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A Multidimensional Assessment of Parent-Identified Behavior Problem Toddlers[1]

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Sixty-eight 2- and 3-year-olds (46 parent-referred, 22 controls) participating in an identification, assessment, and follow-up study of hyperactivity and related behavior problems were evaluated on parent-report, observational, and cognitive measures. Referred youngsters were described by both parents as more active, inattentive, difficult to discipline, and aggressive with peers than were controls. Mothers of referred children also reported a more difficult infancy period. Laboratory assessments confirmed parental reports of current problems. Referred children shifted activities more during free play, were more active and inattentive during structured tasks, and made more impulsive responses on a delay task than did controls. Discriminant function analysis indicated that parental ratings of activity paired with laboratory measures of sustained attention and impulsivity correctly classified 88% of the sample. These data suggest that the core symptoms of hyperactivity can be identified in very young children, although their prognostic significance remains to be determined.

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A good deal of research exists on hyperactivity in children, but few studies have explored hyperactivity and related behavior problems in children of preschool age or younger. In school-age samples, hyperactivity is generally defined in terms of the target symptoms of restlessness, inability to sustain attention, and poor impulse control (e.g., Barkley, 1981; Douglas, 1980).

While hyperactivity usually comes to professional attention when children cannot conform to the demands of the classroom, clinical history data suggest that many hyperactive children are perceived as active, irritable, and difficult to control from infancy or toddlerhood (Campbell, 1976; Ross & Ross, 1976). Consequently, early onset is now included as one defining characteristic of *attention deficit disorder with hyperactivity,* the term used in the newly revised psychiatric diagnostic guidelines (DSM-III) (American Psychiatric Association, 1980), and it is generally agreed that hyperactivity can be identified earlier than school age (e.g., Barkley, 1981).

Although it makes logical sense to attempt to identify hyperactivity in young children, problems of definition are particularly acute with this age group. Studies of hyperactivity in school-age youngsters often rely on both parent and teacher reports to define groups, thus ensuring some degree of cross-situational, interrater consistency in perceptions of problem behavior (Barkley, 1981). Definition of hyperactivity on the basis of both parent and teacher reports helps to exclude children whose main problem is their excessively intolerant parents. Unfortunately, this dual criterion cannot be used with young children since many are not yet in school. A second criterion often used to define hyperactivity in school-age children is chronicity: a history of problems for at least 2 years. Obviously, it is difficult to speak of chronicity in very young children. Further, data are lacking on the specifics of early hyperactive symptomatology and on age of onset. Finally, while the line between normal and problem behavior is blurry at best, objective behavioral criteria that clearly differentiate normal from problem toddlers and preschoolers are virtually nonexistent. Many of the problems about which parents complain such as tantrums, defiance, restlessness, and difficulty playing alone show developmental change and are typical of toddlerhood and the early preschool years. Thus, it is difficult to differentiate active and defiant children who are showing potentially chronic problems from those who are merely going through a turbulent developmental phase.

Despite this definitional dilemma, young problem children seem worthy of study for several reasons. First, studies of nonclinical samples of toddlers and preschoolers suggest that a high activity level (Halverson & Waldrop, 1973) and angry-defiant behavior (Kohn & Parnes, 1974) are associated with more aggressive peer interactions and less focused play.

Second, longitudinal studies indicate that these maladaptive behaviors in early childhood continue to be related to less competent social and cognitive functioning at elementary school age (Halverson & Waldrop, 1976; Kohn, 1977). In a recent longitudinal study, Buss, Block, and Block (1980) likewise reported continuity in activity level over time and consistency in its personality correlates. More active children were described at three independent assessments, spanning the preschool and early school years, as more restless and fidgety, less compliant, more aggressive, and more competitive.

Studies of clinical samples of young problem children have been rare. However, one follow-up study of hyperactive preschoolers, perceived as problem 3½- to 4½-year-olds (Schleifer, Weiss, Cohen, Elman, Cvejic, & Kruger, 1975), indicated that they continued to have difficulties both at home at 6½ (Campbell, Schleifer, Weiss, & Perlman, 1977) and at school at 7½ (Campbell, Endman, & Bernfeld, 1977). Thus, there is some evidence that potentially maladaptive behavior, observed both in so-called normal and clinical samples, is not automatically outgrown, despite the fact that parents are frequently given such assurances by professionals. Furthermore, follow-up studies (e.g., Minde, Weiss, & Mendelson, 1972; Weiss, Hechtman, Perlman, Hopkins, & Wener, 1979) and therapy outcome studies (e.g., Douglas, Parry, Marton, & Garson, 1976; Weiss, Kruger, Danielson, & Elman, 1975) of older hyperactive children suggest that problems persist and are relatively resistant to treatment instituted at school age. Therefore, studies of the developmental course of hyperactivity may provide important clues to etiology and delineate predictors of outcome, while early identification and intervention may help to prevent some of the later problems in cognitive and social functioning that seem to be reasonably difficult to change.

We are currently studying a group of young children whose parents' complaints of active, inattentive, and impulsive behavior fit comfortably under the rubric of "attention deficit disorder with hyperactivity" as defined in DSM-III. However, in view of recent debates about differential diagnosis (e.g., Lahey, Green, & Forehand, 1980; Sandberg, Rutter, & Taylor, 1978) and the limited data on behavior disorders in very young children, we prefer to describe our clinical sample only as parent-identified behavior problem toddlers and preschoolers until more data are in. These youngsters are being seen as part of an ongoing early identification, assessment, intervention, and follow-up study of parent-referred toddlers and preschoolers. Measures include a parent interview, objective parent rating scales of child behavior, measures of cognitive functioning, objective measures of gross motor activity, and observations of behavior during free play, during a structured play interaction with mother, and during experimenter-administered structured tasks. In addition, children

who attend a preschool are observed during free play in school, and behavior ratings are obtained from preschool teachers (Campbell & Cluss, 1982). The present report will examine differences between parent-identified problem children and controls on parent report measures, cognitive tasks, and behavioral observations obtained in the laboratory during free play and structured tasks.

