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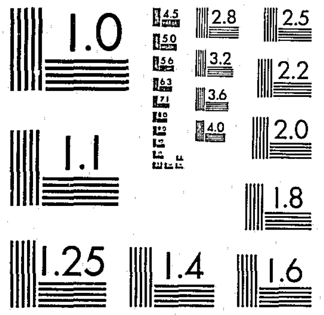

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A Prospective Study of Delinquency in 110 Adolescent Boys with Attention Deficit Disorder and 88 Normal Adolescent Boys

BY JAMES H. SATTERFIELD, M.D., CHRISTIANE M. HOPPE, PH.D., AND ANNE M. SCHELL, PH.D.

The authors studied official arrests from childhood through adolescence in two groups of boys; one group (N=110) was diagnosed in childhood as suffering from attention deficit disorder (ADD), and the second group (N=88) consisted of normal control adolescents. Rates of single and multiple serious offenses and of institutionalization for delinquency were significantly higher in the ADD subjects. These findings suggest a strong relationship between childhood ADD and later arrests for delinquent behavior.

Many follow-up studies of children with attention deficit disorder (ADD) have found a substantial subgroup (25%) to be seriously delinquent (1–3). Unfortunately, all of these studies are flawed by one or more of the following weaknesses: inadequate or missing control groups; lack of information as to the nature, frequency, and type of offenses committed; absence of official arrest data; and substantial numbers of subjects lost to follow-up. The present study is unique in several respects: 1) follow-up data were obtained for a non-ADD normal comparison group that was selected at the same time as the ADD group, 2) official arrest data that included the frequency and type of offense committed were obtained for both the ADD and comparison groups, and 3) arrest information was obtained on 100% of the subjects in both groups.

METHOD

The present study is part of an extensive follow-up of 150 ADD and 88 normal control subjects, full details of which will be reported elsewhere (unpublished data). Informed consent was obtained from all subjects and from their parents after the procedures were fully explained to them. All children in the clinical group were originally referred between 1970 and 1972 for learning and/or behavioral problems to an outpatient clinic for hyperactive children. Most referrals came from schools, parents, and pediatricians. No child was referred by the courts. To be selected for the clinical group a child had to be male, between the ages of 6 and 12 years, attending school, tested as having normal vision and hearing, at or above 80 in IQ according to the Wechsler Intelligence Scale for Children (WISC full scale), and diagnosed by a child psychiatrist using behavioral criteria that required evidence of a long-term (6 months or longer) symptom pattern of hyperactivity, inattention, and impulsivity as reported by parents and/or teachers. Normal control children were paid subjects selected from public school classes and were matched to the clinical group for age, sex, race, and, as closely as possible, for WISC full scale IQ.

The Satterfield Teacher Rating Scale and the Satterfield Parent Rating Scale were administered to most subjects. The rating scale for teachers consisted of 36 items concerning classroom behavior arranged in a checklist form so that the teacher could indicate the degree to which each item of behavior was exhibited (0=not at all, 1=just a little, 2=pretty much, 3=very much). These scales have been demonstrated to have high test-retest reliability and to validly differentiate placebo from methylphenidate treatment groups (4). The Satterfield Parent Scale consists of 45 behavioral items rated on a 3-point scale in a manner similar to that of the Teacher Rating Scale. When subjects were selected for this study the diagnostic category of attention deficit disorder was not in use. Nevertheless, the clinical children in this study were selected by criteria that are similar to *DSM-III* criteria for attention deficit disorder with hyperactivity. Since the two groups were selected according to behavioral criteria, it is not surprising that their scores differed significantly on nearly all 36 items of the Teacher Rating Scale when t tests were done (see table 1). Before follow-up most ADD children had received stimulant drug treatment (methylphenidate) and brief counseling. The mean treatment period (±SD) was 25.1±24.1 months.

