

Continuities in Maternal Reports and Child Behaviors Over Time in Hyperactive and Comparison Groups¹

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Maternal reports, observations of nursery and elementary school behavior, and teacher ratings of problems were available for hyperactive and control children who had participated in a longitudinal study. This paper examines consistencies in maternal reports and child behaviors over time, and their relationship to teacher ratings in elementary school. Maternal reports of infant sleep difficulties were related to maternal ratings of hyperactivity at 4½ and 6½ years. Maternal ratings of activity at 4½ were predictive of 6½-year ratings of hyperactivity and conduct problems. In addition, behavior in a research nursery at 4½ predicted teacher ratings of problems and classroom behavior in grade two. Hyperactive preschoolers who left the table most during structured activities were more often out-of-seat and off-task in school. Controls who were more aggressive in the nursery were more disruptive in the classroom. These data indicate continuities in both maternal reports and child behaviors.

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Research on hyperactivity in childhood has tended to emphasize cognitive and attentional processes (e.g., Campbell, Douglas, & Morgenstern, 1971; Sykes, Douglas, Weiss, & Minde, 1971) or drug effects (e.g., Campbell et al., 1971; Sykes et al., 1971), while the few existing follow-up studies have focused on the adolescent adjustment of children referred at school age (e.g., Mendelson, Johnson, & Stewart, 1971; Minde, Weiss, & Mendelson, 1972). Recently, however, interest has expanded to include the earlier recognition of hyperactivity as well as concern with its developmental course in early childhood (Campbell, 1976).

In one of the only studies to explore hyperactivity in preschoolers, Schleifer, Weiss, Cohen, Elman, Cvejic, and Kruger (1975) compared hyperactive and control children in a research nursery, using a variety of observational, cognitive, and parent report measures. Hyperactive children as a group were more active and aggressive in the preschool, more impulsive on cognitive tasks, and rated by mothers as more hyperactive. However, degree of hyperactivity varied greatly within the clinical group. Follow-up studies of these same groups of hyperactive and control children in the laboratory at 6½ (Campbell, Schleifer, Weiss, & Perlman, 1977) and in the classroom at 7½ (Campbell, Endman, & Bernfeld, 1977) indicated that both maternal and teacher ratings continued to clearly differentiate hyperactive and comparison groups.

On the other hand, comparisons on behavioral measures yielded some differences, but they were less clear-cut. For example, although the hyperactives as a group were more aggressive and off-task in the nursery school than were controls, variations in these behaviors were related to severity of hyperactivity. At 3-year follow-up, hyperactive children were more disruptive toward teachers in the classroom but did not annoy peers more often than controls. Differences in off-task behavior were related to degree of hyperactivity in preschool. Similarly, more active children from the hyperactive group tended to demand more feedback from their mothers in a laboratory-based problem-solving situation at 6½. It appeared, too, that the sample recruited at age 4½ was more heterogeneous than hyperactive samples referred at school age. Thus, the relationships among measures obtained at different time periods were considered pertinent to understanding the early developmental course of this disorder.

In addition to 4½, 6½ and 7½-year data obtained longitudinally, retrospective data on infant adjustment were available in the files. These data, obtained as part of the intake information when subjects were recruited into the study at age 4½, also differentiated hyperactive and control children (Campbell, 1976). Mothers of hyperactives reported more sleep problems and infant irritability.

Thus, given the paucity of longitudinal data on hyperactive children prior to school entrance, it seemed worthwhile to look at continuities and discontinuities in maternal report measures and child behavior within these

hyperactive and control groups. Furthermore, it was possible to ask whether there was any relationship between maternal reports of behavior problems at home and teacher reports of behavior problems in the classroom. In particular, it was of interest to determine within groups whether mothers who rated their 4½-year-olds as very hyperactive were more likely to report a difficult infancy period retrospectively and, further, whether they perceived more problems at 6½. It was also wondered if these were the same children teachers perceived as most hyperactive. In addition, since observations of nursery school and elementary school behavior were available, independent of teacher and parent ratings, it was possible to ask whether there was any relationship between adult reports and observed behaviors.

