Parenting of 7-month-old infants at familial risk for ADHD during infant’s free play, with restrictions on interaction

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A B S T R A C T

Patterns of interaction of 34 mothers and fathers with their 7-month-old boys at familial risk for ADHD and 25 comparison families were studied during infant play with blocks. The parents were instructed to refrain from intervening as much as possible. Infants in the risk group did not differ from those in the comparison group in frequency of needing help or involving parents in play. Nonetheless, they received adequate responsivity from their mothers less often than infants in the comparison group. Mothers in the risk group were also more likely not to respond to these needs at all. Mothers in the comparison group were more physically intrusive. No group difference was found for maternal rebuilding of the infant’s play. No group differences were found for any of father’s behaviors. However, fathers in both groups rebuilt their infant’s play more frequently than mothers, infants looked at them more often, and a larger number of infants involved the father in their play.

Studies have estimated that about 60% of children whose parents have Attention Deficit/Hyperactivity Disorder (ADHD) are likely to have ADHD as well (Biederman et al., 1995; Minde et al., 2003). This intergenerational transmission has been attributed mainly to a genetic neurodevelopmental vulnerability (Barkley, 1998; Biederman et al., 1995; Price et al., 2005; Smalley et al., 2000). However, organic environmental factors, familial factors (Befera & Barkley, 1985; Fischer, 1990; Milberger, Biederman, Faraone, Guite, & Tsuang, 1997); and less optimal patterns of interaction between parents and children were found to be associated with ADHD. Mothers of children with ADHD were found to be more intrusive, demanding, more negative and aversive, less approving and encouraging and expressed less positive affect than comparison groups of mothers (Anderson, Hinshaw, & Simmel, 1994; Barkley, 1985; Buhrmester, Camparo, Christensen, Shapiro Gonzalez, & Hinshaw, 1992; Campbell, 1995; Dupaul, McGuey, Eckert, & Vanbrakle, 2001; Keown & Woodward, 2002; Mash & Johnston, 1982). Children with ADHD were found to express more negativity and anger, to demand more help and attention, and to be less compliant with their mothers’ instructions and requests than the children in comparison groups (Buhrmester et al., 1992; Campbell, 1995; Dupaul, McGuey, Eckert, & Vanbrakle, 2001; Johnston, 1996; Mash & Johnston, 1982; Tallmadge & Barkley, 1983).

In the few studies on fathers’ interaction with ADHD children fathers showed less responsive behavior than mothers in a structured parent–child interaction (Calzada, Eyberg, Rich, & Querido, 2004). In addition, although fathers, like mothers, were more directing of children with ADHD on task performance than parents of comparison groups, children with ADHD reacted to their fathers’ directing in a similar way to the comparison children, whereas they complied less and reacted more negatively to their mother’s instructions (Calzada et al., 2004; Patterson, 1980; Tallmadge & Barkley, 1983).

It was found that when medication attenuated the child’s symptoms this pattern of parent–child interaction improved. These findings supported an approach that the non-optimal parent–child interaction patterns were mostly the result of the...
parents’ reactions to the child’s behavior (Barkley, 1988; Humphries, Kinsbourne, & Swanson, 1978). However, at this age of the children it is already impossible to know how the impaired dyadic pattern of interaction started.

As ADHD is a developmental disorder that often persists from childhood into adolescence and adulthood (Barkley, 1990; Hechtman, 2000; Price et al., 2005), it may well be that having a parent with ADHD not only increases genetic risk for the disorder. It is also possible that the ADHD symptoms exhibited by such parents can lead to less optimal parenting behavior, which could increase the expression of a genetic liability to ADHD, or in some cases, even cause ADHD symptoms in their children without such a liability.

In the above-mentioned studies on interaction the parent’s own ADHD status has not been systematically assessed. In recent years, more attention has been addressed to exploring differences in parenting behavior between parents with ADHD and parents without this disorder. Murray and Johnston (2006) found that mothers with ADHD were poorer at monitoring child behavior and less consistent disciplinarians than mothers without ADHD. They demonstrated lower effectiveness or quality of solutions to problems and a lower level of planning in their solutions. This direction of findings persisted when controlling for conduct behavior and oppositional disorder in the children and co-morbidity in the mothers. Harvey, Danforth, Mckee, Ulaszek and Friedman (2003) found that fathers’ and mothers’ self-reported ADHD symptoms were associated with their self-reports of lax parenting.