METHOD

Subjects

Subjects were recruited from pediatricians' offices, toddler groups, and mothers' day out groups via a poster describing the project. The poster listed five target symptoms (a high level of motor activity, short attention span, difficulty playing alone, tantrums, and defiance) and offered assessment and possible parent training groups to families whose children met inclusion criteria. The poster also asked for volunteers who were not having difficulty with their children and explained the need to assess a range of behavior in young children. Some parents were informed about the project by pediatricians, preschool teachers, or other professionals in the community. The principal investigator also gave talks on development to several parent groups as a way of publicizing the project. However, parents themselves had to phone the project and either request help with their child or express interest in participating. Both problem and control families contacted the project as a result of the poster or talks to community groups, or after they were told about it by other parents who had participated.

To be eligible for the study, children had to be between 2 and 3 years of age (25 months to 47 months) at initial referral and in good physical health, with no evidence of severe language delay, gross brain damage, sensory impairment, retardation, or severe psychiatric disorder. If, during a telephone screening, parents specifically complained of some or all of the target symptoms (a high level of motor activity, short attention span, difficulty playing alone, tantrums, and defiance), their children were included in the clinical group. Of the 57 parents who called the project with complaints of behavior problems, 44 met these initial screening criteria and agreed to participate after the study was described in detail.

Parents who called because of interest, but with no complaints about their child's behavior, were included in the control group. Two parents who

initially called as controls ultimately acknowledged concerns about their child's behavior and, in fact, these two children were among the more inattentive and uncooperative children in the sample. They were, therefore, placed in the problem group, which consists of 46 children (30 boys, 16 girls). The control group is composed of 11 boys and 11 girls.

Problem and control children are well matched on age (M = 34.98 and 36.36 months, respectively, $F < 1$). Five children in the problem group and two children in the control group come from single-parent, female-headed households. Three children in the parent-identified problem group were adopted in early infancy. The remaining 58 subjects live with both biological parents. Forty-seven youngsters are firstborn and 21 are second- or later-born. However, a higher proportion of problem children are firstborns, while more controls are later-born ($\chi^2(1) = 6.97, p < .02$). The control group is also somewhat higher in socioeconomic level, as reflected in both higher parental educational levels ($p < .01$) and a higher paternal occupational level ($p < .01$). Control parents are predominantly middle class and professional, while parents of problem children run the gamut from working class to upper middle class.

Procedure

This study includes assessment, treatment, and follow-up phases. This report, however, examines only initial assessment data obtained prior to and during a home visit and two visits to our laboratory playroom.

During the telephone screening, the study was described in detail, and, if parents agreed to participate, the home visit was scheduled. The study description included a request that each parent independently complete a brief behavior rating scale, the Behar Preschool Behavior Questionnaire (Behar, 1977), prior to the home visit. While the importance of independent parental assessments of the child's behavior was stressed, we cannot be sure how completely our instructions were followed. Behavior ratings completed prior to the home visit were sought to avoid potential biases as a result of questions posed during the structured interview. Two copies of the questionnaire were mailed to parents along with a letter confirming the time of the home visit.

At the start of the home visit, informed consent was obtained; then a structured interview was administered to the child's mother and a Stanford-Binet was administered to the child. Parents were given additional questionnaires on which to describe their child's behavior. During the laboratory visits, measures of activity and attention during free play and structured tasks were obtained and performance on several cognitive

tasks assessed. Interviewers and experimenters were all adult females with previous experience working with children and families. The person who administered the Binet during the home visit and had established rapport with the child served as the consistent contact person for that child and family.

Measures

Parent Report Measures. A structured interview designed to obtain data on the child's early behavior and development, current problems, and information on the family was administered to the mother during the home visit.

Prior to the home visit, each parent independently completed the Behar Preschool Behavior Questionnaire (Behar, 1977), as noted above. This is a 30-item rating scale with established reliability and validity that describes problem behaviors of young children. The questionnaire is composed of factors assessing aggression-hostility, anxiety-fearfulness, and hyperactivity-distractibility. Each item is rated on a 3-point scale, from 0 = "does not apply" to 2 = "certainly applies" to the child.

At the completion of the home visit, the parent-report form of the Werry-Weiss-Peters Activity Scale (Routh, Schroeder, & O'Tuama, 1974) was given to parents to complete. The Activity Scale is a 22-item checklist assessing restless, active, and fidgety behavior in a range of everyday situations including mealtime, playtime, bedtime, and out in public. This checklist was originally designed to be completed on a 3-point scale ("not at all," "pretty much," "very much"). However, after obtaining feedback from a pilot sample of mothers of young children who found it difficult to complete accurately in its original format, we added a "sometimes" category and made it into a 4-point (0-3) scale.

Activity and Attention to Toys During Free Play. Measures of gross motor activity, activity shifts, and attention to toys and other objects were obtained during a 15-minute observation of free play. These measures, derived from Kagan (1971) and Routh et al. (1974) are commonly used to assess directed attention and level of gross motor activity in young children. Rate per minute of gross motor activity was assessed with an actometer worn about the child's waist (Foster, McPartland, & Kupfer, 1978). In addition, the following measures were derived from observations of free play: frequency of activity shifts (exploratory or play activities with toys or other objects), number of exploratory or play activities lasting 20 seconds or less, number of exploratory or play activities lasting 2 minutes or more, amount of exploratory contact with objects other than toys (primarily forbidden objects such as locked cabinets, doors to the

video camera, and one-way screen), and length of longest involvement in an activity.

