates significantly with other measures of verbal ability.

*Parenting Practices and Behavior.* Parenting practices and behavior were assessed using the Parenting Scale (Arnold, O'Leary, Wolff & Acker, 1993), semi-structured interview methods (Quinton, Rutter & Liddle, 1984), and a videotaped assessment of mother-child interaction. The 30-item Parenting Scale is a self-report scale of parental discipline. Factor analyses of this scale have revealed two robust factors: laxness and overreactivity (Arnold *et al.*, 1993). The 11-item *laxness* factor describes the extent to which a parent is permissive and inconsistent when providing discipline by giving in, failing to enforce rules, or providing positive consequences for child misbehavior. The ten-item *overreactivity* factor is consistent with a coercive, authoritarian discipline style that includes threats and physical punishment. The items in this subscale describe the extent to which a parent's behavior is characterized by anger, meanness, and irritability during disciplinary encounters. For each item, parents are asked to indicate on a 7-point Likert Scale their tendencies to use specific discipline strategies, where 7 indicates frequent use of an ineffective strategy and 1 indicates frequent use of an effective strategy. The Parenting Scale has been used in both community and clinical contexts, and scale responses have been shown to discriminate between parents of clinic and nonclinic referred preschool children (Arnold *et al.*, 1993), as well as school-age children with and without ADHD (Harvey *et al.*, 2001). Subscales are internally consistent and correlate significantly with child behavior problems (Arnold *et al.*, 1993). There is some evidence, from a very small sample ( $n = 15$ ), that Parenting Scale scores are related to corresponding observational ratings of parenting (Arnold *et al.*, 1993).

In addition, during the PACS interview, a measure of the efficiency with which a mother was coping with child behavior, was assessed using semi-structured interview methods. This parenting rating was made by a trained interviewer on the basis of detailed questioning of each child's mother about her behavior toward her child. Moderate to high levels of agreement have been found between interviewer ratings of parenting quality and direct observational measures of parenting behavior (Dowdney, Mrazek, Quinton & Rutter, 1984). This interview measure has also been used across a number of investigations, with studies reporting high inter-rater agreement and good discriminant and predictive validity (Taylor *et al.*, 1986, 1991; Woodward *et al.*, 1998).

*Efficiency of parental coping* (range 0–7) assesses parents' ability to manage their child, both in general and when they encounter problems (Heptinstall, 1993). It provides a measure of how well parents cope rather than the way in which they do cope. Efficient parental coping is defined as: (a) the ability to avert potential problems or to handle difficult situations; (b) the sensitivity to pick up problems and change action accordingly; and (c) a consistent approach to managing child behavior, rather than acting according to mood or perception of how serious the behavior is (Heptinstall, 1993). Coping ratings are made at the end of each behavior section of the PACS interview (hyperactivity, conduct problems). Parents are asked detailed questions about how they cope with specific problems applicable to their child. Their level of coping with this specific problem is then rated. High ratings (0, 1) are given when the parent succeeds in anticipating and avoiding problems. Progressively lower ratings are given when parents are less able to anticipate and avoid problems (2), or if parents show an inability to improve child behavior due to inappropriate or ineffective efforts (3), ignore the problem (4), or where parental actions aggravate (5), or seriously aggravate child behavior (6, 7). At the end of the interview an overall coping rating is made based on the balance between good and poor coping. Inter-rater reliability assessments were carried out on 20 percent of the interview transcripts. Overall correlation between ratings was high (.91).

Two further parenting behaviors were assessed on the basis of ten minutes of free play between mothers and their sons. This play session, which was videotaped for later coding, involved giving each mother–child dyad a set of toys selected to promote interaction (for example, some puppets, dinosaurs, a baseball glove, and a set of bats and balls suitable for indoor play) and asking them to play together. On the basis of this observation, measures of interactional synchrony and maternal directiveness were obtained. The interactional synchrony scale was adapted from a coding scheme by Mize and Pettit (1997). The maternal directiveness scale was based on Lindsey's (1999) adaptation of Kochanska and Aksan's (1995) control codes. *Interactional synchrony* was defined as the extent to which mother–child interactions were responsive, connected, reciprocal, mutually focused, and harmonious. High ratings were given when interactions were characterized by mutual responsiveness, shared affect, and a mutual balance in offering and following leads. Low ratings were given when interactions were asynchronous and disjointed. *Maternal directiveness* was defined as the extent to which a mother used power to influence or direct her child. Highly directive behavior included use of direct commands, prohibitions, statements, or physical interventions, accompanied by negative affect, to influence child behavior. Mothers were scored on each of these 5-point behavior scales for each 30-second interval over the course of the 10-minute observation. These 30-second ratings were then averaged to create a total synchrony and directiveness score for each parent.