As noted earlier, existing research on parenting generally relates to preschool and school-age children with ADHD. However, in order to better understand the influence that parents with ADHD have on the development of their children with respect to ADHD, parenting behavior should be studied as early as possible. Indeed, it has been found that intrusive, rejecting and coercive parenting during infancy was associated with ADHD and with hyperactive symptoms in preschool children, and that this non-optimal care-giving behavior could not be attributed to observed infant behavior (Carlson, Jacobvitz & Sroufe, 1985; Feldman, Greenbaum, & Yirmiya, 1999, 2001; Davidov & Grusec, 2006; Londerville & Main, 1981), disengagement of attention in infancy (Rothbart, Ziaie, & O’Boyle, 1992). According to Biringen and Robinson (1991), sensitivity and responsiveness are expressions of emotional availability within a parent–child dyad. Another component of emotional availability in relationships is reflected in the child’s wish to involve the parent in his/her activities, such as sharing pleasure with toys. As the children in the present study were occupied with colorful blocks with which they enjoyed playing, attempts to involve parents in their play in addition to the expression of positive emotions could be expected and could perhaps distinguish between the groups already in infancy.

Boys were chosen as subjects because ADHD is more prevalent in boys than in girls with a ratio of 3:1–9:1 (Barkley, 1990; Danckaerts & Taylor, 1995), and in most of the mentioned studies the subjects were boys or failed to address gender differences because of small number of girls. However, in recent studies it was found that the diagnosis of ADHD-inattentive subtype identifies more girls and that girls with ADHD are more likely to experience intellectual difficulties and less likely to show hyperactivity and oppositional and conduct disorders than boys with ADHD (see review by Campbell, 2000). In addition, according to Johnston and Mash (2001), familial and genetic factors may influence boys and girls in a different way. The risk and comparison groups were chosen based on father’s symptoms because of evidence that children are more affected when the affected parent is of their gender (Minde et al., 2003), and that exposure to maternal ADHD is not associated with more impairment than exposure to paternal ADHD (Biederman, Faraone, & Monuteaux, 2002).

In light of the above-mentioned findings and reasoning, we offer the following hypotheses:

1. A differences will be found between the risk group and the comparison group in need and in request for help (in the categories Needs Help, Bids for Instrumental Help and Looks at Parent) during the play situation.
2. The infants will involve their parents in play more frequently in the comparison group than in the risk group.
3. Parents of the comparison group will respond adequately to their infant’s need for help during the play situation more often and will refrain from responding to these needs less often than parents in the risk group.
4. Parents in the risk group will be more intrusive during the infant’s play (as demonstrated in Rebuilding Infant Behavior and Physical Intrusiveness) than parents in the comparison group.

5. Synchrony of Positive Emotions between the infant and the parent will be more frequent for the comparison group than for the risk group.

1. Method

1.1. Participants

The current study presents data on 59 7-month-old boys ($M = 7.2, SD = 1.67$), their mothers and their fathers. Recruitment to the study was conducted in the maternity ward of the Soroka Medical Center. All parents were native-born Israelis or immigrants who had studied in Israel and spoke Hebrew. For those families who agreed to participate, fathers were then asked to complete a questionnaire assessing ADHD current symptomatology. In this questionnaire 18 items were symptoms of ADHD taken from the DSM-IV (American Psychological Association, 1994) and worded to be suitable for use with adults (Cronbach alpha = .80). Additional 19 items from the Tridimensional Personality Questionnaire (Cloninger, 1987) with a similar format were spread among the ADHD items so that at this visit to the maternity ward the fathers would not have to complete a questionnaire consisting only of items indexing psychopathology.

Entry into the study was based on the number of positive responses (yes–no format) fathers made to the ADHD items. The criterion for recruitment into the ADHD risk group was a score of ≥7, and for recruitment into the comparison group a score of ≤3, with background characteristics similar to the risk group. A cutoff score of at least seven symptoms for the risk group was decided on because it was high enough above the mean to indicate moderate symptomatology, but low enough to ensure a large enough risk sample for longitudinal tracking. Infants with a history of prenatal, perinatal or postnatal complications, including low birth weight and prematurity, were excluded.