METHOD

Subjects

Children were originally recruited into the study through pediatricians in private practice. Hyperactive children were referred as overactive, always on the go, and difficult to manage. Control children were not perceived as particular problems by their parents. Only children with Stanford-Binet IQs of 90 or above, without gross signs of brain damage, physical impairment, sensory handicap, or psychosis were included in the study. Hyperactive and control groups were initially matched on age, sex, IQ, and social class. The original sample consisted of 28 hyperactive children (5 girls) and 26 controls (3 girls). Due to sample attrition, the 2-year follow-up sample was made up of 20 hyperactives (5 girls and 15 boys), and 21 controls (2 girls and 19 boys). The 3-year follow-up was carried out on 3 hyperactive girls and 12 hyperactive boys; the control group consisted of 2 girls and 14 boys.

No children were on medication at the 6½ or 7½-year follow-up. However, hyperactive children received medication in one phase of the preschool study as part of an evaluation of drug effects with young children (see Schleifer et al., 1975, for details). Side effects were marked and few children remained on medication. The preschool data reported in this paper come from predrug measures. In addition, some hyperactive children and their families were seen for time-limited forms of family therapy or behavior management. Details are provided in Campbell et al. (1977).

Despite the large attrition rate, the follow-up samples resembled the original samples on initial hyperactivity scores and demographic variables. They also remained well matched on age and social class and reasonably well matched on intelligence. Follow-up samples at both time periods scored at the average level on the Stanford-Binet at 4½, with controls scoring somewhat higher than

Table I. Means and Standard Deviations of Demographic Data and Initial Hyperactivity Scores for Total and Follow-Up Samples

	Hyperactive		Control	
	Mean	SD	Mean	SD
Original sample	(N = 28)		(N = 26)	
Age at intake ^a	47.23	5.80	47.28	5.91
Binet IQ at 4½	102.96	11.11	104.33	10.40
Social class	32.41	15.94	24.27	15.04
Hyperactivity	47.50	9.53	26.38	5.13
2-year follow-up (6½)	(N = 20)		(N = 21)	
Age at intake	46.80	5.95	47.19	6.29
Binet IQ at 4½	103.75	10.49	110.45	10.82
Social class	32.20	16.87	26.14	16.17
Hyperactivity	49.05	8.00	26.48	5.45
Age at follow-up	79.85	9.81	78.52	9.33
3-year follow-up (7½)	(N = 15)		(N = 16)	
Age at intake	46.67	5.65	47.56	6.57
Binet IQ at 4½	104.40	11.11	110.91	11.25
Social class	33.07	17.01	27.14	17.14
Hyperactivity	47.87	8.22	27.06	6.08
Age at follow-up	92.07	7.54	92.00	8.12

^aAges are given in months.

hyperactives. All families in the study were lower-middle to middle class in social status on the Hollingshead Scale. More details of sample characteristics can be found in Table I.

Procedure

Data to be considered in this report come from several sources: (1) retrospective infancy data obtained at age 4½, (2) behavioral observations in the research nursery at age 4½, (3) maternal ratings of hyperactivity at age 4½, (4) maternal ratings of behavior problems at age 6½, (5) teacher ratings of behavior problems at age 7½, and (6) behavioral observations in the classroom at age 7½.

Infancy Data. At initial contact, history data were obtained on a standard form. Questions included information on complications of pregnancy and delivery and neonatal behavior. Scores on these variables were categorical. Files were rated blind as to presence or absence of the following: complications of pregnancy (including bleeding, toxemia, and infections), complications of delivery (including prematurity, low birth weight, anoxia, breech birth, and Caesarian section), sleep problems, feeding problems, and irritability. Infants who were difficult to feed, who refused to feed, or who failed to suck normally

were considered to have feeding difficulties. Babies who were reported to require little sleep or to sleep irregularly were considered to have sleep problems. Infants who were reported to cry often and who were difficult to soothe were considered irritable.

