

Fifteen-Year Follow-up of a Behavioral History of Attention Deficit Disorder

David C. Howell, PhD, Hans R. Huessy, MD, and Bruce Hassuk

From the Departments of Psychology and Psychiatry, University of Vermont, Burlington

ABSTRACT. A 15-year longitudinal study of 369 children originally classified in second grade as exhibiting or not exhibiting behaviors commonly associated with attention deficit disorder was made. Diagnostic data were collected on these children in second, fourth, and fifth grades and subsequent school performance was evaluated after ninth and twelfth grades. Interviews were conducted 3 years after their graduation from high school. The ninth and twelfth grade records reveal that those who had previously been identified as showing behavior related to attention deficit disorder later performed significantly more poorly in school and had poorer social adjustment. Interviews in early adulthood continued to reveal differences in outcome between normal subjects and those earlier classified as having attention deficit disorder. Many of these differences could not be directly attributed to poor academic performance. A subgroup of students who were rated favorably by their elementary school teachers were found to perform better during high school than other members of the normal group in academic areas, but they generally did not differ from normal subjects in nonacademic areas. *Pediatrics* 1985;76:185-190; *attention deficit disorder, hyperkinesis, minimal brain dysfunction, behavioral disorders.*

During the last 10 to 15 years, considerable attention has been paid to the syndrome now known as attention deficit disorder,¹ but previously referred to as hyperkinesis or minimal brain dysfunction. A number of studies have attempted to examine the long-term prognosis of this disorder.²⁻⁸ However, most follow-up reports in the literature are retrospective studies conducted on children seen in psychiatric clinics, and most lack suitable controls. The present work was undertaken to complement these studies and to delineate more clearly

the natural course of the attention deficit disorder syndrome.

The present study differs from most follow-up studies of attention deficit disorder in at least two important ways. First, it is one of the few studies to begin with a total sample of all children of a given age in a number of schools. Most other studies have begun by drawing samples from the records of various mental health agencies, and thus have dealt only with a population already known to be experiencing a number of difficulties. By drawing on all second grade children in a sample of towns in a well-defined region of the state, this study is capable of comparing children who do and do not exhibit attention deficit disorder-like behavior. A second unique characteristic of this study is that it deals with a predominantly rural and small-town population, whereas previous studies have mainly focused on urban populations.

METHOD

This study is directed at examining in a longitudinal fashion the long-term outcome of a history of attention deficit disorder-related behavior. Data have been collected at six stages during this period. The basic diagnostic instrument was a 21-item questionnaire designed by Huessy and Cohen³ to detect children with a history of attention deficit disorder-related behavior patterns. The items were carefully chosen to tap the behavioral components commonly associated with attention deficit disorder. They cover activity level, attention span, learning problems, and related difficulties. Children are rated from 1 to 5 on each item, 3 represents the average level of the behavior, and the total across the 21 items is taken as the child's score. This score formed the basis for classification for the present study. (For the specific items and a more complete discussion of this scale, the reader is referred to Preis and Huessy.⁹)

The Huessy scale closely resembles one devised

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Reprint requests to (D.C.H.) Department of Psychology, University of Vermont, Burlington, VT 05405.
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by Conners,¹⁰ and the correlation between the two scales is 0.77.³ The Huessy scale, however, is more sensitive to learning problems associated with attention deficit disorder than is the Conners scale, which focuses almost exclusively on behavior problems.

In the first stage of data collection, teachers of children in the second grade completed the Huessy scale on every student in their classes. The children came from 18 rural and small-town schools within 40 miles of Burlington, Vermont. These schools represented a reasonable cross section of nonurban schools in northwestern Vermont at that time. The original sample included 501 children. The same scale was again completed on the same children in fourth grade, and again when they were in fifth grade. Thus each child in the study received three scores at the elementary-school level.

Because of normal attrition, the sample size was reduced to 430 children by the end of fourth grade and to 352 children by the end of fifth grade. The second-grade scores of those subjects who were subsequently lost did not differ significantly, however, from the second-grade scores of the subjects who were retained. The same holds true for the fourth grade scores of subjects who were, and were not, lost after the fourth grade.

Children who scored at or above the 80th percentile on the Huessy scale in a given year were classified as members of the attention deficit disorder group for that year. Although this is admittedly a somewhat arbitrary system of classification, subsequent analyses of the data will demonstrate that it does lead to a meaningful classification of children.

It is important to stress that we are not dealing here with a group of children with a clinical diagnosis of attention deficit disorder. We are simply categorizing those who had a high score on the Huessy scale as children who exhibited attention deficit disorder-related behaviors. The question is whether this classification is predictive of subsequent behavior.