This study focuses on the relationship between childhood ADD and teenage *offender* rates (number of subjects arrested) rather than offense rates (number of

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arrests), which will be reported elsewhere. Offender rates were obtained from the subject's official arrest records covering childhood through 17 years as recorded in the Los Angeles County Probation Department's automated juvenile index. This index includes all officially reported arrests of children and juveniles living in Los Angeles County. We therefore included in this study only subjects who had been living in the county for the 8-year interval covered by our follow-up study. This selection resulted in 110 ADD and 75 control subjects. In order to improve the socioeconomic class balance between groups we added to the control group at follow-up all non-ADD brothers of ADD subjects who were aged 14–20 years and were from lower socioeconomic class families living in Los Angeles County. This provided us with an additional 13 subjects for a total of 110 ADD and 88 control subjects. The majority of the subjects (83% of the ADD group and 97% of the controls) were white. Official arrest information was obtained on all 198 subjects.

At follow-up we classified offenses into two types—serious and nonserious. Nonserious offenses included running away from home, alcohol intoxication, possession of less than an ounce of marijuana, vandalism, and petty theft. Serious crimes included robbery, burglary, grand theft, grand theft automobile, and assault with a deadly weapon. Only the arrest data for serious offenses are reported here. The socioeconomic status of all families was based on the 6-point Duncan Scale (5). Due to the small cell size, this scale was collapsed into a 3-point scale by combining adjoining classes. A number of comparisons on outcome data between the ADD and control subjects and between subgroups of ADD subjects were performed using the chi-square test or Fisher's exact probability test (two-tailed) as appropriate.

RESULTS

The mean ages at follow-up were 17.3 years (range, 14–21) for the ADD group and 16.9 (range, 13–20) for the controls. Since the two groups were not well matched for socioeconomic class, subjects were first stratified on this factor. Separate analyses in each socioeconomic class revealed no difference in offender rates between black and white ADD subjects. Therefore these groups were combined for purposes of analysis. The percentage of ADD subjects arrested at least once for a serious offense in the lower, middle, and upper socioeconomic classes was 58%, 36%, and 52%, compared with 11%, 9%, and 2% for the controls ($\chi^2=7.87$, df=1, $p<.01$; $\chi^2=4.48$, $p<.05$; and $\chi^2=20.2$, $p<.001$, respectively). These differences were not due to age, since the groups compared were not significantly different in age. Lower arrest rates were found for upper socioeconomic class control subjects and for middle socioeconomic ADD subjects, but these trends were not significant. We also examined the number of subjects with multiple arrests for serious offenses. The percentage of ADD subjects in the lower, middle, and upper socioeconomic classes who had a record of multiple arrests for a serious offense was 45%, 25%, and 28%, compared with 6%, 0%, and 0% for the controls ($\chi^2=6.94$, df=1, $p<.01$; $\chi^2=12.9$, $p<.001$; and $\chi^2=11.6$, $p<.001$, respectively). Offender rates did not vary significantly as a function of socioeconomic status in either group.

TABLE 1. Scores of 102 Adolescent Boys with Attention Deficit Disorder (ADD) and 69 Normal Adolescent Boys on the Satterfield Teacher Rating Scale[a]