Previous studies have shown these measures to have good reliability and validity (Kochanska & Aksan, 1995; Mize & Pettit, 1997). For example, Mize and Pettit (1997) found that interactional synchrony was significantly associated with children's social competence. For the purpose of this study, interobserver reliability was assessed on the basis of 20 percent of all videotaped observations. This analysis revealed a reasonable level of inter-rater agreement (Landis & Koch, 1977), with kappa values of .66 for synchrony and .68 for directiveness.

## Results

### *Observed and Teacher-rated Social Behaviors of Hyperactive and Comparison Boys*

Table 1 shows the group mean scores for child social behaviors of hyperactive and comparison boys measured by direct observation and teacher ratings. For ease of comparison, observed social behaviors are reported as the percentage of total observation time hyperactive and comparison group children spent engaged in each behavior category. Effect sizes were calculated for the analysis of each variable to elucidate the magnitude of group differences in standard deviation units. Effect sizes were calculated by taking the difference between the hyperactive and comparison group means and dividing this difference between the pooled standard deviation of the two groups (Cohen's *d*).

Between-group comparisons using the *t*-test for independent samples showed that when observed during a preschool session, hyperactive boys were significantly more noncompliant ( $p < .0001$ ), aggressive ( $p < .01$ ), and disengaged ( $p < .01$ ) than comparison boys. Effect sizes for these observed behaviors were in the moderate-to-large

**Table 1. Mean Observed and Teacher-rated Social Behavior for Boys in the Hyperactive and Comparison Groups**

Measure	Hyperactive ( <i>N</i> = 33)		Control ( <i>N</i> = 34)		<i>p</i>	Effect Size
	Mean	<i>SD</i>	Mean	<i>SD</i>		
<i>Observational Ratings*</i>						
Participation	45.09	11.58	45.87	13.02	>.80	.06
Positive interaction	16.68	8.14	18.53	10.53	>.40	.19
Noncompliance/ annoying others	3.27	2.95	.81	1.56	<.0001	.95
Aggression	2.91	3.62	.84	1.46	<.01	.73
Solitary	29.05	14.69	32.47	13.61	>.30	.24
Disengaged	2.50	2.61	1.09	1.61	<.01	.66
<i>Teacher Ratings</i>						
Prosocial toward peers	1.96	.43	2.29	.64	<.05	.59
Withdraws from peers	1.66	.60	1.39	.45	<.05	.50
Accepted by peers	2.03	.64	2.57	.54	<.0001	.84

\* Comparisons based on 28 hyperactive boys.

range (all  $>.50$ ) using Cohen's (1988) standards. No significant between-group differences were found for observed participation, positive interaction, or solitary behavior ( $p > .05$ ). In addition, teacher ratings showed that hyperactive boys were significantly more likely to withdraw from peer contact ( $p < .05$ ). Similarly, hyperactive boys were significantly less well accepted by their peers ( $p < .0001$ ) and received lower ratings of prosocial behavior than comparison group boys ( $p < .05$ ). Effect sizes for these teacher-rated behaviors were in the moderate-to-large range (all  $>.50$ ).