After the children had completed ninth grade, and again upon graduation, their high school records were examined to determine whether there were differences between those who had earlier been classified as exhibiting attention deficit disorder-related behaviors and those who had not.

Finally, after the students had been out of high school for approximately 3 years, extensive interviews were conducted with 86% of the 430 subjects for whom at least second- and fourth-grade data were available. The interviews were structured around a 174-item protocol dealing with educational background, employment history, marital

status, self-perception, medical history, family background, military service, interactions with police and other authorities, drug use, and satisfaction with life. The questions were read to the subject by the interviewer and elaborated when necessary. The entire interview took about 1½ hours. Except in cases in which distance made personal interviews impractical, all interviewing was conducted face to face. In some cases, it was necessary to conduct the interviews by phone; in rare instances, the subjects were overseas and the interview protocol was mailed to them. It was decided that the disadvantages of nonpersonal interviews in these cases were outweighed by the advantage of having data from as many subjects as possible. Fourteen percent of the students were not interviewed; they had all been located but chose not to participate. From what information we do have, this group did not appear to differ in any systematic way from those who were interviewed.

RESULTS

The analysis of the data from the current study falls neatly into three sections: the first deals with the reliability and validity of the Huessy scale, the second deals with the information obtained from school records, and the third deals with the interview data.

Reliability and Validity

The reliability of the Huessy scale can be approached with respect to internal consistency and test-retest reliability. One of the most important estimates of reliability is Cronbach's α , which is concerned primarily with the internal consistency of the scale. Computing alpha for the second, fourth, and fifth grade data separately, the resulting values are .94, .93, and .96, respectively. Such high levels of reliability justify further examination and use of the scale.

The reliability of the scale was also examined from the point of view of test-retest reliability. Although it was not feasible to have the same teacher complete the same scale on the same children on two separate occasions, it is possible to examine test-retest reliability indirectly by looking at the intercorrelations of the second, fourth, and fifth-grade scores. Because different teachers completed the scale in different years, and because the behavior of some of the children would be expected to change over time, such correlations should certainly be lower than standard test-retest reliabilities. However, these correlations do provide a lower bound on the reliability of the scale. The correlations between second and fourth grade, second and

fifth grade, and fourth and fifth grade scores are .67, .63, and .69, respectively. Under the circumstances, and taken in conjunction with the values of Cronbach's α reported above, these results indicate that the scale has satisfactory reliability.

Although it was not possible, nor even desirable, to assess the validity of the scale by asking all of the children to submit to a clinical evaluation, some data are available which bear on the scale's validity. After the scale was originally filled out for all of the children, the teachers were asked to identify "problem" children in their classes. (The definition of a "problem child" was left to the individual teacher.) It was found that all of the children so identified did indeed have scores above the 80th percentile on the Huessy scale and thus had been correctly detected by the scale. (The scale was not scored by the teachers, nor did they have access to the scores.) This result is in line with those reported by Roberts et al¹¹ who demonstrated that teachers can make valid distinctions in rating students and do not simply respond on the basis of global impressions. An alternative way to evaluate the validity of the scale is to ask if it is predictive of future behavior. That question is addressed in the next two sections.

School Records

For subsequent analyses, children were classified into two major groups on the basis of their scores in elementary school. One group, referred to here as the normal group, was those children who never received a high score (above the 80th percentile) on the Huessy scale or who received a high score on only one occasion. The second group, referred to as the attention deficit disorder group, consisted of those children who scored above the 80th percentile in at least 2 of the 3 years that it was administered. For the data taken from high school records, this classification system assigns 269 students to the normal group and 49 students to the attention deficit disorder group. Such a prevalence rate (15%) is not drastically out of line with other estimates of prevalence. (Lambert et al¹² set their maximum prevalence rate at 13%.) In addition to the normal and attention deficit disorder groups, a subset of the normal group was identified consisting of those subjects who scored in the lowest 20% of the distribution on the Huessy scale at least twice. This group is referred to as the "low" group, and for the analysis of school records it contained 55 students.

The results of the analysis of the data from the ninth and 12th grade school records are presented in the top half of the Table. (The ninth grade data for a smaller sample of these same subjects have been published previously.³ The results for the more complete sample given here are in general agree-

ment with the earlier data.)