Mothers were not assessed for ADHD at the maternity ward in which they stayed for a short time after delivery. However, when the infants were between 2 and 6 months old, a psychiatric interview with each of the parents was conducted at their home. At this time, they also completed the Conners Adult ADHD Rating Scale (CAARS; Conners, Erhardt, & Sparrow, 1998) on themselves and on their spouses. The interview was conducted by two fifth-year medical students and two clinical psychology students trained and supervised by a psychiatrist, using the Structured Clinical Interview for DSM-IV Axis I Disorders [SCID (1)] (First, Spitzer, Gibbon, William, & Benjamin, 1996). As that does not include questions on ADHD, they also administered the ADHD module from the Schedule of Affective Disorder and Schizophrenia for School-Age Children, Epidemiologic Version (K-SADS-E) (Orvaschal & Puig-Antich, 1987), worded in a way appropriate for adults.

The interviews were analyzed by the psychiatrist and a clinical psychologist. To establish diagnostic reliability, each of them independently diagnosed the same 32 interviews. They disagreed on the diagnosis on four cases (12.5%), and these disagreements were resolved by discussion. The rest of the interviews were divided between them for diagnosis. The interviewers and the diagnosticians were blind to the previous assessment of the fathers or their group assignment.

The following mental disorders were found: Depression, Adjustment Disorder, Posttraumatic Stress Disorder, Bipolar Disorder, Obsessive-Compulsive Disorder, Dysthymia, Panic Disorder, Generalized Anxiety Disorder, Social Phobia and Substance Abuse.

When the infants were 2–3 weeks old, 186 families participated in the first home visit. The mean level of paternal symptoms in this sample was: risk group $M = 9.73, SD = 2.34$; comparison group $M = 1.47, SD = 1.12$. Some of these families did not want to come to the lab at 7 months (19 in the risk group and 4 in the comparison group). In each of the groups four families could not be found, and divorce, illness or death occurred in additional six families. The other families were not included in the present report because of technical problems with the equipment and because the present study only included children whose fathers in addition to their mothers could come to the laboratory and both had an observation. It was much more difficult and sometimes impossible to schedule a meeting in the laboratory with fathers, because they could not reconcile between work requirements and the time that was optimal for their infant to come to the laboratory.

The infants and the parents in the sample of 186 and the present sample did not differ significantly on background variables except for gestation age of the infant, $t(165) = 2.43, p = .016$. The gestation age of the infants in the present sample was on average 5–6 days less than that of those infants who did not participate in the present study. The infants in the two samples also did not differ in the percentage of first-born infants, 36% and 33%, respectively. Nor did they differ with regard to percent of mothers with psychopathology, 17% and 16%, respectively, or for percent of father’s psychopathology, 16% and 15%, respectively.

Of the 59 infants who participated in the present study, 34 infants were in the risk group and 25 were in the comparison group (a similar proportion to the sample of 186). The mean number of symptoms of the fathers in these groups was $M = 9.76, SD = 2.00$; $M = 1.24, SD = 1.09$, respectively. No differences were found between the risk group and the comparison group for fathers, mothers and infants on the background variables (Table 1). Nor did they differ in percentage of first-born infants (risk group 27%, comparison group 32%). For reasons related to other aspects of the longitudinal study, the mother was present with the infant in the first session, and the father was present in the second. No difference in infants’ age was found between risk and comparison groups at the first and at the second laboratory meeting. The infants in both groups were older by about 2 weeks when interacting with fathers than they were when interacting with mothers. The groups also did not differ in frequency of maternal psychopathology (risk 15%, comparison 20%). However, paternal psychopathology in the risk group...
Table 1
Child, mother and father background information by risk and comparison groups.

<table>
<thead>
<tr>
<th></th>
<th>Risk (N=34)</th>
<th>Comparison (N=25)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age with mother</td>
<td>6.90</td>
<td>.64</td>
<td>7.63</td>
</tr>
<tr>
<td>Age with father</td>
<td>7.36</td>
<td>.60</td>
<td>8.12</td>
</tr>
<tr>
<td>Gestation age (weeks)</td>
<td>38.82</td>
<td>2.00</td>
<td>39.17</td>
</tr>
<tr>
<td>Weight at birth (g)</td>
<td>3230.15</td>
<td>463.38</td>
<td>3247.00</td>
</tr>
<tr>
<td>Birth order</td>
<td>2.33</td>
<td>1.05</td>
<td>2.16</td>
</tr>
<tr>
<td>Mother</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>29.25</td>
<td>5.49</td>
<td>29.34</td>
</tr>
<tr>
<td>Years of education</td>
<td>13.21</td>
<td>2.20</td>
<td>13.52</td>
</tr>
<tr>
<td>Father</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>32.83</td>
<td>6.50</td>
<td>32.48</td>
</tr>
<tr>
<td>Years of education</td>
<td>12.79</td>
<td>2.79</td>
<td>13.04</td>
</tr>
</tbody>
</table>