Nursery Observations at 4½. The method of obtaining behavioral observations in the nursery school is described more fully in Schleifer et al. (1975). Briefly, three hyperactive children and three controls were grouped together and observed during free play and structured activities over a 9-week period. Teachers and observers were blind to group membership. During free play, number of physically aggressive acts toward peers during a 30-minute period on 3 consecutive days was noted for each subject. This constituted the "aggression" score. Three 30-minute observations were also carried out during structured activities. Behaviors were labeled "up," the number of times the child left his seat without leaving the table, and "away," the number of times the child actually left the table. Interobserver reliability ranged from 98% to 100%.

Maternal Ratings of Hyperactivity at 4½. During the initial interview, the mother and psychiatrist (G. W.) completed the Werry-Weiss-Peters Activity Scale (Werry, 1968), which rates a number of behaviors on a series of 3-point scales for a summary score of hyperactivity.

Maternal Ratings of Behavior Problems at 6½. As part of the 2-year follow-up, mothers completed the Conners Parent Questionnaire (Conners, 1970), a rating scale of child psychopathology which is factor-analytically derived. Four factors were used in these analyses: Conduct Problem, Anxiety, Impulsive-Hyperactive, and Learning Problem. Each behavior is rated on a 4-point scale from "not at all a problem" to "very much a problem." The Learning Problem factor is loaded with items that reflect dislike of school rather than cognitive difficulties.

Teacher Ratings of Behavior Problems at 7½. Teachers completed the Conners Teacher Questionnaire (Conners, 1969) as part of the 3-year follow-up. This scale rates behaviors as described above, with the major focus on school-related behaviors. The factors derived from this questionnaire are: Conduct Problem, Inattentive-Passive, Tension-Anxiety, and Hyperactivity.

Classroom Observations at 7½. Observers who were blind to group membership and had no prior knowledge of the subjects went into the classrooms and coded a number of child and teacher behaviors in 10-second blocks for two 15-minute periods. Children were in grade one and two classrooms and several children were in special classes for the learning disabled. Details of class structure and observational procedures are provided in Campbell et al. (1977). The variables of interest in this report are out-of-seat, off-task behavior and disruptive behavior toward teacher, peer, or the entire class. For the purposes of this analysis, the three disruptive behavior categories were summed to form one disruptiveness score. These behaviors were initially coded separately. Inter-

observer reliability, calculated on 16 subjects as percentage of agreements divided by agreements plus disagreements, ranged from 88.5% to 100%.

RESULTS

Treatment of the Data

Data are reported separately for hyperactive and control groups. Pearson product-moment correlations were calculated among maternal ratings, teacher ratings, and child behaviors in the nursery school and elementary school classroom. Since the retrospective infancy data were categorical, associations between maternal reports of infant behavior and maternal ratings of behavior at 4½ and 6½ were assessed with point biserial correlations (Ferguson, 1959). Because of sample attrition, *N*s vary from one analysis to another. All *p* values reported are for two-tailed tests. Means and standard deviations of all non-categorical measures are summarized in Table II.

Relations Among Maternal Report Measures. Maternal ratings of hyperactivity at age 4½ on the Werry-Weiss-Peters showed low to moderate rela-

Table II. Means and Standard Deviations of Child Behavior Scores and Maternal and Teacher Ratings

	Hyperactive		Control	
	Mean	SD	Mean	SD
4½-year measures	(N = 28)		(N = 26)	
Hyperactivity score	47.50	9.53	26.38	5.13
Up	11.36	6.68	4.50	5.56
Away	5.07	5.48	.23	.71
Aggression	3.14	5.86	.12	.43
6½-year measures	(N = 20)		(N = 21)	
Conners Parent Questionnaire				
Conduct problem	7.15	5.37	2.05	2.24
Anxiety	2.50	2.44	2.22	2.78
Hyperactive	10.85	5.88	2.38	3.17
Learning problem	3.30	2.90	1.24	1.46
7½-year measures	(N = 15)		(N = 16)	
Conners Teacher Questionnaire				
Conduct problem	6.47	7.68	2.13	6.71
Inattentive-passive	6.87	3.89	4.12	4.47
Tension-anxiety	5.07	2.76	4.00	2.96
Hyperactive	9.20	5.93	2.87	3.22
Classroom behavior				
Out-of-seat, off-task	16.73	15.15	12.41	10.88
Disruptive	12.20	10.08	13.56	11.52