#### *Between-group Differences in Child Characteristics and Parenting Behavior*

The results in Table 1 suggest that hyperactive preschool children are characterized by a range of peer-related difficulties. To examine the extent to which these between-group differences in social behaviors might be explained by child characteristics and the nature of mother-child interactions at home, Table 2 compares the two groups on a range of child and parenting measures. Child measures included: PACS child conduct problems; verbal ability; and child age. Parenting measures included: maternal laxness; overreactivity; coping; mother-child interactional synchrony; and maternal directiveness. Each comparison was tested for statistical significance using the *t*-test for independent samples. Cohen's *d* effect size was also calculated for each comparison. These results showed that boys in the hyperactive group tended to be older ( $p < .05$ ) and were characterized by higher mean levels of conduct problems than boys in the comparison group ( $p < .01$ ). Effect sizes for these variables were moderate ( $>.50$ ). However, it is also clear from the conduct problem scores for each group that conduct problems were evident among both groups of children, and not all children in the

**Table 2. Mean Scores for Child and Parenting Covariates for Boys in the Hyperactive and Comparison Groups**

Measure	Hyperactive Boys ( $N = 33$ )		Control Boys ( $N = 34$ )		<i>p</i>	Effect Size
	Mean	SD	Mean	SD		
<i>Child Variables</i>						
PACS conduct problems	1.00	.43	.74	.30	$<.01$	.66
Verbal ability	94.23	18.78	98.47	18.74	$>.40$	.23
Child age (months)	56.81	3.00	54.94	3.56	$<.05$	.58
<i>Parenting Variables</i>						
Lax parenting*	2.86	.82	2.37	.92	$<.05$	.54
Overreactive parenting*	3.07	.85	2.60	.83	$<.05$	.54
Coping	2.19	.95	1.12	.41	$<.0001$	1.19
Synchrony**	2.92	.45	3.44	.50	$<.0001$	.97
Directiveness**	3.10	.26	3.08	.45	$>.90$	.05

\* Comparison based on 32 hyperactive and 33 control boys. \*\* Comparison based on 29 cases and 32 controls.

hyperactive group showed high levels of conduct problems. No significant differences were found between the two groups on the measure of child verbal ability ( $p > .40$ ).

The results also revealed pervasive differences in the parenting practices and mother-child interactions experienced by children in the hyperactive and comparison groups. Mothers of hyperactive children reported using more lax ( $p < .05$ ) and over-reactive disciplinary practices ( $p < .05$ ), indicating a greater tendency to overreact with anger and irritability, and to give in when their child misbehaved. They also reported less efficient coping with child behavior ( $p < .0001$ ), such as being able to anticipate and avoid problems. Similarly, during the videotaped free play session, interactional synchrony between mothers and children in the hyperactive group tended to be less responsive and to be characterized by lower levels of mutual focus ( $p < .0001$ ). Finally, no significant between-group differences were found for observed maternal directiveness ( $p > .05$ ). Effect sizes ranged from moderate ( $>.50$ ), for the measures of disciplinary practices, to large ( $>.80$ ), for interactional synchrony and coping.

#### *Correlations between Child Behavior Scores and Child Social Behavior, Child Characteristics, and Parenting Variables*

Given the between-group differences in child behavior, child social behavior and parenting variables, it was of interest to examine the bivariate relations among these measures. As can be seen from Table 3, PACS and PBQ hyperactivity scores were significantly correlated with PACS conduct problem scores (range  $r = .31 - .39$ ).

The results also indicated that hyperactive behavior problems (as measured by PACS and/or PBQ scores) were related significantly to higher levels of aggressive, non-compliant, disengaged, and socially withdrawn behaviors, and lower levels of prosocial behavior and acceptance by peers (range  $r = .28 - .46$ ). In addition, correlations between these social behaviors and PACS conduct problems ranged from modest to moderate (range  $r = -.15 - .42$ ).

Parenting measures demonstrated expected patterns of associations with child social behaviors. More specifically, boys with higher levels of negative social behaviors and lower rates of peer acceptance had mothers who reported less efficient coping with child behavior and who were less synchronous in play interactions with their sons; additionally, higher rates of observed disengaged behavior at preschool were also linked to lower rates of mother-child interactional synchrony. Similarly, boys whose mothers reported more frequent use of lax disciplinary practices were rated by teachers as less prosocial toward peers ( $p < .05$ ).