Children and their mothers were ushered into a playroom equipped with a selection of nine age-appropriate toys, which pilot testing had shown captured the attention of children in this age group. Toys included a tyke bike, a ball, a pounding toy, a doll family and furniture, a teddy bear, a toy telephone, a shape box, a school bus with people, and a plastic shopping cart with plastic food. Mothers were instructed not to initiate play or interaction but to respond briefly to child overtures and to intervene if the child was endangering himself/herself.

The actometer, mounted on a red cowboy belt, was placed around the child's waist, and he/she was instructed to sit on his/her mother's lap. The experimenter then recorded the actometer reading, left the room, and signaled the beginning of playtime with a knock. Children were permitted to play with the toys for 16 minutes, with the 1st minute serving as a warm-up period. During the next 15 minutes, each object the child contacted was sequentially recorded in 10-second blocks by observers behind a one-way screen. In most cases there were two observers, one of whom was unfamiliar with the subject and blind to group membership. At the completion of the play period, the experimenter entered the room, read the actometer, and then asked the child to help pick up the toys.

Measures of activity shifts and attention to toys were derived from the sequential records. All sessions were videotaped for later checking. Observers showed relatively good agreement on which specific toy(s) and/or other object(s) the child contacted during each 10-second interval. The percentage agreement reached a mean of 86% across 17 randomly selected subjects. Since children were in contact with at least one toy or nontoy object during almost every observation interval, nonoccurrence was rare. Furthermore, strict criteria were employed. The two observers had to agree on the specific toys contacted and their sequence within each interval for an agreement to be scored. In addition, Pearson correlations between pairs of raters, calculated on 37 subjects, selected at random, ranged from a high of $r = .97$ for frequency of activity shifts to a low of $r = .75$ for number of activities lasting 2 minutes or more (mean $r = .89$, all $ps < .001$).

Performance on Structured Tasks. The Stanford-Binet was administered according to standard instructions and was scored using 1972 norms. In addition, during each laboratory visit, two structured tasks were administered in the same order for all subjects. During session 1, the Cookie Delay task (Golden, Montare, & Bridger, 1977) followed the free-play observation. After a juice break, a highly simplified version of the Matching Familiar Figures Test (Kagan, 1966) was administered. During session 2, the Draw-A-Line Slowly Test (Maccoby, Dowley, Hagen,

& Degerman, 1965) was administered twice, once before and once after the Preschool Embedded Figures Test (Coates, 1972). Within session 1, task order was not counterbalanced because we were most interested in the children's performance on the Cookie Delay task before they became tired.

Prior to administration of the Cookie Delay, the experimenter made sure that the child understood the concept of waiting by having him/her delay for 10 seconds before ringing the bell. Each child correctly completed two consecutive trials of this pretest task. The Cookie Delay task (Golden et al., 1977) was then administered. The child was instructed to observe the experimenter hide a piece of animal cracker under one of three identical cups and then to wait for the experimenter to ring the bell before finding the cookie. Six trials were administered. Delay intervals, in random order, ranged from 5 to 45 seconds.

Impulsive responses were scored when the child picked up the cup or ate the cookie during the delay interval. Several children pushed the experimenter's hand down on the bell during the delay interval and then ate the cookie. This was also considered an impulsive response. Good delays were scored when the child waited for the signal before picking up the cup, regardless of whether the correct cup was chosen first. Correct responses were scored when the child both delayed and selected the correct cup first. Test-retest reliability obtained on an independent sample of 12 children attending a local preschool (M age = 37 months) and tested twice over a 4-week interval was as follows: impulsive responses, $r = .81$, $p < .002$; good delays, $r = .81$, $p < .002$; correct responses, $r = .64$, $p < .025$.

The simplified version of the Matching Familiar Figures Test (Kagan, 1966) consisted of six practice trials and eight test trials. The child was instructed to select, from two to four alternatives, the one picture that matched a standard for each trial. Stimulus pictures consisted of cutout shapes of hats, faces, apples, etc. Latency to first response and number of incorrect choices on only the first trial were scored, since many children refused a second trial. Test-retest reliability on an independent sample of 12 preschool attenders indicated that the latency measure was unreliable ($r = .44$, n.s.), which incorrect choices on trial 1 showed moderate stability ($r = .69, p < .01$).

The Preschool Children's Embedded Figures Test (Coates, 1972) consists of 3 pretest and 24 test pictures, each containing a hidden equilateral triangle. Items were arranged in order of increasing difficulty by five independent adult judges, and this order was then pretested on 19 problem-free 2½- to 4½-year-olds ($M = 42.47$ months) attending a local preschool. After the task was demonstrated on the pretest pictures, each child was instructed to find a triangle on each test picture. Testing was discontinued after five consecutive failures. Latency and correct responses

were scored. The test manual (Coates, 1972) indicates adequate test-retest reliablity (r = .70) for the correct response measure in a sample of 21 3-year-olds.

The Draw-A-Line Slowly Test (Maccoby et al., 1965) required the child to draw a line connecting two *X*s on an 8½ by 11-inch sheet of paper, as slowly as possible, after a demonstration by the experimenter. Time to complete the line was recorded. This task was administered twice (r = .64, $p < .001$) and a mean score derived.

Activity and Attention During Structured Tasks. During structured tasks activity was again measured with the actometer. Activity rate per minute was calculated separately during the Binet administration and during the administration of each laboratory task. During laboratory tasks, an observer behind a one-way screen noted the total time on each task and the frequency of out-of-seat and off-task behavior. Out-of-seat behavior was scored each time the child physically left the chair. Off-task behavior was scored when the child attended to objects in the room that were not task-related or tried to engage the experimenter or her/his mother in task-irrelevant conversation when and only when it impeded the presentation of the next test trial. Ignoring the experimenter's directions, staring into space, or attempting to distract the experimenter were also considered off-task behaviors.

RESULTS

Interview data are complete and analyzed for all 68 subjects. Two subjects in the clinical group dropped out after the home visit and two more dropped out prior to the second laboratory visit.