tionships with reports of infant behavior, although these two sets of data were collected at the initial intake visit. Reports of sleep difficulties in infancy were correlated significantly with hyperactivity scores at 4½ for both the hyperactive ($r = .36$, $df = 26$, $p < .10$) and control groups ($r = .84$, $df = 24$, $p < .01$). Infant feeding problems were related to control mothers' ratings of activity at 4½ ($r = .33$, $df = 24$, $p < .10$). Infant irritability and obstetric complications did not covary with 4½ year hyperactivity scores (r 's from $-.14$ to $.29$).

Maternal ratings of behavior problems on the Conners Parent Questionnaire at the 2-year follow-up when subjects were 6½, however, showed many significant relationships to both retrospective reports on infant behavior and 4½-year hyperactivity scores. Sleep problems in infancy again emerged as a strong correlate of later problems for both groups, while control children who were perceived as irritable infants were also seen as more difficult 6½-year-olds. Moreover, ratings of activity at 4½ on the Werry-Weiss-Peters were strongly associated with ratings of child psychopathology on the Conners Parent Questionnaire. Thus, of the 58 correlations among maternal report measures, 15 (26%) were significant at $p < .05$ or better and 24 (41%) at $p < .10$ or better. These correlations are presented in Table III.

It was also possible to determine, using cutoff scores on the Conners, how many children would still be diagnosed as hyperactive on the basis of maternal ratings at 6½. Douglas and her colleagues (Douglas, Parry, Marton, & Garson, 1976) have used a mean rating of 1.5 per item (range 0 to 3) on the Conners hyperactivity factor as a cutoff score. Using this criterion, 12 of the 20 hyperactives seen for follow-up or 60% would still be classified as hyperactive according to maternal reports. If the criterion is broadened to include a mean rating of 1.5 on either the Hyperactivity or Conduct Problem factor, that is, ratings reflecting active symptoms, 15 or 75% of the original hyperactives would still be considered problems. Either way, only 1 of the 21 controls (4.8%) would be classified as a problem at 6½ on the basis of maternal ratings.

Maternal Hyperactivity Ratings at 4½ and Child Behavior in School. Maternal ratings of 4½-year activity level were poorly related to up, away, and aggression scores in the preschool for both groups. Thus, children who were most active in the nursery school setting were not necessarily rated most active by their mothers at 4½ and vice versa (r 's from $-.15$ to $.22$). Similarly, out-of-seat, off-task behavior and disruptive behavior in the elementary school were not closely associated with 4½-year activity ratings for hyperactives ($r = .33$ and $-.09$, $df = 13$), or controls ($r = .18$ and $-.23$, $df = 14$). Thus, of the 10 correlations reported in this analysis, none was significant.

Maternal and Teacher Ratings. Very minimal associations between teachers' and mothers' ratings of child problems were evident from the data. Mothers' ratings at 4½ on the Werry-Weiss-Peters and at 6½ on the Conners showed only low to moderate and nonsignificant correlations with teacher ratings of problems at 7½ on Conners' Teacher Rating Scale. (r 's from $-.43$ to $.40$, df 's = 13 and 14).

Table III. Correlations of 6½-Year Maternal Reports on the Conners with Retrospective Infancy Data and Ratings of Activity Obtained in the Preschool at 4½

	Hyperactive ^a (N = 20)			Control ^d (N = 21)		
	Conners Parent Questionnaire			Conners Parent Questionnaire		
	Conduct problem	Anxiety	Learning problem	Conduct problem	Anxiety	Learning problem
Feeding problems	-.49 ^b	.12	-.14	.43 ^b	.24	.26
Sleeping problems	.37 ^c	.47 ^b	.51 ^b	.44 ^b	.60 ^d	.55 ^d
Irritability	-.14	.21	.18	.44 ^b	.42 ^c	.39 ^c
Delivery problems	.41 ^c	.34	.28	-.08	-.23	.26
Pregnancy complications	.26	.24	.05	.30	.03	.44 ^b
Hyperactivity at 4½	.40 ^c	.28	.67 ^d	.50 ^b	.55 ^d	.52 ^b

^aFor hyperactives, $df = 18$; for controls, $df = 19$.