#### *Factors Accounting for the Relationship between Preschool Hyperactivity and Peer Behaviors*

To examine the extent to which group differences in teacher-rated and observed free play peer behaviors could be explained by between-group differences in the extent of children's conduct problems, parenting experiences, and other child variables, the data were analyzed using analysis of covariance. These analyses were done in two stages. First, the association between hyperactivity and each peer behavior outcome was adjusted for the effects of PACS child conduct problems. This analysis was then extended by adding into the model the other child (e.g., child age) and parenting variables shown in Table 2. In addition, observed noncompliance/annoying others, aggression, and disengaged behavior were also entered into the models for teacher ratings

Table 3. Interrelations among PBQ and PACS Child Behavior Scores, Child Social Behavior at Preschool, Child Characteristics, and Parenting Measures

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>PBQ Scores</i>																			
1. Parent-rated hyperactivity	.76**	.59**	.35**	-.17	-.24 <sup>+</sup>	.40**	.32*	.07	.28*	-.17	.30*	-.41**	-.13	.19	.25*	.25*	.49**	.42**	.00
2. Teacher-rated hyperactivity		.58**	.31*	-.11	-.12	.46**	.28*	-.06	.36**	-.29*	.15	-.40**	-.22 <sup>+</sup>	.22 <sup>+</sup>	.23 <sup>+</sup>	.25*	.57**	.47**	.06
<i>PACS Scores</i>																			
3. Hyperactivity			.39**	.00	-.20	.39**	.19	-.02	.20	-.20	.16	-.21 <sup>+</sup>	-.16	.16	.18	.17	.47**	.33**	.03
4. Conduct problems			-.07	.07	.07	.42**	.20	-.15	.18	-.15	.06	-.31*	.12	.23 <sup>+</sup>	.01	.39**	.56**	.26*	.02
<i>Observed Social Behavior</i>																			
5. Participation					-.23 <sup>+</sup>	-.07	-.06	-.70**	.09	.03	.04	.18	.06	.12	-.09	-.04	-.10	-.02	-.15
6. Positive interaction					.05	-.02	-.38**	-.27*	-.27*	.27*	-.24 <sup>+</sup>	.35**	.43**	.07	-.31*	-.02	-.11	-.28*	.06
7. Noncompliance/annoying others						.51**	-.30*	.13	-.10	-.09	-.15	.03	.14	.09	.04	.44**	.29*	.11	.11
8. Aggression							-.23 <sup>+</sup>	-.04	-.10	-.13	-.06	-.05	-.05	.19	.13	.06	.32*	.29*	.29*
9. Solitary								-.14	-.10	.16	-.24 <sup>+</sup>	-.28*	-.24 <sup>+</sup>	-.24 <sup>+</sup>	.24 <sup>+</sup>	.02	-.04	.00	.09
10. Disengaged									-.21 <sup>+</sup>	.00	-.32*	-.22 <sup>+</sup>	-.22 <sup>+</sup>	.14	.13	.14	.25 <sup>+</sup>	.33*	-.20
<i>Teacher-rated Social Behavior</i>																			
11. Prosocial toward peers										-.27*	.56**	.18	.06	.06	-.30*	-.05	-.22 <sup>+</sup>	-.23 <sup>+</sup>	.19
12. Withdraws from peers											-.58**	-.07	.05	.07	-.02	-.02	.04	.16	-.24 <sup>+</sup>
13. Accepted by peers												.18	.18	.01	-.19	-.23 <sup>+</sup>	-.42**	-.45**	.16
<i>Child Characteristics</i>																			
14. Verbal ability														.24 <sup>+</sup>	-.33**	-.03	-.29*	.28*	-.02
15. Child age														.03	-.04	-.04	.12	.19	.07
<i>Parenting Behavior</i>																			
16. Lax parenting																.36**	.36**	.27*	-.04
17. Overreactive parenting																	.49**	.25 <sup>+</sup>	-.17
18. Coping																		.57**	.10
19. Synchrony																			.29*
20. Directiveness																			

Note: *N*s ranged from 58 to 67.  
<sup>+</sup>  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$  (2-tailed).

of peer functioning. The approach used in this second stage consisted of backwards and forwards methods of variable elimination to identify the best fitting and most parsimonious model. Covariate factors were retained in the models if they reached the  $p < .05$  level of significance.