Interview

The interview included 16 questions about problem behaviors, both historical and current, as well as about characteristic disciplinary practices. Most of these differentiated the groups. Eight questions dealt with pregnancy and delivery complications as well as general health of the target child and other family members. Information on the psychiatric history of immediate family members of either parent was also obtained. These items tended not to differentiate the groups. Finally, demographic data, reported earlier, were obtained during the interview.

Data were analyzed with χ^2 to assess maternal reports of the presence or absence of various symptoms and problems. Mothers who perceived their youngsters as a problem reported more general difficulties during the

neonatal and infancy periods, as well as more current problems, than did control mothers (all p's $< .001$). Specifically, problem children were described as more active and irritable infants who cried more often and were more difficult to soothe when upset (all p's $< .01$). Eating problems were also more common in the clinical group ($p < .02$), with a trend toward reports of more sleeping difficulties ($p = .07$). Problem youngsters were not described as less cuddly than controls.

Mothers of referred children also reported more current problems in social relations, response to discipline, and ability to play alone than did mothers of controls. Peer problems were especially prevalent among referred youngsters ($p < .001$); mothers of referred children also noted difficulties getting along with siblings ($p < .05$). Although mothers did not report differences in favored disciplinary techniques, problem children were described as more likely to react to a disciplinary attempt with a temper tantrum ($p < .03$), while controls were more likely to comply ($p < .01$). Mothers of problem youngsters also reported that their children were less able to amuse themselves than controls ($p < .02$). Thus, mothers who complained of difficulties managing their young children reported a range of problems beginning in early infancy. These data were also analyzed for sex differences within the clinical group, but none approached statistical significance.

Although reports of specific behavior problems differentiated the groups, no differences emerged in reported pregnancy or delivery complications, medical problems affecting the child or other family members, family history of psychiatric disorder or substance abuse, or marital instability. Mothers of referred children reported a slightly higher incidence of symptoms of hyperactivity in close relatives ($p = .07$).

Parent Questionnaires

Both parents independently completed the Behar Preschool Behavior Questionnaire (Behar, 1977) and the Activity Scale (Routh et al., 1974). Scores were analyzed using 2 × 2 (group × sex) ANOVAs. There were no significant sex differences or sex by group interactions. However, parent-identified problem youngsters were rated by both parents as more hyperactive and hostile-aggressive, but not more anxious, than controls. Activity scale scores also differentiated the groups according to both maternal and paternal ratings. These data are summarized in Table I.

Birth order and social class differences between parent-identified problem children and controls were more likely to influence maternal perceptions of child behavior than laboratory measures. Therefore, in order to be sure that they were not serving to confound results, maternal

Table I. Comparisons Between Problem and Control Children on Parent Report Measures of Behavior Problems

	Maternal report					Paternal report				
	Problem		Control			Problem		Control		
Measure	*Mean*	*(SD)*	*Mean*	*(SD)*	*F*	*Mean*	*(SD)*	*Mean*	*(SD)*	*F*
Behar	($N = 46$)		($N = 22$)			($N = 40$)		($N = 20$)		
Hostile	8.93	(4.93)	5.05	(2.48)	$12.03^{c,d}$	7.52	(4.76)	4.90	(3.06)	$4.77^{a,e}$
Anxious	5.13	(2.64)	4.05	(2.28)	2.62	4.38	(2.97)	4.05	(2.26)	< 1
Hyperactive	5.37	(1.77)	2.18	(1.50)	50.33^{c}	4.85	(1.80)	2.65	(1.72)	19.38^{c}
Total	24.24	(9.89)	13.59	(5.27)	21.40^{c}	20.85	(9.99)	13.95	(7.02)	7.01^{b}
Werry et al.	($N = 44$)		($N = 22$)			($N = 34$)		($N = 18$)		
Activity	35.32	(12.63)	18.14	(9.82)	$30.20^{c,f}$	29.85	(13.20)	21.44	(10.33)	$5.07^{a,g}$

[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.
[d] $df = 1, 64$.
[e] $df = 1, 56$.
[f] $df = 1, 62$.
[g] $df = 1, 48$.

reports on the Behar were also analyzed using birth order of child and maternal educational level as covariates. The same pattern of significant group differences emerged (all p's $< .01$ or better), indicating that these demographic variables were not accounting for differences in maternal perceptions of problem behavior.

Behavioral Observations

Free Play. Data from free-play observations were likewise analyzed with group by sex ANOVAs for the 66 subjects for whom data were complete. Parent-identified problem children changed activities more often during free play, $F(1, 62) = 10.00$, $p < .01$, engaged in more very short activities of 20 seconds or less, $F(1, 62) = 8.31$, $p < .01$, and engaged in fewer activities that lasted at least 2 minutes, $F(1, 62) = 13.01$, $p < .001$. They also showed a tendency to spend more time engaged with objects other than toys, $F(1, 62) = 2.84$, $p = .097$. Length of the longest play activity did not distinguish the groups, $F < 1$. Similarly, groups did not differ in amount of gross motor activity as measured by the actometer, $F < 1$. This analysis was carried out on $N = 56$, because several children refused to wear the actometer; there were also several instances of equipment failure and human error. Discriminating variables are summarized in Table II.

Boys spent significantly more time than girls exploring nontoy objects in the playroom, $F(1, 62) = 10.22$, $p < .01$. No other sex differences or sex by group interactions approached statistical significance.

Structured Tasks. Gross activity level, calculated as actometer counts per minute, was measured during the Stanford-Binet administration at home and during structured laboratory tasks administered on two separate visits. Home visit actometer data were complete for 54 children and failed to reveal significant main effects of sex or group membership. Actometer data from the laboratory tasks were analyzed on a composite score obtained by averaging actometer counts per minute across tasks. When actometer data were missing from either laboratory visit, scores from only one visit were used. Parent-referred youngsters tended to be more active and fidgety during structured tasks than controls, $F(1, 58) = 3.70$, $p = .06$.