	Group Score				
	ADD		Controls		
Scale Item	Mean	SD	Mean	SD	t[b]
Fidgets	2.6	0.7	0.6	0.6	18.9
Easily distracted	2.5	0.7	0.8	0.8	14.4
Restless	2.5	0.7	0.7	0.7	16.5
Talks a lot	2.4	0.8	0.8	0.8	12.9
Bothers children	2.3	0.7	0.5	0.6	17.0
Can't concentrate	2.3	0.8	0.4	0.7	15.5
Demands much attention	2.3	0.9	0.3	0.6	17.1
Disrupts the class	2.3	0.8	0.4	0.6	16.6
Doesn't finish assignments	2.2	0.9	0.5	0.8	12.6
Leaves projects unfinished	2.2	1.0	0.4	0.6	14.3
Says things without thinking	2.2	0.9	0.4	0.5	16.8
Clowns around	2.1	0.9	0.5	0.7	13.1
Doesn't follow directions	2.1	0.9	0.5	0.7	13.6
Hard to discipline	2.0	1.0	0.1	0.4	16.8
Acts silly	1.9	1.1	0.4	0.6	11.2
Does everything in a hurry	1.9	1.1	0.6	0.7	9.5
Fights	1.9	1.1	0.2	0.5	13.0
Doesn't do homework	1.8	1.1	0.3	0.6	10.2
Easily frustrated	1.8	1.1	0.4	0.7	10.6
Doesn't take responsibility	1.7	1.0	0.3	0.5	11.5
Easily upset	1.7	1.0	0.4	0.7	10.2
Unpopular with peers	1.7	1.1	0.1	0.4	13.5
Irritable, quick tempered	1.6	1.1	0.2	0.5	10.6
Uncooperative and resistant	1.6	1.0	0.1	0.3	13.3
Lacks leadership	1.5	1.1	0.5	0.8	6.8
Daydreams	1.4	1.0	0.6	0.8	5.2
Not interested in school	1.4	1.1	0.2	0.6	8.5
Falls apart under stress	1.3	1.0	0.3	0.5	8.3
Feels disliked	1.3	1.1	0.1	0.4	13.5
Lies to get out of trouble	1.2	1.1	0.1	0.2	10.4
Feels like a failure in school	1.0	1.1	0.1	0.4	7.3
Rude or sassy	1.0	1.0	0.1	0.3	8.5
Steals	0.8	1.0	0.1	0.2	7.1
Fearful	0.7	0.8	0.5	0.6	2.3
Overly serious or sad	0.6	0.9	0.4	0.7	2.1
Shy	0.5	0.9	0.7	0.9	0.7

[a] 0=Not at all, 1=just a little, 2=pretty much, 3=very much.

[b] The ADD group scored significantly higher on all scale items except "shy" ($p<.05$ on "fearful" and "overly serious or sad," $p<.001$ on all other items).

TABLE 2. Institutional Patterns for 110 Adolescent Boys with ADD and 88 Control Adolescent Boys

	ADD Group		Controls	
Institution	N	%	N	%
Juvenile hall	22	20	1	1
Probation camp	12	11	0	
Residential group home	9	8	0	
Prison or jail	2	2	0	
Psychiatric hospital	8	7	0	
Total	27[a]	25	1	1

[a] Other numbers total more than 27 because some subjects had been in more than 1 institution. Six subjects had been in 1 type of institution, 17 subjects in 2 types, 3 subjects in 3, and 1 subject in 4.

Finally, we examined the rate of institutionalization for delinquent behavior and found that 27 subjects in the ADD group (25%) had been institutionalized, compared with 1 subject in the control group (1%) ($\chi^2=22.1$, df=1, $p<.001$). ADD youths were placed in five types of institutions (table 2); three of these (juvenile hall, state and county probation camps, and prison or jail) were locked facilities. Institutionalization patterns varied from youths who had been placed in only one type of institution to youths who had been placed in several different institutions. There was a nonsignificant trend toward lower institutionalization rates in the higher socioeconomic status groups. In order to avoid confounding the effects of socioeconomic status and institutionalization rates we selected a subgroup of 63 ADD and 63 control subjects matched for socioeconomic status and age. The person doing the matching was blind to the subjects' arrest records. We then compared institutionalization rates between groups in these matched subgroups and found that 19% of the ADD group but none of the normal group had been institutionalized ($\chi^2=13.2$, df=1, $p<.001$). Length of psychopharmacotherapy was not related to outcome.