The results of these analyses are summarized in Table 4, which shows for each outcome the adjusted and unadjusted mean social behavior scores and the difference in means for the two groups at each step of the analysis.<sup>2</sup> Table 4 also lists the covariate factors found to be significant in each model. The adjusted mean scores in Table 4 can be interpreted as the mean scores for each group that would be expected if all children had been exposed to equivalent levels of the covariate factors.

The results show that statistical control for PACS conduct problems did not substantially reduce the between-group differences in mean observed and teacher-rated social behaviors. Even after adjustment for the effects of conduct problems differences persisted in the peer-related behaviors of hyperactive and comparison boys. These findings suggest clearly that the poorer social functioning of children with hyperactive behavior problems could not be explained fully by the confounding effects of conduct problems (as assessed from parental descriptions of child behavior).

When parenting and other child variables were also included in the models, the following pattern of results was obtained. With respect to observed social behavior, the between-group difference in aggression was no longer significant when maternal coping was included as a covariate in the model ( $p > .07$ ), while, maternal coping, overreactive parenting, and PACS conduct problems partly accounted for significant associations between hyperactivity and noncompliance/annoyance ( $p < .05$ ).

With regard to teacher-rated peer behaviors, associations between hyperactivity and prosocial behavior ( $p > .05$ ) and peer acceptance ( $p > .08$ ) were no longer significant when parenting and child variables were added to the models. Significant covariates included lax parenting in respect of prosocial behavior, and interactional synchrony, PACS conduct problems, and observed disengaged behavior for peer acceptance.

Overall the results in Table 4 suggest that the associations between hyperactivity and child social behaviors can be explained in part by children's differential exposure to parenting behaviors that are important for children's social development, while acceptance by peers can also be partly explained by social disengagement. However, as the between-group difference in noncompliance/annoyance was only partly explained by parenting behaviors, the present findings also suggest clearly that the behavioral features associated with hyperactivity, such as inattention and impulsiveness, appear to also make direct contributions to the social behavior of hyperactive children.

## **Discussion**

The present study examined the peer relations of pervasively hyperactive preschool boys in a community sample. In particular, we were interested in the extent to which differences in the peer relations of hyperactive and comparison boys could be explained by the presence of comorbid conduct problems and between-group differences in parenting behaviors, as well as other child factors. This study had two advantages over previous studies that have examined the peer functioning of hyperactive preschool children. First, assessments were made of children's peer status as well as their social behavior. Second, greater use was made of teacher ratings to obtain

Table 4. Observed and Teacher-rated Social Behavior Means and Differences between Groups after Adjustment for Conduct Problems, Parenting Behavior, and Child Variables

	Hyperactive Boys	Comparison Boys	Mean Difference	p	Covariates
<i>Observational Ratings</i> *					
Noncompliance/annoyance					
Unadjusted difference	3.30	.73	2.57	<.0001	
After adjustment for conduct problems	3.00	.97	2.03	<.01	1
After adjustment for conduct problems, parenting, and child variables	2.80	1.14	1.66	<.05	1, 2, 3
Aggression					
Unadjusted difference	2.91	.84	2.06	<.01	
After adjustment for conduct problems	2.83	.90	1.93	<.05	
After adjustment for conduct problems, parenting, and child variables	2.61	1.07	1.54	>.07	2
Disengaged					
Unadjusted difference	2.50	1.09	1.41	<.01	
After adjustment for conduct problems	2.45	1.14	1.31	<.05	
<i>Teacher Ratings</i>					
Prosocial toward peers					
Unadjusted difference	1.97	2.32	.35	<.05	
After adjustment for conduct problems	1.97	2.31	.34	<.05	
After adjustment for conduct problems, parenting, and child variables	2.01	2.28	.27	>.07	4
Withdraws from peers					
Unadjusted difference	1.66	1.39	.27	<.05	
After adjustment for conduct problems	1.66	1.38	.28	<.05	
Accepted by peers					
Unadjusted difference	1.97	2.59	.62	<.0001	
After adjustment for conduct problems	2.03	2.55	.52	<.01	1
After adjustment for conduct problems, parenting and child variables	2.14	2.45	.31	>.08	1, 5, 6

Covariates: 1 = conduct problems; 2 = coping; 3 = overreactive parenting; 4 = lax parenting; 5 = synchrony; 6 = disengaged.  
 \* Comparisons based on observations of 28 hyperactive boys.

information about peer-related behaviors. The major findings and implications of the study are reviewed below.