^b $p < .05$.

^c $p < .10$.

^d $p < .01$.

Table IV. Correlations Between Elementary School Teacher Ratings on the Conners at 7½ and Child Behaviors in Nursery and Elementary School

	Hyperactive ^a (N = 15) Conners Teacher Rating Scale			Control ^a (N = 16) Conners Teacher Rating Scale			
	Inatten- tive- passive	Tension anxiety	Hyperactive	Conduct problem	Inatten- tive- passive	Tension- anxiety	Hyperactive
Preschool behaviors (4½)							
Up	.07	.24	.18	.60 ^b	-.12	-.10	.33
Away	-.26	.63 ^b	.07	.63 ^c	-.23	-.08	.28
Aggression	-.19	.23	-.31	.56 ^b	.71 ^c	.00	.42 ^d
Elementary school behaviors (7½)							
Out-of-seat, off-task	.14	.08	.34	-.06	.36	.50 ^b	-.13
Disruptive	.10	.38	.43	.34	.62 ^c	-.07	.36

^aFor hyperactives, *df* = 13; for controls *df* = 14.

^b*p* < .05.

^c*p* < .01.

^d*p* < .10.

Using cutoff scores on the Conners as described above, 9 of the 15 hyperactives seen for follow-up (60%) were rated by teachers as overactive in the classroom while 11 (73%) were rated as hyperactive, conduct problems, and/or inattentive at 7½-year follow-up. Two controls (12.5%) were hyperactive according to teacher ratings, while another 2 control children were rated as discipline or attention problems. Thus, using a broad criterion of active problems 25% of controls were also seen as having some difficulties in school by age 7½. However, only 6 children in the clinical group were rated as hyperactive by mothers at 6½ and teachers at 7½. Thus of the 15 hyperactives seen for both follow-ups, only 40% were rated as hyperactive both at home and at school when they reached school age. Mothers and teachers agreed more readily on the classification of 13 of the 16 controls or 81% as no problem. Nine hyperactive children (60%) and 3 controls (19%) were classified differently by mothers and teachers. Thus, the ϕ coefficient assessing the relationship between teachers' and mothers' classifications as to the presence or absence of hyperactivity reached .35, $p < .05$, indicating only moderate agreement. However, it appears that there is greater agreement when problems are absent than when they are present and these gross classifications appear to show slightly higher agreement than do correlations between scores on specific factors of the Conners scales.

Teacher Ratings at 7½ and Child Behavior in School. On the other hand, elementary schoolteachers' ratings on the Conners showed several clear-cut relationships to child behaviors in both the preschool setting and the elementary school classroom. Although the correlations between preschool behavior and teacher ratings were stronger in the control group, significant correlations were evident for both groups. Similarly, disruptive and out-of-seat behaviors in elementary school showed some relationships to classroom teachers' ratings, with these associations also stronger in the control group. Of the 40 correlations in this matrix, 7 or 18% are significant at $p < .05$ or better. These findings are summarized in Table IV.

Correlations Among Child Behaviors in School. Several strong relations emerged between nursery school and elementary school behavior. Out-of-seat, off-task behavior among hyperactive children was positively associated with up ($r = .72$, $df = 13$, $p < .01$), away ($r = .33$), and aggression scores ($r = .35$) in the preschool, while disruptive behavior and away scores were positively correlated ($r = .43$). Control children who were more aggressive in the research nursery tended to be more disruptive in elementary school ($r = .73$, $df = 14$, $p < .01$).