DISCUSSION

Only one ADD child (1%) had been arrested (for a minor offense only) before being given the diagnosis of ADD. This child had a clear history of a symptom pattern consistent with the diagnosis of ADD at least three years before his arrest. Therefore in this clinical group ADD preceded (in most cases by many years) the serious delinquent behavior we have described. Differences between the offender rates in the ADD and control groups were striking. Among the ADD group the rates for any serious offenses in the lower, middle, and upper socioeconomic classes were 5, 4, and 26 times higher than for controls; the rates for multiple serious offenses were 7, 25, and 28 times higher. The institutionalization rate for ADD subjects was more than 19 times higher than that for controls. These findings suggest a strong relationship (particularly evident in the data for subjects in the upper socioeconomic class) among childhood ADD, juvenile delinquency, and institutionalization. On the basis of current knowledge it is difficult to know to what extent the relationship is causal. Our results do indicate that the presence of childhood ADD identifies one group of children who are at increased risk for serious teenage delinquency. Since ADD precedes delinquency, its presence should alert professionals to the increased risk and lead to attempts at delinquency prevention.

Our results are difficult to compare with previous studies due to differences in methodology noted previously. The serious delinquency rate in our ADD group of 36% to 58% is higher than the rates reported in several other studies. It is unlikely that this difference is due solely to differences in socioeconomic class of the samples, since we did not find significant differences in offender rates in the three socioeconomic classes of our ADD group. Further, there was a normal socioeconomic class distribution of ADD subjects, with 24% in the lower, 52% in the middle, and 24% in the upper classes. This group of ADD children had Teacher Rating Scale factor scores of classroom behavior that were similar to scores found in one of our other studies and in studies by other investigators (6). This suggests that our ADD subjects (as children) were probably similar to ADD children studied by others. A more likely explanation for the unusually high rate of delinquency found here is that we obtained official arrest information on 100% of both groups selected for study. Robins (7) and others have commented on the fact that the subjects hardest to find at follow-up are those with a disproportionately high rate of deviant behavior. The present study is part of a larger study that includes interviews with all follow-up subjects. A fairly sizable subgroup of ADD subjects did not return for interviews. The offender rate for serious offenses was twice as high among the nonreturning as it was among the returning ADD subjects. Thus, follow-up studies of ADD children in which substantial numbers of subjects are lost to follow-up may find artificially low rates of delinquency. An additional factor that may have contributed to the higher delinquency rates we found is that we used official rather than nonofficial arrest reports.

The poor outcome for drug-treated ADD children found in our study is consistent with other follow-up studies of drug-treated children that have found an absence of long-term beneficial effect (8, 9). Stimulant medication probably is an important factor in a multimodality treatment approach (6). However, the long-term benefits of stimulant medication *alone* have not yet been demonstrated. An important question for physicians to consider is whether stimulant medication alone results in more harm than benefit to the child and his family, since it may convince the parents that the child is receiving adequate treatment and divert attention from the need for treatment aimed at other associated disabilities such as poor peer relationships, poor self-image, antisocial behavior, and learning disabilities (6).

The strong relationship between juvenile delinquency and adult arrest (7, 10) suggests that a sizable number of our ADD delinquents will become adult offenders. These findings have implication for prevention of juvenile delinquency and adult criminality. It is well known that delinquent and criminal behavior usually originates in early childhood and that antisocial behavior, once firmly established, is notoriously resistant to treatment (reference 11 and unpublished data from S.H. Shamsie, 1980). A recently developed multimodality treatment program for ADD children may offer new hope for aborting antisocial behavior and preventing later delinquency and criminality. One component of this program involved specific treatment of antisocial behaviors and underlying psychopathology. ADD children in this program were found to have less antisocial behavior, enhanced academic performance, and better social adjustment when evaluated after 1, 2, and 3 years of multimodality treatment (6, 12). From the viewpoint of cost effectiveness, it is far less expensive to fund such treatment programs for ADD children than to attempt to deal with the problems of delinquency and criminality within the criminal justice system. For example, the cost of 1 year of the multimodality treatment program for a child with ADD is approximately $2,000 (12), which is 10% of the cost of 1 year's incarceration in juvenile hall. Social and fiscal loss to society for those who become adult offenders cannot be accurately estimated. We hope that this study will contribute to a greater focus of scientific and social attention on children who are at high risk for the development of delinquency and to a greater emphasis on early intervention and treatment.

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