was significantly higher than in the comparison group (24% and 4%, respectively, \( \chi^2(1) = 4.45, p = .03 \)). One mother and five fathers were diagnosed at psychiatric interview with ADHD, all in the risk group.

1.2. Procedure

As infants approached the age of 6 months, families were contacted to arrange a date for a visit to the developmental laboratory. The visit was scheduled only after the child could sit up by himself. Because of the scope of the observations, two sessions were necessary (one for each parent), with a span of about 2 weeks between them. Each session started with a warm-up, followed by the face-to-face interactions and then five tasks from the Laboratory Temperament Assessment Battery (LAB-TAB) (Goldsmith & Rothbart, 1996), one of which (task orientation blocks) was the subject of this study. In half of the cases with each parent, the block task was the second task of the five, and in the other half, it was the last task. When it was second for the mother, it was last for the father, and vice versa. All sessions were videotaped. The experimenters were graduate students in psychology who were blind to the group assignment of the infants.

During the “orientation blocks” task, the child sat next to a child-size table and one of his parents sat to the left, away from the table. At the onset of the task, the experimenter placed four colored playing blocks of different shapes on the table, in front of the child, said “Here are a few blocks to play with,” and left the room for 3 m. During the initial warm-up, the parent was told about this task (as well as the others), shown a picture of it, and informed that he/she is expected to refrain from intervening in the child’s play as much as possible. These instructions were reiterated before the episode was started. Identical instructions were given to mothers and fathers. Both parents signed informed consent forms for their participation and that of their son.

1.3. Coding of the observation

Observation of the 3-min task was divided into 18 units (intervals) of 10 s each. During each unit of time the observer indicated, for every category of behavior, whether or not it appeared. The infant’s behavior and the parent’s behavior were coded separately by two different teams of coders. The coders were blind to the group assignment of the infants and to the hypotheses of the study. The following categories were coded.

1.4. Infant behavior

1.4.1. Needs Help

The coders decided whether the infant directed any signal for help to his parent or was in a state requiring the parent’s help (e.g., the infant tried to reach a block that was too far away or that fell off the table; all the blocks were thrown on the floor). Included in this category were also any infant behaviors indicating that his sitting position was uncomfortable.

1.4.2. Bids for Instrumental Help

This sub-category of Needs Help was coded when the infant not only required assistance, but also explicitly directed bids for help to the parent. For instance, it was coded when the infant looked at his parent while trying to reach a block that was too far away.
1.4.3. Looks at Parent
This category was coded whenever the infant took a quick look at his parent when not in need for instrumental help or under apparent stress.

1.4.4. Involves Parent
This category was coded when, while playing, the infant tried to give a block to his parent, pointed to a reachable block and looked to the parent, held and showed a block to the parent.

1.4.5. Distress
Any expression of stress on the part of the infant that could be identified was coded separately, in addition to being included in the Needs Help category. As less than 7% of the infants expressed any kind of distress, this category was not analyzed separately.

The reliability between two independent coders in classifying the infant's behavior for 15% of the parent–infant dyads, as measured by Kappa, was in the range of .71–.86.

1.5. Parent behavior

1.5.1. Rebuilding Infant Behavior
This category was coded when the parent directed the infant’s play even though the infant did not seem to require any help, and when the parent’s behavior did not seem to fit the infant’s play or tempo. For instance, when the parent added a block to the infant’s construction or took away a block, unrelated to the infant’s needs.

1.5.2. Physical Intrusiveness
This category was coded when the parent interfered with the infant’s play by physical touch when there was no objective need for this. The touch could be related to the infant’s play or to other aspects of the situation (e.g., put the infant’s hand on a block, repeatedly wiped the infant’s nose without any apparent need).