DISCUSSION

These data provide some evidence of consistency in maternal ratings of behavior problems across time periods for both hyperactive and comparison

groups. Mothers who reported more sleep problems in infancy also rated their youngsters as more hyperactive at 4½ and 6½. As well, infant sleep problems were associated with higher ratings on scales reflecting conduct problems, anxiety, and dislike of school. Furthermore, infant irritability among nonhyperactive children was associated with maternal ratings of anxiety, discipline problems, and hyperactive behavior. Infant feeding difficulties were inconsistently related to maternal ratings, while pregnancy and delivery complications showed some associations with later behavior problems. These relationships are consistent with the report of Thomas, Chess, and Birch (1968) indicating a higher prevalence of active behavior problems among children who were irritable and irregular infants.

Follow-up data on these subjects indicated that mothers continued to rate hyperactive children as significantly more active and difficult to discipline than controls (Campbell et al., 1977). Gross categorization of problems on the basis of cutoff scores likewise indicated that three out of four hyperactives were still showing active symptoms at 6½ according to maternal reports. The correlational analyses also reveal consistencies within groups. Thus, 4½-year ratings of activity level predicted 6½-year ratings of conduct problems and hyperactivity for both clinic and control groups. Furthermore, maternal ratings of anxiety and dislike of school at 6½ were positively associated with ratings of activity level at 4½ in the comparison group. Thus, it appears that maternal perceptions of problems remained reasonably stable.

Despite these continuities in maternal report measures, there were few relationships between hyperactivity ratings at 4½ and actual behavior in the research nursery and the elementary school classroom. Although the maternal ratings at 4½ appeared to accurately classify clinic and nonclinic groups, as evidenced by the clear group differences on both hyperactivity ratings and preschool behaviors, they seem to be insensitive to gradations of problem behavior. The most active and aggressive children in the research nursery were not necessarily rated as most hyperactive by their mothers; nor were those rated most active by their mothers the most troublesome in elementary school. Similarly, teacher and maternal ratings showed little agreement on severity within groups, although there was moderate agreement on a gross categorization of presence or absence of problems. These findings may reflect cross-situational differences in behavior from home to school (Schleifer et al., 1975), differential parental tolerance, or the heterogeneity of the clinical group (Campbell et al., 1977).

Teacher ratings at 7½, however, appeared to show some relations to behaviors observed in the preschool as well as to independently obtained classroom observations in elementary school. Surprisingly, these associations were stronger for comparison than hyperactive subjects. Thus, up, away, and aggression scores in the research nursery were associated with teacher ratings of conduct problems in grade two for nonclinic children, while aggressivity was positively associated with inattentive and hyperactive behavior. Furthermore, hyperactive

subjects who left the table more frequently during structured activities in the preschool were rated by their elementary school teachers as more inattentive. However, within the clinic group, none of the preschool behaviors was significantly correlated with teacher ratings of hyperactivity. Similarly, observations in the elementary school indicated that disruptive behavior was positively associated with teacher ratings of inattentive and hyperactive behavior in both groups, although only one correlation reached statistical significance.

Finally, some continuities in child behavior are in evidence. Up, away, and aggression scores in hyperactive preschoolers were positively associated with out-of-seat, off-task behavior in elementary school, with up scores highly predictive of this behavior later on. Aggressive behavior in preschool was strongly associated with disruptive behavior in elementary school among controls. Thus, it appears that these target behaviors in a preschool setting have some continuity with later maladaptive behavior in elementary school. These data are in line with the findings of Halverson and Waldrop (1976), which indicate consistency in activity level from 2½ to 7½ in nonclinic children.

Given the rather large attrition rate in these samples and the problem of interpreting correlational data when samples are small, these findings must be considered suggestive of continuity in maternal report measures and child behaviors. However, it appears that these two sources of data form somewhat separate clusters. Mothers seem to be reasonably consistent in their perceptions and accurate in their classification of problem behavior. However, within samples of hyperactive and nonhyperactive children, maternal ratings of hyperactivity, and of pathology in general, do not necessarily correspond to teacher ratings or degree of disturbance as inferred from behavioral observations in school. On the other hand, teacher ratings appear to be more reflective of overt behavior, while consistencies in child behavior are also in evidence. These findings suggest that data from several sources should be included when evaluating both degree of pathology and changes in behavior over time.

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