Rate per minute of out-of-seat and off-task behavior were also assessed during the administration of laboratory tasks and composite mean scores used in data analysis. In two instances, data from only one visit were available. Consistent with the actometer data, referred children were more often out of seat, $F(1, 61) = 5.12$, $p < .05$, and off task, $F(1, 61) = 4.53$, $p < .05$, during experimenter-administered structured tasks than

Table II. Comparisons Between Problem and Control Children on Discriminating Observational and Cognitive Measures[a]

Measure	Problem		Control		F	df	p
	Mean	*(SD)*	*Mean*	*(SD)*			
Free play	(N = 44)		(N = 22)				
Activity shifts	24.73	(9.00)	17.23	(7.02)	10.00	1,62	< .01
20-second activities	13.30	(7.31)	7.95	(4.41)	8.31	1,62	< .01
120-second activities	1.32	(1.05)	2.36	(1.09)	13.01	1,62	< .001
Nontoy (blocks)	19.01	(13.87)	12.11	(10.73)	2.84	1,62	= .097
Structured tasks	(N = 44)		(N = 21)				
Out of seat[b]	.28	(.31)	.11	(.13)	5.12	1,61	< .05
Off task[b]	.34	(.29)	.18	(.19)	4.53	1,61	< .05
	(N = 42)		(N = 20)				
Actometer rate/min	4.03	(2.86)	2.60	(1.73)	3.70	1,58	= .06
Stanford-Binet	(N = 45)		(N = 22)				
IQ	104.56	(20.29)	121.14	(12.18)	11.41	1,63	< .001
Cookie delay	(N = 44)		(N = 22)				
Impulsive responses	1.43	(1.65)	.27	(1.73)	8.34	1,62	< .01
Good delays	4.48	(1.73)	5.68	(1.09)	8.25	1,62	< .01
Correct responses	2.64	(1.62)	3.77	(1.77)	5.75	1,62	< .02

[a]Analyses using transformed data to normalize scores revealed essentially the same pattern of results; therefore, analyses of raw data are reported.
[b]Rate per minute.

controls. There was also a tendency for boys to be off task more often than girls, $F(1, 61) = 3.51, p = .07$.

Performance on Structured Tasks

Stanford-Binet. Not surprisingly, children in the parent-referred group scored significantly lower on the Stanford-Binet than did control children, $F(1, 63) = 11.41$, $p < .001$. One child in the referrred group refused to cooperate on the Binet.

Cookie Delay. All three measures on the Cookie Delay task differentiated parent-referred problem youngsters from controls. Problem children made significantly more impulsive responses, $F(1, 62) = 8.34$, $p < .01$, and consequently significantly fewer good delays, $F(1, 62) = 8.25$, $p < .01$. They also made fewer correct first choices on delay trials, $F(1, 62) = 5.75$, $p < .02$. However, the ratio of correct responses to good delays did not differ between the groups ($F < 1$). That is, when problem children were able to delay, they were as likely as controls to also select the correct cup.

Matching Familiar Figures. No group differences were obtained on latency to first response or number of incorrect choices on trial 1.

Preschool Embedded Figures. Parent-referred children did not differ from controls on reaction time measures or number of figures correctly located.

Draw-A-Line Slowly. This task was administered twice and a composite mean score used in data analysis. Problem and control youngsters did not differ on this measure.

No sex differences or group by sex interactions were obtained on any of the cognitive measures.

Discriminant Function Analysis: Problem Children vs. Controls

Since several parent report and laboratory measures discriminated between parent-referred youngsters and controls, three stepwise discriminant function analyses were carried out to determine which combination of measures best differentiated the groups.

The first analysis was conducted on 66 subjects and examined the relative ability of maternal report measures reflecting active and aggressive symptomatology to discriminate the groups. The hostile-aggressive, hyperactive, and total scores on the Behar and the Activity Scale score were entered into this analysis. Three variables were sufficient to differentiate the groups: hyperactivity, activity score, and hostile-aggressive, Wilks λ = .541, canonical correlation = .68, $\chi^2(3) = 37.27$, $p < .0001$. Using this combination of variables, 80.30% of subjects were correctly classified. Four control subjects and nine parent-referred subjects were misclassified. Standardized discriminant function coefficients are presented in Table III.

In a second analysis ($N = 65$), six variables reflecting attention to toys, active behavior during structured tasks, and impulsivity were selected for entry into the discriminant function: activity shifts, 20-second activities, 2-minute activities, amount of nontoy contact, out-of-seats, and impulsive responses on the delay task. These particular variables were selected primarily because they were highly discriminating measures of attention and impulsivity obtained during both free play and structured tasks. In addition, the nontoy variable was included since it was our clinical impression that the least focused youngsters in the sample spent much of their time "flitting" from object to object and showed limited involvement with the toys. Two-minute activities were entered first in the equation, followed by impulsive responses, and out-of-seats during structured tasks. Additional variables did not contribute significantly to subject classification. This function correctly classified 70.77% of subjects, Wilks λ = .726, canonical correlation = .52, $\chi^2(3) = 19.66$, $p < .001$. Only five control

Table III. Standardized Canonical Discriminant Function Coefficients: Parent-Defined Problems vs. Controls

	Maternal reports		Laboratory measures		Maternal reports and laboratory measures	
Step entered	Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
1	Hyperactive	.884	2-minute activities	−.697	Hyperactive	.684
2	Activity	.430	Impulsive responses	.451	Impulsive responses	.427
3	Hostile	−.339	Out-of-seats/minute	.416	2-minute activities	−.345
4	—	—	—	—	Activity	.278
Group centroids						
Problems		.635		.417		.749
Controls		−1.299		−.875		−1.570

subjects were incorrectly classified, although 14 parent-referred youngsters performed more like controls (see Table III).