As shown in the Table, children in the attention deficit disorder group show an overrepresentation of boys, a lower mean IQ, and a greater tendency to repeat a grade than do those in the normal group. Moreover, in both ninth and twelfth grades, those in the attention deficit disorder group were more likely to enroll in remedial English and less likely to enroll in advanced English. Although not shown in the Table, this difference in course placement was evident in other academic subjects as well. The differences in grade point averages for the two groups are particularly striking: roughly three quarters of a letter grade.

Students were categorized as exhibiting poor social adjustment if their school records contained at least two notations of infractions such as disruptive classroom behavior, truancy, or setting fires in trash cans. As shown in the Table, the attention deficit disorder group displayed substantially more social adjustment problems than did the normal group. This difference is observed in both ninth and twelfth grade records. In both cases, the percentage of students in the attention deficit disorder group who exhibited problems in social adjustment is two to three times higher than it is for the normal group.

Finally, the comparison between the low group and normal group reveals differences on all variables related to school performance other than enrollment in remedial classes. (Because the low group was a subset of the normal group, all statistical comparisons were carried out using the students in the low group versus the remainder in the normal group.) In each case, students who were rated at the low (good) end of the scale performed consistently better in school than those who were rated near the center or upper end of the scale.

Interview Data

The data obtained from personal interviews after the students had been out of school for approximately 3 years are presented in the lower half of the Table. These results offer some interesting insights into the outcome of students who had previously exhibited attention deficit disorder-like behaviors. As we were successful at locating all people for whom at least second and fourth grade data were available, our interview data are based on interviews with 51 more respondents than were involved in the analysis of data from school records. Of the 369 people interviewed, 50 were from the attention deficit disorder group and 319 were from the normal group.

As is shown in the Table, respondents in the attention deficit disorder group were significantly

TABLE. Academic and Behavioral Performance of Groups Classified by the Huessy Scale

	Groups		
	Attention Deficit Disorder (ADD)	Normal	Low
General data			
No. for school records	49	269	55
Males (%)	76*	49	36*
Mean IQ	91.1*	104.9	113.9*
Repeated 1 or more grades (%)	31*	6	0*
9th grade performance			
Remedial English (%)	33*	11	10
Advanced English (%)	0*	13	36*
Grade point average	1.76*	2.50	3.16*
Poor social adjustment	27*	12	0*
12th grade performance			
Remedial English (%)	16*	5	0
Advanced English (%)	0*	15	29*
Grade point average	1.84*	2.50	3.14*
Poor social adjustment (%)	43*	12	0*
Selected interview data			
No. for interviews	50	319	86
Parents sought help for behavior/learning problems (%)	30*	8	15*
Completed high school (%)	59*	87	100*
Education beyond high school (%)	18*	40	67*
College preparatory curriculum (%)	4*	35	74*
Reading problems in school (%)	55*	22	2*
Suspended from school (%)	49*	24	8*
Employed as laborer (if employed) (%)	62*	36	15*
Has had 4 or more full-time jobs (%)	50*	24	13†
Considers self "accident prone" (%)	22†	12	6
Has been injured in fight (%)	35*	15	10
Rejected for military enlistment (%)	18†	8	0
Recent trouble with police (%)	37*	15	10
Ever arrested (%)	31*	10	7
Smokes marijuana at least once per day (%)	29*	10	3†

* $P < .01$.† $P < .05$.

more likely than those in the normal group to report that their parents had previously sought help for them for behavior and/or learning problems. However, a check at the end of ninth grade with all local pediatricians and child psychiatrists revealed that only one child had been seen by them for behavior problems, and in that case medication was not provided. It is reasonable to assume, therefore, that few, if any, of these children were treated with medication.

As shown in the Table, the members of the attention deficit disorder group were significantly more likely to have dropped out of school before graduation and significantly less likely to have had additional education or training beyond high school. This last finding is not surprising in light of the fact that these students were less likely to have been enrolled in college preparatory courses in school, or even to have completed high school. Once they left school, the members of this group were also more likely to have been rejected for

military service if they attempted to enlist. At the time of the interview, the subjects in the attention deficit disorder group were more likely to have had several different full-time jobs in the past, indicating a higher level of instability of employment. Moreover, among those who were employed, the subjects in the attention deficit disorder group were disproportionately represented in the lowest job classification.

In terms of behavior problems, the subjects in the attention deficit disorder group had a significantly higher incidence of having been suspended from school, having had trouble with the police since leaving school, and having been arrested. They were also more likely to have been injured in a fight, to consider themselves as being accident prone, and to use marijuana at least once a day. Clearly, the attention deficit disorder group is different from the normal group in terms of adjusting to adult life.