1.5.3. Adequate Response
Adequate Response was coded when the parent’s response was in accordance with the infant’s need and capacities. For instance, if the parent helped the child when a block fell down/was out of reach and the infant made explicit efforts to reach it, or when all blocks were thrown from the table and the parent put them back on the table within the infant’s reach.

1.5.4. Inadequate Response
This category was coded when the infant required help and what the parent provided was not suited to the child’s needs (e.g., brought back blocks that were far away, but did not place them within the infant’s reach). As this behavior was infrequent in our study (less than for 10% of the infants), this category was not included in our analyses.

1.5.5. No Response
No Response was coded when the infant needed or asked for help, the parent was focused on the infant’s play (was not looking away), and yet the parent did not respond.

1.5.6. Synchrony of Positive Emotions
Synchrony of Positive Emotions was coded when the parent and infant expressed a positive emotion in the same unit of observation (Kochanska’s, 1998).

The reliability between two independent coders in classifying the parent’s behavior for 15% of the parent–infant dyads, as measured by Kappa, was in the range of .70–.96.

The infant category Needs Help was identified by both teams of coder. That is, it was both coded for infant behavior and used in the coding of parent behavior for the categories Adequate Response, Inadequate Response and No Response. The few disagreements between the teams in identification of Needs Help were solved by mutual observation and agreement.

1.6. Data analysis
For some infants, the last four or five 10-s intervals could not be coded. Thus, for each infant, for all categories, the number of intervals during which a category occurred was divided by the number of intervals coded. For parent behavior, the number of intervals in which the Adequate Response, Inadequate Response and No Response categories were coded was divided by the number of intervals in which the Needs Help category was coded. All other parent categories were analyzed in the same way as the infant categories. Thus, the score for each infant and parent was a fraction. Data were analyzed using a mixed analysis of variance (ANOVA), with group (risk, comparison) as a between-subject variable and parent (with mother, with father) as a within-subject variable, and by t-tests. Effect size of all the ANOVA results was evaluated with partial eta-squared and t-test results with Hedges’ g. Categories that observers attributed only to 25–50% of the children were subjected to chi-square analysis.
Table 2
Means and standard deviations of infant’s behavior with mothers and with fathers by group (risk, comparison).

<table>
<thead>
<tr>
<th></th>
<th>Risk Mother M ± SD</th>
<th>Risk Father M ± SD</th>
<th>Comparison Mother M ± SD</th>
<th>Comparison Father M ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bids for Help</td>
<td>.05 ± .09</td>
<td>.03 ± .07</td>
<td>.02 ± .04</td>
<td>.03 ± .07</td>
</tr>
<tr>
<td>Involves Parent</td>
<td>.03 ± .07</td>
<td>.03 ± .06</td>
<td>.02 ± .05</td>
<td>.05 ± .09</td>
</tr>
<tr>
<td>Looks at Parent</td>
<td>.08 ± .09</td>
<td>.13 ± .14</td>
<td>.11 ± .09</td>
<td>.17 ± .17</td>
</tr>
</tbody>
</table>

2. Results

2.1. Infant’s behavior

No differences for Needs Help were found between groups, \(F(1,56) = .89, p = .35, \eta^2 = .016\), or between the infant’s behavior in the presence of the mother and in the presence of the father, \(F(1,56) = 1.04, p = .31, \eta^2 = .018\). Nor was the interaction between group and parent significant, \(F(1,56) = .02, p = .90, \eta^2 = .000\).

No group difference was found for the Looks at Parent category. However, a significant difference in frequency of looks to mother and father was found, \(F(1,56) = 7.40, p = .008, \eta^2 = .117\). As indicated in Table 2, the infants looked at their father more often than at their mother. The interaction between group and parent was not significant.

Bids for Instrumental Help and Involves Parent were found only for 25–50% of the children. Chi-square analysis revealed no significant differences between groups in the percentage of infants that directed Bids for Instrumental Help, either to their mothers or to their fathers. Nor were there significant differences between interactions with mothers and interactions with fathers for Bids for Instrumental Help. Thus, contrary to the first hypothesis, the two groups of infants did not differ in all three categories that indexed their need for a parent’s help.

No difference was found between groups in percentage of infants who attempted to include a parent in their play (Involves Parent), both when the mother was present and when the father was present. However, the percentage of infants who tried to involve their father was significantly higher than the percentage who tried to involve their mother, \(\chi^2 = 46.99, df = 1, p < .001\). Thus, the second hypothesis was not confirmed.