In agreement with previous research about preschool children with hyperactive or hyperactive/conduct problems, observations showed that boys in the hyperactive group were more likely than comparison group boys to annoy others, violate social rules, be disruptive (Campbell *et al.*, 1994; DuPaul *et al.*, 2001), and aggressive toward peers (Campbell & Cluss, 1982; Schleifer *et al.*, 1975). Consistent with Hughes *et al.* (2000), hyperactive boys were also rated by their teachers as showing less prosocial behavior toward their peers. However, unlike other studies (Alessandri, 1992; Campbell & Cluss, 1982; Campbell *et al.*, 1994), hyperactive boys were also more frequently observed in disengaged behavior. This discrepancy in findings may have been due to the nature of the measure used in the present study, which also included noncompliant behavior of a solitary nature.

Extending previous research, preschool boys with pervasive hyperactive behavior problems had lower rates of peer acceptance than comparison children. Thus, according to teacher ratings, difficulty in relating to other children and lack of acceptance by peers clearly begins at a very young age for hyperactive children. Relatedly, teachers noted that hyperactive boys were more likely than comparison boys to show withdrawn behaviors such as avoiding peers and keeping peers at a distance. It is possible that these patterns of social withdrawal may be a consequence of peer exclusion (Ladd, 1999). Conversely, our finding that the link between hyperactivity and peer acceptance can in part be explained by observed social disengagement suggests that social isolation may serve as an antecedent for peer rejection (or neglect) (Hinshaw *et al.*, 1997). Further longitudinal research that includes observations of peer status, as well as teacher ratings of social behavior, may help to clarify the relationship between withdrawn behaviors and social status in preschool hyperactive children. Nonetheless, the results of this study do highlight the wide range of peer difficulties associated with pervasive preschool hyperactivity.

A major aim of this study was to examine the role of child conduct problems in explaining associations between hyperactivity and peer behaviors. In common with other studies of hyperactive and hard-to-manage preschool children (Campbell & Cluss, 1982; Campbell *et al.*, 1994; DuPaul *et al.*, 2001; Hughes *et al.*, 2000), there was some overlap between hyperactive and conduct problems in the present study. In general, associations between hyperactivity and measures of peer relations were attenuated by statistical control for the effects of PACS conduct problems. However, hyperactivity continued to be associated with child social behaviors, when the influence of conduct problems was taken into account. These results clearly show that the problematic peer relations and social interactions of boys in the hyperactive group could not be wholly explained by their comorbid conduct difficulties. These findings differ somewhat from two other studies that failed to find associations between hyperactivity and aggression (Alessandri, 1992), and prosocial behavior (Pavuluri *et al.*, 1999) when conduct problems were controlled for. These disparate findings may be due to differences in measures of aggression, or different sources of information about children's prosocial behavior. In relation to this last point, Pavuluri *et al.* (1999) obtained ratings of prosocial behavior from parents rather than teachers. However, correlations across settings and raters of children's peer behaviors are typically of low magnitude (Achenbach, McConaughy & Howell, 1987), suggesting that teacher ratings may provide a more accurate indication of peer behavior in preschool settings than parent ratings. Nonetheless, despite these differences across studies, it is increasingly clear that the relation-

ship between hyperactivity and peer functioning cannot be explained fully by conduct problems (as derived from parental descriptions of child behavior). Rather, the behavioral characteristics of hyperactivity clearly pose unique difficulties for hyperactive children in their social interactions with others.