A third discriminant function analysis ($N = 66$) was carried out using the three maternal report and the three laboratory measures that best differentiated the parent-referred children from controls in the preceding analyses. The results of this analysis indicated that two maternal report and two laboratory measures were sufficient to accurately classify 87.88% of the sample. Only two controls and six referred youngsters were misclassified. Variables were entered into the discriminant function equation in the following order: hyperactivity score on the Behar, impulsive responses on Cookie Delay, 2-minute activities during free play, and Activity Scale scores, Wilks $\lambda = .452$, canonical correlation $= .74$, $\chi^2(4) = 48.47, p < .0001$ (see Table III).

Discriminant Function Analysis: Clinical Subgroups

While a number of parent report, observational, and cognitive measures successfully differentiated parent-identified problem children from controls, we were struck by the heterogeneity of the clinical sample. Some of the parent-referred children seemed to be clinically active, defiant, and difficult to manage; others appeared to be typical toddlers who were somewhat inattentive and/or noncompliant, but not consistently so. In some cases, parental intolerance or mismanagement seemed more salient than the child's behavior. In order to test our clinical hunches, we divided the clinical group into those children who appeared to have bona fide problems of a potentially persistent nature, the clinical problem group (22 boys and 7 girls), and those whose problems appeared more developmental in nature, the "terrible twos" (8 boys and 9 girls). These clinical subgroups are relatively well matched on age (35.28 vs. 34.47 months, $t < 1$), IQ (101.93 vs. 108.88, $t = 1.18$), and maternal educational level ($t < 1$).

Three stepwise discriminant function analyses were then performed to determine whether a combination of maternal report and/or observational measures differentiated these a priori clinically defined subgroups of parent-identified behavior problem children. Forty-four clinical subjects had complete data on all measures and were included in these analyses, which paralleled those just reported on the sample as a whole. These analyses are summarized in Table IV.

The first analysis included the four maternal report measures reflecting active and aggressive symptomatology and general behavior problems: Behar total score, hostile-aggressive score, hyperactivity score, and activity ratings. Two variables were sufficient to discriminate these

Table IV. Standardized Canonical Discriminant Function Coefficients: Clinically Defined Problems vs. "Terrible Twos"

	Maternal reports		Laboratory measures		Maternal reports and laboratory measures	
Step entered	Variable	Coefficient	Variable	Coefficient	Variable	Coefficient
1	Behar total	.662	Out-of-seats/minute	.787	Behar total	.771
2	Activity	.485	Nontoy (blocks)	.567	Out-of-seats/minute	.529
3	—	—	—	—	Nontoy (blocks)	.521
Group centroids						
Clinical problems		.437		.399		.609
Terrible twos		−.694		−.633		−.967

clinical subgroups. Total Behar score and activity rating classified 75% of cases, in line with clinical judgment, Wilks $\lambda = .759$, canonical correlation $= .49$, $\chi^2(2) = 11.30$, $p < .01$. Clinical problem children were characterized by higher scores on both these measures, and only three "terrible twos" were misclassified in this analysis.

The second analysis included activity shifts, 20-second activities, amount of nontoy contact, out-of-seats, and impulsive responses on the Cookie Delay task. Out-of-seats followed by nontoy contacts together classified 70.45% of cases in line with our a priori division of the clinical group, Wilks $\lambda = .791$, canonical correlation $= .46$, $\chi^2(2) = 9.62$, $p < .01$. Children we called clinical problems were more often out of their seats during structured tasks and spent more time during free play engaged with nontoy objects. Only two children whom we classified as "terrible twos" were classified as clinical problems in this analysis.

Finally, these four discriminating variables were entered into a further analysis to assess their combined contribution to the differentiation of a priori clinically defined subgroups. Total Behar score, followed by out-of seats and amount of nontoy contact classified 79.55% of cases in line with clinical judgment, Wilks $\lambda = .619$, canonical correlation $= .618$, $\chi^2(3) = 19.45$, $p < .001$. Only one child we considered a "terrible two" behaved more like a "clinical problem" on the observational measures and was rated by his mother as having more behavior problems.

DISCUSSION

These results demonstrate that very young children who are perceived by parents as active, inattentive, and difficult to discipline do differ from nonproblem control children on a range of laboratory and parent-report measures indicative of difficulties sustaining attention and controlling impulsive responding. These data suggest, then, that symptoms of attention deficit disorder and related behavior problems can be identified in 2- and 3-year-olds; furthermore, parent complaints appear to reflect genuine difficulties analogous to the target symptoms of attention deficit with hyperactivity as defined in school-age youngsters (Barkley, 1981; Douglas, 1980).

As a group, parent-referred children differed from controls on parent-report measures of active, inattentive, aggressive, and noncompliant behavior. Both parents independently described problem children as generally more restless and distractible and as more active and inattentive in a variety of day-to-day situations. Mothers who complained of problems with their 2- to 3-year-olds also reported a more difficult infancy period characterized by irritability, a high level of activity, and feeding problems,

a finding consistent with other reports associating a difficult infancy period with later externalizing symptoms (Campbell, 1976; Thomas, Chess, & Birch, 1968, Bates, Pettit, & Bayles, Note 1). These mothers reported more current difficulties with discipline and peer relations as well.

Since parents initiated referral, it is not surprising that they reported more problems with their youngsters. Indeed, one major issue relevant to the study of behavior problems in very young children is whether parent complaints are indicative of difficulties that can be assessed on objective laboratory measures and that differentiate parent-identified problem youngsters from controls. Alternatively, it is possible that parent complaints, in the absence of corroborating evidence from other sources such as teachers, are reflecting intolerance and/or ignorance of the typical behaviors of toddlers and preschoolers. However, data from the laboratory measures confirm that the parent-identified problem children were indeed more active, inattentive, and impulsive than controls.