In the analysis of the interview data, we again

identified a subgroup of people who had scored at or below the 20th percentile on at least two occasions. The data for this group are shown in the right-hand column of the Table. Like the data taken from school records, the interview data show that members of the low group performed significantly better than the other people in the normal group on those variables that are directly or indirectly related to school performance. However, the two groups do not differ on many of the other variables shown.

DISCUSSION

The most important finding of this study is that children who were identified as exhibiting attention deficit disorder-related behavior in elementary school were definitely at risk for later behavioral and/or educational problems in high school and early adulthood. It is evident that problems that led to these people being identified as at risk do not simply disappear as they grow older. It is also apparent that while some of the difficulty that these people encounter after leaving school can be attributed to their poor school performance, many of these differences cannot be explained away so simply. And even those differences that can be explained on the basis of school performance are, nonetheless, real differences that affect later social adjustment.

It might be suggested that many of the differences between the attention deficit disorder group and normal group might be attributed to the fact that the attention deficit disorder group contains a high percentage of boys. However, when we reran the analyses using only the data for boys, the group differences remained. It is more difficult to show that group differences remain when we look only at girls. For example, because girls, in general, were rarely injured in a fight and seldom attempted to enlist in the military, and because there are relatively few girls in the attention deficit disorder group, it is not surprising that many of the group differences on nonacademic variables fall short of statistical significance for girls. However, with few exceptions, the direction of the differences between the attention deficit disorder group and the normal group are in the same direction for girls as they are for boys. We are continuing to examine this issue.

It might also be suggested that the Huessy scale is simply identifying students with learning problems and then showing that children who start out doing poorly in elementary school continue to do poorly in high school. One counter to this argument is the fact that if children are classified solely on the basis of the nonacademic items on the Huessy

scale, the observed differences remain. Similarly, we continue to find group differences after controlling for IQ.

One other interesting feature of the data concerns the results for those subjects who had unusually low scores on the Huessy scale. As was shown in the Table, those in the low group did differ from the rest of the normal group on the academic items, but the groups generally did not differ on the non-academically related items. This would suggest that the scale is bipolar with respect to academic area but not with respect to nonacademic areas. The lack of a relationship, in the low group, between academic achievement and social adjustment lends further weight to the previous conclusion that poor social adaptation in early adulthood is not to be explained solely in terms of previous academic achievement.

Although the present results might suggest that the long-term prognosis for those exhibiting attention deficit disorder-related behavior is not good, it is important to keep in mind that there is a large number of people even within the attention deficit disorder group who have normal adult outcomes. In particular, those subjects who were identified as at risk on only one occasion do not differ significantly from those never identified as at risk in terms of adult outcomes (which is why the two groups were pooled in the Table). These two groups do differ in academic performance and, as a result, subsequent employment status, but they are, in general, quite comparable on the other variables. Future work will be concerned with identifying those variables that are important predictors of why some "at risk" children appear to outgrow their problems when they leave the school environment and why others do not.

IMPLICATIONS

The data presented above demonstrate that those children with a childhood history of attention deficit disorder-related behaviors often show poor outcomes as young adults. These results are in agreement with those of Satterfield et al¹³ who found that children determined to have attention deficit disorder later had significantly higher rates of single and multiple juvenile offenses and of institutionalization for delinquency. Such a negative prognosis is also in line with some of our own data and those of Tarter et al¹⁴ who found that a high percentage of adult male alcoholics had a positive history of attention deficit disorder-like behavior as children, and with the findings of Huessy et al⁴ and others that many children with attention deficit disorder later qualify for the adult diagnosis of

attention deficit disorder—residual type. Aside from negative social outcomes, the educational handicap that these children suffer is likely to produce an ever-widening gap between their economic status and that of their peers.

Because of the strong evidence for a negative adult prognosis for attention deficit disorder, early identification and successful intervention is socially and economically important. The poor self-image that these individuals develop becomes extremely difficult to alter with increasing years. In some cases, medication produces symptom control, and further study will hopefully provide us with successful social and psychological intervention.

SUMMARY

The data from this study reveal that it is possible to identify children in elementary school who exhibit behavior commonly associated with attention deficit disorder. These children perform more poorly than normal children in ninth and 12th grades in the areas of both academic achievement and social adjustment. This poorer performance does not disappear when these students leave school, but continues into early adulthood. Some of these later problems can be explained on the basis of a lower level of prior academic achievement, but other problems are not explained away so simply. Regardless of the degree to which problems in adulthood derive from problems in high school, they are nonetheless serious problems.

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