The wide range of social difficulties evident among the pervasively hyperactive preschoolers raises significant concerns about these children's future peer relationships and experiences. Both asocial behavior and aggression, particularly when accompanied by low levels of prosocial behavior, have been shown to predict negative peer status (Bierman & Wargo, 1995; Hinshaw & Melnick, 1995). Social isolation and peer rejection are also likely to result in reduced opportunities for interactions with peers and, consequently, decreased opportunities for positive social learning experiences (Henker & Whalen, 1999) through the processes of positive peer interactions and feedback from peers about inappropriate social behaviors (Bierman & Wargo, 1995).

The second major aim of the study was to examine the role of parenting behaviors in explaining peer difficulties of preschool children with hyperactivity. The present analysis suggested that the differences in the peer behaviors of hyperactive and comparison children could be explained to some extent by parental disciplinary practices, efficiency of child behavior management, and parent-child interaction patterns. However, it is acknowledged that hyperactive child characteristics probably also shape parenting behavior, and from a transactional perspective, child behavioral outcomes arise from the continual interplay of parent and child (Shaw & Bell, 1993).

The specific relationships found in the present study between parenting behaviors and peer outcomes are supported by previous research in the area of social development. For example, the current findings for teacher-rated prosocial behavior and observed noncompliance/annoyance suggest the possibility that hyperactive children may have less exposure to the types of disciplinary strategies that teach children how their behavior affects relationships with others (Hart *et al.*, 1992). More specifically, given the higher rates of maternal reported lax and overreactive disciplinary practices in the hyperactive group, these children may have less exposure to styles of discipline that include explaining consequences, limit setting, and following through. As a result, hyperactive children may be less likely than comparison children to acquire prosocial, relationship-enhancing tendencies, which they can carry over from parent-child to child-peer interactions (Hart, Ladd & Burlison, 1990).

Similarly, past research suggests that children's peer acceptance is related to their ability to participate successfully in peer and play interactions (Coie, Dodge & Kuper-smidt, 1990; Dekovic & Janssens, 1992). In turn, skills necessary for young children to coordinate their behavior with peers and sustain enjoyable play may be learned in the context of synchronous interactions with parents (MacDonald & Parke, 1984; Mize & Pettit, 1997; Pettit & Clawson, 1996). Current results, showing that the between-group difference in peer acceptance was partly accounted for by differences in exposure to interactional synchrony, tend to support this association. The behavior patterns observed for parent-child interactional synchrony in the present study suggest that hyperactive children may have fewer opportunities to learn the skills necessary for successful child-peer interactions such as reciprocity, attentiveness, and sensitivity to social cues (Pettit & Clawson, 1996; Rose-Krasnor *et al.*, 1996).

Previous research has not examined the relationship between maternal coping and young children's observed aggression and noncompliant behavior with peers. However, the current findings do show some similarities with research highlighting associations between inconsistent, restrictive, or coercive disciplinary practices, and

aggression, antisocial behavior, and peer status (Dishion, 1990; Hart *et al.*, 1992; Pettit *et al.*, 1988). This earlier research suggests several possible processes that may account for the link found between maternal coping and the negative peer behaviors shown by hyperactive children at preschool. First, inconsistent parental responses to child behavior problems characterized by poor coping may cause hyperactive children to feel a lack of control over outcomes, which in turn may lead to the development of maladaptive social skills (Pettit *et al.*, 1991). Second, poor parental coping, which includes reactive rather than proactive responses to child behavior problems, may provide hyperactive children with negative models for dealing with conflict situations (Patterson, 1982). In turn, hyperactive children may transfer these styles of behavior from the family to the peer setting (Patterson, 1982; Pettit *et al.*, 1988, 1991).

However, although clearly an important contributing factor, the results of the present study suggest that parenting behaviors do not account fully for all the peer relationship difficulties. Furthermore, the behavioral characteristics of hyperactivity, such as inattentiveness and impulsiveness, probably also have a direct influence on the social behavior and status of hyperactive children. In addition, it is likely that other parenting and child variables not included in the present study, such as father's affective tone and child temperament patterns, may contribute to the peer behaviors of hyperactive children (Ladd, 1999).