2.2. Parent’s behavior

As described in the Section 1, the score of the Adequate Response and No Response categories was calculated as a proportion of the intervals of observation in which the child needed help from his parents. Not all infants needed help from their parents, and those who needed it did not need it during each unit of observation. Across the entire episode, three infants did not need help from either parent, another nine did not need help from their mother and another six did not need help from their father. No differences were found between groups in this respect, either with mother or with father. As a result, the sample of parents that could be analyzed together in a within analysis (ANOVA) was much smaller (\(N = 41\)) for these categories than for the other ones. Thus, for these two categories, in addition to analysis of variance (ANOVA), including the two parents, the data for each parent were also analyzed separately by a t-test analysis.

For Adequate Response, no differences were found for group or for parent in the ANOVA analysis. Nor was the interaction between parent and group significant. However, when analyzed separately, the between-group difference for mother’s behavior was significant, \(t(45) = 2.34, p = .02, g = .569\). As indicated in Table 3, when the infant needed help, mothers in the comparison group provided adequate assistance more often than mothers in the risk group. When mothers with psychopathology were excluded from the analysis, the differences between the groups were similar to the findings in Table 3 (risk group .49; comparison group .67) this difference failed to reach significance probably because of the small number of subjects (40). The same was found for mothers without psychopathology whose spouses were also without psychopathology (risk group .48; comparison group .67, \(N = 33\)). For all the fathers, the difference between the groups in Adequate Response was not confirmed.

Table 3
Means and standard deviations of parental behavior, by group (risk, comparison) and by parent (mother, father).

<table>
<thead>
<tr>
<th>Parental behavior</th>
<th>Risk Mother M ± SD</th>
<th>Risk Father M ± SD</th>
<th>Comparison Mother M ± SD</th>
<th>Comparison Father M ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>.46 ± .37</td>
<td>.54 ± .46</td>
<td>.71 ± .36</td>
<td>.59 ± .40</td>
</tr>
<tr>
<td>Inadequate</td>
<td>.04 ± .17</td>
<td>.02 ± .11</td>
<td>.01 ± .07</td>
<td>.05 ± .19</td>
</tr>
<tr>
<td>None</td>
<td>.51 ± .37</td>
<td>.38 ± .43</td>
<td>.20 ± .35</td>
<td>.37 ± .40</td>
</tr>
<tr>
<td>Rebuilding</td>
<td>.15 ± .17</td>
<td>.24 ± .20</td>
<td>.14 ± .17</td>
<td>.22 ± .27</td>
</tr>
<tr>
<td>Physical Intrusiveness</td>
<td>.04 ± .07</td>
<td>.09 ± .20</td>
<td>.06 ± .08</td>
<td>.04 ± .07</td>
</tr>
<tr>
<td>Synchrony</td>
<td>.08 ± .10</td>
<td>.09 ± .11</td>
<td>.06 ± .10</td>
<td>.06 ± .07</td>
</tr>
</tbody>
</table>
was not significant, $t(48) = - .34, p = .73, g = .096$. The groups did not differ also when the fathers with psychopathology were excluded from the analysis.

Similarly, no differences between groups or between parents were found in the ANOVA analysis for the No Response category. However, the interaction between parent and group tended to be significant, $F(1,39) = 3.9, p = .055$. More mothers in the risk group did not respond to the infant’s needs. In this analysis as well, when data for mothers and fathers were analyzed separately (Table 3), mothers refrained from responding to the infant’s needs or bids for help more frequently in the risk group than in the comparison group, $t(45) = 2.10, p = .04, g = .614$. For No response as well, when mothers with psychopathology were not included in the analysis, the results resembled the findings for mothers’ behavior when mothers with psychopathology were included in the analysis (risk group .49; comparison group 33; $N = 40$). However, this difference between the groups was not significant. The findings did not change when fathers with psychopathology were also excluded from the analysis.

For fathers, no between-group difference was found in this category, $t(48) = .09, p = .93, g = .025$. The groups did not differ also when the fathers with psychopathology were excluded from the analysis. Thus, the third hypothesis was supported only for mothers.