Parent-identified problem children changed activities more often during free play; consequently, they engaged in more very short activities of 20 seconds or less and fewer play bouts lasting 2 minutes or more. They also spent more time engaged with objects other than toys, and often these were forbidden objects such as doors to the one-way mirror or the video camera. However, groups did not differ in the length of longest bout of activity, indicating that referred youngsters, like the nonproblem controls, spontaneously demonstrated some sustained attention to toys, although they were less likely to do so. Finally, amount of gross motor activity during free play did not distinguish the groups. Thus, during free play, problem youngsters were more likely to flit from one thing to another, and these shifts in activity often occurred in rapid succession, reflecting a lack of sustained, directed attention to or involvement with toys. In this context, the amount of activity was less relevant than the focus of attention. Vigorous and active play may be focused and goal-directed or unfocused and scattered. Thus, amount of activity in this situation may tell us little about the nature of the child's attention. Indeed, this finding is consistent with DSM-III and underlines the importance of examining symptomatology across contexts (e.g., Barkley, 1981; Henker & Whalen, 1980).

On laboratory tasks, parent-referred youngsters were more often off task than controls, reflecting more lapses in attention in response to adult direction and structure. Furthermore, in a context in which a high activity level was less adaptive to situational demands, they were also more active than controls, measured in terms of both out-of-seat behavior and actometer scores. Thus, consistent with Henker and Whalen's (1980) discussion of school-age hyperactive children, these young parent-referred children were less able than controls to conform to adult demands to sit still and attend to structured tasks.

Actometer scores during Binet administration failed to differentiate the groups. However, a number of children refused to wear the actometer during the home visit, and the number of distractors available (siblings, pets, toys, etc.) make this measure difficult to interpret. While referred children performed more poorly on the Binet than controls, the meaning of lower IQ scores in inattentive, restless, and impulsive young children is unclear. Some of the apparently bright and verbal youngsters in the clinical group obtained relatively low scores on the Binet, and it is likely that the relatively poor performance of many of these youngsters is a reflection of the presenting complaints rather than an indication of deficits in cognitive functioning.

The Cookie Delay task proved to be a sensitive measure of impulsivity in this age group. Parent-referred children were more likely to reach for the cookie during the delay interval. Consequently, they made fewer delay responses and reached for the correct cup less often than controls. However, the proportion of correct responses to good delays was not different for the groups, suggesting that these problem youngsters were able to attend to the correct placement of the cookie and perform competently on some trials.

The groups did not differ on the Matching Familiar Figures, Preschool Embedded Figures, or Draw-A-Line Slowly tests. These data are inconsistent with results from a study of somewhat older preschoolers (Schleifer et al., 1975) but may reflect the insensitivity and relatively poor reliability of these measures with very young children.

The discriminant function analyses suggest that a combination of parent-report and laboratory measures may best discriminate parent-referred problem youngsters from controls; further, laboratory measures obtained during both free play and structured tasks appear to contribute significant and independent variance to the discriminant function equation, underlining the importance of a multidimensional, cross-situational assessment strategy. In addition, the four most discriminating variables were maternal ratings of a high activity level and hyperactive symptomatology, impulsive responses on the delay task, and sustained attention (negatively weighted) during free play. This constellation of measures may tentatively be interpreted to reflect the core symptoms of hyperactivity: restlessness, impulsivity, and attention deficit. However, it remains to be determined whether these specific variables will as clearly differentiate problem from control children in a newly recruited cross-validation sample. Until additional confirmatory data are obtained, these findings may be interpreted to indicate the need for a broad-based assessment and to suggest potentially sensitive measures for use with young children.

Although these data have been interpreted in terms of the attention deficit disorder construct, these parent-referred youngsters are also

less compliant and more aggressive than controls and, therefore, may be showing early signs of conduct disorder. Parent report and interview data indicate concern about discipline problems and aggression with peers. The higher rate of nontoy contact among referred children may also partly reflect noncompliance since the children were instructed to play with the toys. As well, the subsample of subjects who attended preschool were observed in their classrooms. Problem children were more aggressive with peers during free play and less compliant with teacher directions than controls (Campbell & Cluss, 1982). While the relationships among symptoms of conduct disorder, attention deficit, and hyperactivity in school-aged samples have been the subject of recent debate (e.g., Lahey et al., 1980), these symptoms appear to be particularly intermingled in very young children, and distinctions among them are difficult, if not impossible, to make. Follow-up data may begin to shed light on the relative prognostic importance of attentional problems, impulsivity, aggression, and noncompliance in very young children.

Despite the fact that groups differed on numerous variables, it appeared that some children in our parent-referred group were typical, though difficult, toddlers, and it was our clinical impression that some of these youngsters would be likely to outgrow their problems. Confirmation of this awaits completion of follow-up assessments, which are currently under way. However, it is of interest that overall level of psychopathology as measured by total scores on the Behar, out-of-seats, and amount of nontoy contact during free play best discriminated between our a priori clinically defined subgroups. This suggests that problem children with more pervasive symptomatology, who were also more active and noncompliant, were classified as clinical problems and that we may have been responding to severity of initial problems, as well as range of overall symptomatology.

While the parent-referred group is somewhat biased since referrals were predominantly parent-initiated, this group was still composed of families from a range of backgrounds and ran the gamut from working to upper middle class. The control group was also biased in that it was primarily middle class. However, social class cannot account for group differences in attention and impulse control. (The correlation between maternal education and activity shifts was $r = -.08$, while the r with impulsive responses was .06.) Many of the most difficult youngsters in the sample came from professional families, and well-educated parents were at as much of a loss about how to handle their children as less-educated parents. Thus, while the children in this study are not representative samples either of problem youngsters or of controls, the findings are consistent with the argument that parent complaints are indicative of bona fide difficulties and that the symptoms of attention deficit disorder with hyperactivity and associated behavior problems can be identified in 2-

and 3-year-olds. It remains to be determined which problem children are showing early onset of this disorder (American Psychiatric Association, 1980; Barkley, 1981), which will develop into conduct disorders, and which are demonstrating transient signs of a turbulent developmental phase. The persistence of symptoms and the relative contributions of child and family characteristics to follow-up status at age 4 will be the subject of a future report.