It is acknowledged that the cross-sectional, correlational design of this study does not provide a strong test of the direction of effect from parenting to peer behaviors. The behavioral difficulties of children with hyperactive problems may strain parents' abilities to effectively manage child behavior and engage in synchronous interactions with their children (Lytton, 1990), as well as presenting a barrier to effective peer interactions. Relatedly, children without hyperactive behavior problems may be less demanding, making it easier for parents to anticipate misbehavior and employ proactive strategies to minimize the occurrence of problem behavior. They may also be more competent and rewarding social partners, making it easier for their mothers to engage in more synchronous interactions with them (Mize & Pettit, 1997). However, the current findings are consistent with short-term longitudinal studies of other high-risk samples showing that parental behaviors predict children's social skills with peers (Pianta, Nimetz & Bennett, 1997). Support for the direction of influence from parenting to child behavior is also provided by recent findings from parent training studies, which suggest that parenting skill *per se* is likely to influence preschool hyperactive behavior (Sonuga-Barke, Daley, Thompson, Laver-Bradbury & Weeks, 2001). Longitudinal research should help to further clarify the role of parenting behaviors in the development of problematic peer functioning among preschoolers with hyperactive behavior problems.

Given the relationships found between coping, lax and overreactive parenting, interactional synchrony, and peer-related behaviors, it is possible that the inclusion of these parenting behaviors in parent training interventions for hyperactive preschool children may lead to improvements in the social functioning of hyperactive children. Support for this possibility arises from the Multimodal Treatment Study of ADHD (MTA) (Hinshaw *et al.*, 2000), which found that treatment-related reductions in negative/ineffective parenting were a key mechanism underlying social skills improvements at school. Ideally, parenting interventions for young hyperactive children should begin before preschool, given the possibility that these children initially enter preschool peer systems with problematic interpersonal styles originating from family socialization processes (Olson, 1992). Additionally, this study highlights peer-related behaviors that

could be targeted for treatment at preschool, given the suggestion that classroom interventions may be effective in reducing the impaired social skills of hyperactive children (Barkley, Shelton, Crosswait, Moorehouse, Fletcher, Barrett, Jenkins & Metevia, 2000).

This study had a number of limitations. In particular, although subject groups were clearly defined, the present study was based on a relatively small number of parents and children. These sample sizes limit the precision of the results and the statistical power of tests. Therefore, it is possible that some of the nonsignificant results arose from the limited statistical power of the study rather than an absence of association. The generalizability of the findings would also have been improved with a larger and more representative sample of mothers and children. More specifically, the sample in the present study was limited to boys. Future studies also need to examine the early peer functioning of girls with hyperactive behavior problems, given the suggestion that the causes and consequences of peer rejection may be different among boys' and girls' peer groups (Ladd, 1999).

In conclusion, the results of this study suggest that compared with their same-aged peers, preschool boys with hyperactive behavior problems are more likely to have a range of peer-related difficulties including deficits in prosocial behavior, aggression, noncompliance, annoying others, peer withdrawal, and lack of acceptance. These social behavior differences between hyperactive and comparison children continued to persist after due allowance was made for the confounding influence of child conduct problems. However, associations between hyperactivity and child social behaviors were explained to some extent by group differences in exposure to parenting behaviors that are important for children's social development, and the behavioral characteristics of hyperactive behavior problems. Additionally, lack of peer acceptance was also partly explained by social disengagement. Although the correlational nature of this study limits conclusions that can be drawn about the causal relationships between parenting behavior and child outcomes, the present findings do suggest that the behavioral characteristics that distinguish hyperactive children and the quality of early parent-child interactions at home, may make unique contributions to the development of early peer relationship difficulties of children with hyperactive behavior problems.

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## Notes

1. Nonparticipants (no parent form returned,  $n = 178$ ) did not differ from participants (parent form returned,  $n = 225$ ) in terms of teacher-rated hyperactivity scores and socioeconomic rating of the preschool attended, according to the Ministry of Education indicators using school catchment data, Census data, and school ethnicity data.

2. As there were participants with parenting scores missing on direct observation and/or questionnaire measures, participants with missing data on these variables were excluded from the model of interest. Thus, means for noncompliance, prosocial with peers, and accepted by peers are based on 60, 65, and 58 participants, respectively.