No difference between groups was found for Rebuilding Infant Behavior. However, parents differed significantly in the frequency of this behavior, $F(1,57) = 5.61, p = .02, \eta^2 = .09$. As indicated in Table 3, fathers rebuilt their infant’s play more frequently than mothers. The interaction between group and parent was not significant.

As Physical Intrusiveness was observed only for 25–50% of the parents, chi-square analysis was performed. It revealed that the percentage of mothers who exhibited this category of behavior differed between the two groups, and this difference approached significance, $\chi^2 = 3.53, df = 1, p = .06$. More mothers in the comparison group were physically intrusive with their infant than mothers in the risk group. No difference was found for fathers. Thus, the findings for Rebuilding Infant Behavior did not support the fourth hypothesis and the findings for maternal Physical Intrusiveness was in a direction opposite to that predicted.

As Table 3 indicates, the rate of the category of Synchrony of Positive Emotions between infant and parent was low. Most of the time, the children were interested in playing with the blocks by themselves, and the parents sat to the side of the infant, having been instructed to refrain from intervening as much as possible. However, more than 50% of the children and their parents were in Synchrony of Positive Emotions during at least part of the observation. Thus, the data were analyzed for all infants by an ANOVA. The ANOVA showed no differences between groups or between parents. Nor was the interaction between group and parent significant. Thus, the fifth hypothesis was not supported.

3. Discussion

The current findings indicated that, at 7 months of age during free play with blocks, infants at familial risk for ADHD did not differ from a comparison group in their need for help from their mothers and their fathers. The infant’s need for help was investigated in three ways: any signal that indicated a need for help as judged by an observer; the infant’s Bids For Instrumental Help from his parents; and the infant’s quick look at his parent for “emotional refueling” (Mahler et al., 1975). In all three indexes, risk and comparison groups did not differ significantly from each other during interaction with mothers or with fathers. Despite this lack of difference between the groups in infant’s behavior, mothers in the risk group responded in an adequate way to their infant’s needs less often than mothers in the comparison group, or did not respond at all more frequently.

The findings of the present study with regard to maternal adequate responsivity are in line with existing research on mothers of preschool and school-age children with ADHD. These previous studies found that, in most dimensions of interaction, mothers of children with ADHD responded less adequately to their children than mothers in comparison groups (Anderson et al., 1994; Barkley, 1985; Battle & Lacy, 1972; Cunningham & Barkley, 1979; Mash & Johnston, 1982). About 35% of the parents of children with ADHD were expected to have ADHD themselves (Biederman, Faraone, Keenan, & Tsuang, 1991). Thus, the findings of the present study hint at the possibility that the less adequate responsivity of the mothers of children with ADHD at preschool and school age may date already from infancy, and that in infancy, at least in some situations, it could be independent of the infant’s behavior.

The mothers of the risk group in the present study were not diagnosed with ADHD symptomatology; it was their spouses who were so diagnosed. However, these findings are in line with studies that have found that familial and parental functions are disrupted in families in which one of the parents has ADHD symptomatology (Biederman et al., 2002; Minde et al., 2003; Weiss, Hechtman, & Weiss, 2000). A new infant calls for a reorganization of the family system and the behavior of each of the participants. It seems that having a disorganized, non-attentive and hyperactive spouse can disrupt the reorganization and impair also the parenting behavior of the parent who does not have ADHD symptoms. There is suggestive evidence that psychopathology of the parents did not account for these findings.

In the context of the present study, the mothers in the two groups rarely responded in an inadequate way to the infant’s needs. However, mothers of infants at risk for ADHD did not respond at all to their child’s need-related events more often than mothers in the comparison group. It should be stressed that No Response was coded in the present study only when the parents were at least outwardly perceived as focusing on the infant’s play. Additional research is needed to clarify why these mothers did not respond. Pinpointing more specifically an aspect in which such mothers react less adequately to their infants needs can help in promoting preventive plans already in infancy for children whose fathers have about 10 symptoms of ADHD.
No group difference was found for fathers or for mothers in terms of Rebuilding Infant Behavior. These findings are in line with research on parents of children with ADHD at preschool and school age in regard to redirecting the child’s behavior (Calzada et al., 2004; Patterson, 1980; Tallmadge & Barkley, 1983). Rebuilding an infant’s behavior and redirecting a child’s behavior have much in common.