REFERENCE NOTE

1. Bates, J. E., Pettit, G. S., & Bayles, K. *Antecedents of behavior problems at age three years.* Boston: Society for Research in Child Development, 1981.

REFERENCES

American Psychiatric Association. *Diagnostic and statistical manual of mental disorders (DSM-III).* Washington, D.C., 1980.

Barkley, R. A. Specific guidelines for defining hyperactivity (attention deficit disorder) in children. In B. Lahey & A. Kazdin (Eds.), *Advances in child clinical psychology* (Vol. 4). New York: Plenum, 1981.

Behar, L. The Preschool Behavior Questionnaire. *Journal of Abnormal Child Psychology,* 1977, *5,* 265-276.

Buss, D. M., Block, J. H., & Block, J. Preschool activity level: personality correlates and developmental implications. *Child Development,* 1980, *51,* 401-408.

Campbell, S. B. Hyperactivity: Course and treatment. In A. Davis (Ed.), *Child personality and psychopathology* (Vol. 3). New York: Wiley, 1976.

Campbell, S. B., & Cluss, P. Peer relationships of young children with behavior problems. In K. H. Rubin & H. S. Ross (Eds.), *Peer relationships and social skills in childhood.* New York: Springer-Verlag, 1982.

Campbell, S. B., Endman, M., & Bernfeld, G. A three-year follow-up of hyperactive preschoolers into elementary school. *Journal of Child Psychology and Psychiatry,* 1977, *18,* 239-250.

Campbell, S. B., Schleifer, M., Weiss, G., & Perlman, T. A two-year follow-up of hyperactive preschoolers. *American Journal of Orthopsychiatry,* 1977, *47,* 149-162.

Coates, S. W. *Preschool Embedded Figures Test.* Palo Alto, California: Consulting Psychologists Press, 1972.

Douglas, V. I. Treatment and training approaches to hyperactivity: Establishing external or internal control. In C. K. Whalen & B. Henker (Eds.), *Hyperactive children: The social ecology of identification and treatment.* New York: Academic Press, 1980.

Douglas, V. I., Parry, P., Marton, P. M., & Garson, C. Assessment of a cognitive training program for hyperactive children. *Journal of Abnormal Child Psychology,* 1976, *4,* 389-410.

Foster, F. G., McPartland, R. J., & Kupfer, D. J. Motion sensors in medicine, Part I. A report on reliability and validity. *Journal of Inter-American Medicine,* 1978, *3,* 4-8.

Golden, M., Montare, A., & Bridger, W. Verbal control of delay behavior in two year old boys as a function of social class. *Child Development,* 1977, *48,* 1107-1111.

Halverson, C. F., & Waldrop, M. F. The relations of mechanically recorded activity level to varieties of preschool play behavior. *Child Development,* 1973, *44,* 678-681.

Halverson, C. F., & Waldrop, M. Relations between preschool activity and aspects of intellectual and social behavior at age 7½. *Developmental Psychology,* 1976, *12,* 107-112.

Henker, B., & Whalen, C. K. The changing faces of hyperactivity: Retrospect and prospect. In C. K. Whalen & B. Henker (Eds.), *Hyperactive children: The social ecology of identification and treatment.* New York: Academic Press, 1980.

Kagan, J. Reflection-impulsivity: The generality and dynamics of conceptual tempo. *Journal of Abnormal Psychology,* 1966, *71,* 17-24.

Kagan, J. *Change and continuity in infancy.* New York: Wiley, 1971.

Kohn, M. *Social competence, symptoms, and underachievement in childhood: A longitudinal perspective.* Washington, D.C.: V. H. Winston, 1977.

Kohn, M., & Parnes, B. Social interaction in the classroom—A comparison of apathetic-withdrawn and angry-defiant children. *Journal of Genetic Psychology,* 1974, *125,* 165-175.

Lahey, B. B., Green, K. D., & Forehand, R. On the independence of ratings of hyperactivity, conduct problems, and attention deficits in children: A multiple regression analysis. *Journal of Consulting and Clinical Psychology,* 1980, *48,* 566-574.

Maccoby, E., Dowley, E., Hagen, J., & Degerman, R. Activity level and intellectual functioning in normal preschool children. *Child Development,* 1965, *36,* 761-770.

Minde, K. K., Weiss, G., & Mendelson, N. A five-year follow-up study of 91 hyperactive school children. *Journal of the American Academy of Child Psychiatry,* 1972, *11,* 595-610.

Ross, D. M., & Ross, S. A. *Hyperactivity: Theory, research, and action.* New York: Wiley, 1976.

Routh, D., Schroeder, C., & O'Tuama, L. Development of activity level in children. *Developmental Psychology,* 1974, *10,* 163-168.

Sandberg, S., Rutter, M., & Taylor, E. Hyperkinetic disorder in psychiatric clinic attenders. *Developmental Medicine and Child Neurology,* 1978, *20, 279-299.*

Schleifer, M., Weiss, G., Cohen, N. J., Elman, M., Cvejic, H., & Kruger, E. Hyperactivity in preschoolers and the effect of methylphenidate. *American Journal of Orthopsychiatry,* 1975, *45,* 38-50.

Thomas, A., Chess, S., & Birch, H. G. *Temperament and behavior disorders in children.* New York: New York University Press, 1968.

Weiss, G., Hechtman, L., Perlman, T., Hopkins, J., & Wener, A. Hyperactives as young adults: A controlled prospective ten-year follow-up of 75 children. *Archives of General Psychiatry,* 1979, *36,* 675-681.

Weiss, G., Kruger, E., Danielson, U., & Elman, M. The effect of long-term treatment of hyperactive children with methylphenidate. *Canadian Medical Association Journal* 1975, *112,* 159-164.