The current results for maternal Rebuilding Infant Behavior are incongruent with the findings of Jacobvitz and Sroufe (1987) and of Morrell and Murray (2003) on the association between maternal intrusiveness in infancy and ADHD of their children at preschool. These differences can be explained by the different contexts of the studies. In the Jacobvitz and Sroufe (1987) study, the contexts of observation were a feeding and a free play session in a lower socio-economic class. In the Morrell and Murray (2003) study, it was a session of infant–mother free play without toys. In the present research, the context was a block play situation, and, unlike in the other studies, parents were instructed not to intervene.

Our findings that more mothers were physically intrusive with their infants in the comparison group than in the risk group are in contrast to the results of Jacobvitz and Sroufe (1987) and Morrell and Murray (2003). In the present study this category included two kinds of behavior: (1) improving the child’s sitting position when unnecessary or wiping the infant’s nose too frequently; and (2) physical intrusion in his play. Because these behaviors were coded together, we are unable to tell which of them were found less in the risk group.

In the current study, the findings for fathers’ behavior differ from those of the mothers in various aspects. In contrast to mothers, no between-group differences were found for fathers in the categories of Adequate Response and No Response. Moreover, while no group differences were found for mothers or fathers in Rebuilding Infant Behavior, fathers in both groups were found to rebuild their infant’s play significantly more frequently than mothers. In addition, while no group differences were found in the Involves Parent and Looks at Parent categories, more infants involved their father in their play and looked at fathers during interaction than they did with their mothers.

The findings of a lack of group differences in paternal Adequate Response and paternal non-response is not in line with findings on parental differences in responsiveness in older children with ADHD (Calzada et al., 2004). It seems that the context of the present study can account for the difference. In the present study, the child was focused on play with colorful blocks that enabled various kinds of play. It seems that these blocks evoked a greater temptation to play among fathers than mothers. This greater involvement in the infant’s play could contribute to the similarity in responsiveness in the risk and comparison group. The findings that fathers in both groups rebuilt infants’ behavior more often than the mothers, is in line with such an interpretation. It is also in line with previous findings on differences in interaction patterns between fathers and mothers in general. Fathers, more than mothers, have been found to actively interact with their infants, to act more as playmates (Lamb, 1997), to be more instrumental, to direct and control more, and to disturb the child’s play more by offering ideas that are not in synchrony with it (Jacobs, 1998; Russel & Russel, 1987).

The findings on Rebuilding Infant Behavior and Physical Intrusiveness with regard to group differences are not similar. The different findings for these categories suggest that the concept of intrusive parental behavior is too general and can obscure more subtle differences that may exist in the behavior of fathers and mothers with their infants at risk for ADHD.

No differences between groups or parents were found for Synchrony of Positive Emotions. In fact, the frequency of mutual smiling and laughing was low in the context of this study. This low frequency could be attributed to the intensity with which the infants played with the blocks; consequently, they interacted less with their parents.

3.1. Limitations

At this point of the longitudinal study, we do not know which of the children will ultimately have ADHD. When diagnosed, it will be of interest to study the correspondence between the parent’s behavior and that of the infant who developed ADHD, on the one hand, and of the infant who did not develop this disorder, on the other hand. The sample size is small. As mentioned it was difficult and some times impossible to reconcile between work requirements of the fathers and the optimal time for the infants to come to the Lab. For reasons related to other aspects of the longitudinal study mother–infant interaction episodes occurred in the first laboratory session and father–infant interaction episodes in the second session. An additional limitation of the study is the fact that only boys were studied.

Concluding remarks: In the present study no differences were found between 7-month-old boys at risk due to their father’s ADHD symptomatology and a comparison group, either on need for help or on the number of infants that involved parents in their activities. Nonetheless, mothers in the risk group reacted in an adequate way to the infant’s needs less often than mothers in the comparison group and those in the risk group refrained from responding at all more often than those in the comparison group. No differences between groups were found for mothers’ and fathers’ rebuilding of the infant’s play, however, mothers were more physically intrusive in the comparison group. Father–infant interaction differed from mother–infant interaction; fathers in both groups rebuilt the infant’s play more often, and more of infants looked at and involved their fathers in their play. No group differences in father’s behavior were detected. The less optimal maternal parenting of infants in families where the fathers perceive that they have about 10 ADHD symptoms can have an impact on the development of ADHD in their infants with a genetic liability for ADHD and perhaps in some cases even without such a liability.
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References


